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Technology and Registered Nurses' Work in Acute Care:

A Healing Inquiry

by

Patricia Beryl Marck   ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial
fulfillment of the requirements for the degree of Doctor of Philosophy

Faculty of Nursing

Edmonton, Alberta

Fall, 2000

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Date submitted to the Faculty of

ABSTRACT

This research explores the nature of work, work relations, and work environments for ten (10) registered nurses in seven (7) Alberta acute care hospitals. Participants practised in one or more clinical areas including orthopaedics, cardiac or general systems intensive care, neurosciences, operating room, recovery room, diagnostic care, burns, general or cardiovascular surgery, trauma, and labour and delivery. In the study, *technology* was defined both as the machines, treatments, and products of the health care industry and as characteristic patterns of thinking, relations, and comportment that surface in our daily work. Technology theory and knowledge of ecological restoration were successively used to analyse the nurses' accounts.

In the nurses' accounts of their work, practice settings with a preoccupation for short-term "efficiencies" were also ones where an overall environmental degradation was described. Narrow targets of quicker discharges, more procedures, and "just in time" staffing were frequently pursued despite significant adverse consequences for patients' and practitioners' overall health and well being. Recurring instances were cited where adequate patient monitoring, clinical decisions, scheduling of staff, maintenance of sufficient equipment and supplies, error management, and/or communications and coordination between areas were neglected in order to get more immediate although often unproductive tasks "done". In contrast, participants described a smaller number of practice settings as more supportive of good nursing care. These settings exhibited attributes such as valuing the retention of experienced

nursing expertise, consistent presence of unit level clinical leadership, respectful and democratic work relations, consultative redesigns, and error management that was transparent and improvement oriented.

The association between deteriorated or denatured nursing care and degraded work environments parallels several concerns in the field of ecological restoration, where similar technological tendencies threaten efforts to recover and sustain the ecological integrity and health of damaged lands. Knowledge from the nurses' accounts, technology theory, relational ethics, and ecological restoration is synthesised to develop recommendations in the inter-related areas of *relations*, *resistance*, and *response*. Principles of ecological and ethical integrity are used to identify structures, processes, and relations that support good nursing care and the critical questioning of automatic technological practices. The aim of suggested reforms is to foster individual and system-wide capacities for adaptive, self-organising, and self-correcting practices that heal in a complex, biotechnological world. The use of root cause analysis with sentinel events, early warning systems for emerging health technologies, and interdisciplinary projects in research, education, and practice are examined as potential exemplars of healing practices that incorporate principles of ecological and ethical integrity, and areas of further research are proposed. Additional reforms are outlined under the interconnected categories of knowledge development, critique and synthesis of new knowledge, dissemination and practice of what we learn, feedback on knowledge applications, and democratic systems design in health care.

A WILDERNESS OF MIRRORS I

I am nature's child,

   nature is in me

tremulating; it moves

in my limbs, clouds, bones,

skin, pores, lungs and blood.

All these tiny matters of the earth are in

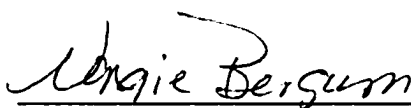   you   and   in me.

Maureen Lunn, 1999[1] (p. 8)

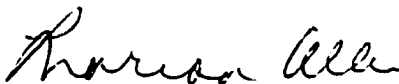[1] Maureen Lunn, "A Wilderness of Mirrors, I," (Vancouver, BC, 1999), p. 8.

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Technology and Registered Nurses' Work in Acute Care: A Healing Inquiry* submitted by Patricia Beryl Marck in partial fulfillment of the requirements for the degree of Doctor of Philosophy.
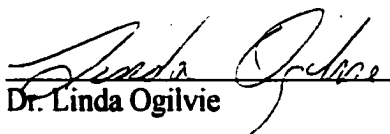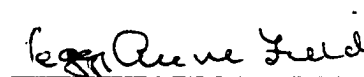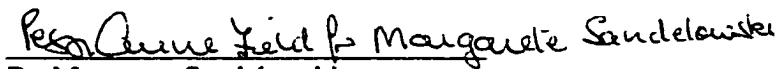
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Dr. Vangie Bergum, Supervisor

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Dr. Marion Allen

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Dr. Eric Higgs

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Dr. Linda Ogilvie

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Dr. Peggy Anne Field

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External Examiner
University of North Carolina at Chapel Hill

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September 11, 2000
Date

DEDICATION

This work is dedicated to the registered nurses of Alberta and to the patients who await their healing care.

ACKNOWLEDGEMENTS

Thanks for the completion of this work begin with the registered nurses who participated in the research; my deepest hope is to faithfully represent them and their work in this dissertation. To whatever extent that fidelity is achieved, I owe lasting thanks to my dissertation committee. In my supervisor, Dr. Vangie Bergum, I thank a mentor who allowed me to risk and who taught me unflagging commitment to the research process in every necessary detail. To Dr. Marion Allen, I give thanks for sharing her unbounded joy for disciplined, civil, and open-ended debate. To Dr. Eric Higgs, I owe gratitude for the steady company of a demanding intellect and a large-spirited human being.

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I also thank the Interdisciplinary Research Group on Relational Ethics led by Dr. Bergum and Dr. Sheila Gallagher for early and ongoing encouragement to research and write about technology. Particularly, I thank Dr. John Dossetor, who always encouraged me to pursue doctoral studies and to reach for more. I am also grateful to Dr. Peggy Anne Field and to Dr. Linda Ogilvie for reading and probing my work. In addition, Dr. Janet Ross Kerr and Dr. Colin Soskolne offered valuable advice on my research, and Dr. Margarete Sandelowski provided criticisms of merit for this and future work. As well, I thank Deliah Robinson and

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TABLE OF CONTENTS

LIST OF FIGURES OR ILLUSTRATIONS

Chapter 1

1

tech-nol-o-gy *n.* 1615, discourse or treatise on the arts, borrowed from Greek *technologiā,* systematic treatment of an art, craft or technique; originally referring to grammar (*techno-* combining form of *téchnē* art, craft + *-logiā* -logy). The transferred sense of science of the mechanical and industrial arts, practical arts collectively, is first recorded in English in 1859.

Robert K. Barnhart[1] (p. 1120)

tech-nique (teknēk´) *n.* mechanical details or skill in an art...see TECHNICAL.

Robert K. Barnhart[1] (p. 1120)

tech-ni-cal *adj.* 1617, skilled in a particular art or subject...probably from Greek *technikós* of art, from *téchnē* art, skill, craft...The meaning of having to do with an art, science, discipline, or profession, especially the mechanical arts, is first recorded in English in *Chambers Cyclopaedia* (1727-41).

Robert K. Barnhart[1] (p. 1119-1120)

2

nurse *n.* Before 1382 *nurse* foster parent, tutor...contraction of earlier *nurrice* wet nurse, woman or man who takes care of a young child...from Latin, feminine of *nūtrīcius* that suckles, nourishes, from *nūtrīx* (genetive *nūtrīcis*) wet nurse, from *nūtrīre* to suckle, NOURISH. The meaning of the person who takes care of the sick is first recorded in English in Shakespeare's *Comedy of Errors* (1590). –*v.* *nourse* to bring up (a child)...later *nurse* to suckle (1535); alteration of Middle English *nurshen* nourish (before 1382)...The figurative meaning of foster, promote the growth of, is first recorded before 1542. The extended meaning of wait on, take care of (a sick person), is first recorded in Swift's *Letters* (1736).

Robert K. Barnhart[1] (p. 714-715)

nourish *v.* Probably before 1300 *norisshen* to bring up (a young person), to raise...from Latin *nūtrīre* to feed, nurse, foster, support, preserve.

Robert K. Barnhart[1] (p. 712

work *n.* Probably before 1200 *work*, developed from Old English *weorc*, *worc* something done, deed, action, proceeding, business...Before 1250 *werken;* later *worken* (about 1300, past tense *wroghte*, past participle *wroght*)...*worked*, formed directly on the stem of the infinitive *to work*, became established in the 1400's. The older form *wrought* is now archaic, except in senses that denote fashioning, shaping, or decorating with the hand or an implement...

Robert K. Barnhart[1] (p. 1244)

3

Prologue: A Context for Research

...the new grad was supposed to theoretically take this poor sick lady
with the TPN, and then they were going to put in a central line. This
other girl who is charge looked at me and said, "You are going to have
to take that patient." I said I can't...I'm supposed to be the person who
also goes into the OR if there is a problem in the OR. I said I can't take a
patient that heavy and be in the OR...It's not fair to the patients.

Haley[2]

Neither science nor technology...has a theory of what is worthy and in
need of explanation or transformation.

Albert Borgmann[3] (p. 27)

What do we know about the nature of nurses' work in our present complex

health care system? In this dissertation, findings from a research conversation

between philosophy of technology and registered nurses' narratives of their work

in acute care are presented. The purpose of the research was to generate and

synthesize a critical analysis of technology and nursing that helps us understand

what it is to nurse in a technological world. The working definition of *technology*

that drove the research is "the characteristic way that we take up with the world."[4]

(p. 35) This philosophic view argues that technology is a persistent, largely

unnoticed pattern that characteristically surfaces in many of our daily habits,

relations, and comportment.

As an enduring flavour to modern existence, several contemporary

philosophers believe that the moral fact and significance of technology is easily

and frequently overlooked.[3][4][5][6][7][8][9][10] In this sense, these scholars argue, our

human capacity to indiscriminately absorb and incorporate technology into our

4

lives situates its most essential questions in both "little" everyday and "larger",

more fundamental moral choices. This deeper notion of technology incorporates

but also significantly exceeds the notion of specific machines, products,

techniques, and other technologies that populate modern health care and,

therefore, nurses' work. In effect, what we do and make cannot be materially or

morally split off from who and how we are.

What does this thesis about technology hold for the nursing discipline and

its knowledge development? In the present research, the position taken is that a

discipline knows and shows what it is through its unique orientation to the

world.[11] [12] [13] [14] *Orientation* in this sense includes a perspective and core values

that are expressed in a mindful way particular to the discipline and its "raison

d'être".[11] [13] *Nursing* is defined for the research as a practical science centred

around the aim of fostering human health. At the outset of the research, *health*

was defined as a resource for daily living[15] in a technological society. At the close

of the research analysis, health was redefined as a *source* of thriving in the

complex ecosystem of which technology plays an increasingly large role. A

healthy *ecosystem* is one whose structures, relations, and processes allow for the

viable reproduction, safe birth, good life, and good death that characterize the co-

evolutionary renewal of all biological life.[16]

In the research, human health is not conceived as incompatible with

chronicity, permanent injury, or even terminal illness.[17] However, a view of

humans and their environment as integral parts of a shared ecosystem means that

human health is increasingly endangered along with an ailing global environment

5

that faces growing threats to its overall well being.[18] [19] In a similar sense, modern nursing and the technological environments where it is practiced are envisioned as critically linked parts of a larger whole, the system of modern health care. Inquiry that develops integrated knowledge of technology and nurses' work is therefore essential to ethical nursing practice in a technological age.

In Chapters 2 through 5 of the dissertation, various aspects of the research findings are presented in a series of papers prepared for publication. In Chapter 6, key recommendations for reform in research, practice and administration, ethics, policy, and education are generated. Finally, Chapter 7 is used to re-examine the research and its limitations, and to summarize its recommendations. The remainder of the present chapter reviews the background to the research, the research design, process, ethical considerations, and limitations, and a summary of the research papers that comprise the rest of this work.

Background and Purpose

Move them out, we've got more coming in. The pace...we've got nine
that we don't want to send to the floor but we want to bring in more, so
who is the one that we are least worried about you know. Basically it
comes down and I think some of them, well I know, I know some of them
are pressured to move their patients out now.

Elva[2]

The stimulus for this research is concerns and questions that surfaced in the researcher's consulting practice with a Canadian provincial nursing association during a turbulent period of cutbacks and reorganization to publicly

6

funded health care that commenced in the early '90's. In Alberta, local changes to health care duplicated similar cost-control measures and work redesign movements across North America. At the Alberta Association for Registered Nurses (AARN), concerns and questions about nursing practice and health care to the consulting area had been tracked since 1991. From the onset of province-wide health system changes in 1993 to the design of the present study in 1998, the numbers of front line practitioners, managers, and patients and families reporting patient care concerns to the AARN rose steadily. Over a four-year time span, reports of safety issues to the AARN increased more than fivefold, rising from 30 in 6 months as of June 1994 (7.5 % of 402 total reported concerns) to 175 in 6 months as of May 1998 (28% of 636 total reported concerns).[20] Commonly, the ethical dilemmas reported to the AARN related to one or more of the following issues: growing gaps between expected care and available resources, conflicted relationships in the work setting, and ongoing disruptions to the practices and policies of health care environments. Hopes that ethical issues with nursing care would moderate after the most hectic period of restructuring abated are still unrealized; the latest review of reported concerns indicates a sustained and unacceptable number of safety issues.[21]

Ethical issues with patient care relate to several broad trends across first world health systems, including a growing gap between proliferating health care technologies and public funds for health care, demands for evidence-based practice and delivery models, and a call for more and better health care information. Alongside these trends, both health care systems and individual

7

workplaces have been re-engineered in concert with considerable workforce disruption.[22] Multiple controversies arise for policy makers, practitioners, and the public in the wake of these trends. Examples of these controversies include whether health care is a profit driven market or a public good; whether the best available evidence actually guides practice and health policy or ever can; and whether or not professional care can be safely divided into multiple tasks for delivery by lesser-trained personnel.[23] All of these debates can be examined as matters of what we do or do not question, what we hold dear, and how we comport ourselves in a technological age.[3 4 5 6 8 9 24 25]

One outcome of the multiplying controversies that characterize our present technological health care system is a growing demand for assistance with conflict resolution. At the same time, the sources and course of conflict in a vastly complex technological health system are often not readily apparent. However, the growing practice problems that surface in modern health care suggest that along with problem solving skills and ethical intentions, nurses and other disciplines need to more fully account for the fact of technology within their everyday practice, and within the system overall. Given well-documented international shortages of qualified nurses and the extent of current concerns within health care, continued ignorance about the actual nature of nurses' work may exact a steep price. The research was therefore designed to initiate a broader account of nurses' work and ethical issues within a technological system. The overall purpose of the research became that of contributing to a different and more useful explanation of nurses' concerns with modern health care than had been developed to date. The

8

hope was that researching technology from a broad philosophic perspective would allow some of the concerns and conflicts that arise in modern health care to become more intelligible and amenable to constructive resolution. The next section details the means by which these aims of the project were dealt with in the research design.

Research Design

If you know a doctor always sticks on a vacuum the minute you say the patient's fully dilated, so you deliver the patient because he is in a rush, well then you just "won't check her." You know she is fully by the way she is acting and monitor strip and the whole shebang. You just "don't check her"...Well 1½ hours later she's coming into view. "Oh she's fully now, better call the doctor".

<div align="right">Haley[2]</div>

To pass beyond the modern framework, we must allow things that are beyond the control of modernity to speak in their own right. Because narrative discourse is about things in particular, I will relate stories that others have told and recount things of my own observation.

<div align="right">Albert Borgmann[4] (p. 5)</div>

Does the nurse who pretends not to check her labouring patient take a necessary and ethical measure to counter unnecessary technological interventions for a woman and her baby? Do her actions constitute defensible clinical judgment, sound risk management, or prudent nursing practice – and what more do we need to know before we even hazard an informed opinion? The research design of this project began with the premise that no question which nursing needs to pursue

should be limited by a poverty of methods. As a practical science, the nursing discipline requires the dialectical generation of knowledge about health, health care, humans, society, and technology from philosophical, historical, ethical, scientific, critical theoretical, and artistic perspectives.[26 27 28 29 30] The case in nursing for such methodological heterodoxy is its potential to strengthen our ability to ask and pursue those questions that matter for the discipline.[26 31 32 33 34 35 36] A post-positivist research tradition of critical multiplism is compatible with these requirements for knowledge development.[31 33 36]

The design process commenced with a critical review of several relevant bodies of literature to situate current health care trends and prevalent practitioner concerns within technological health care in a broader context. A search and critique of research and other literature from the 1970's onward concerning technology, health care, and nursing was conducted. The primary search terms of *technology*, *nursing*, *health care*, *relationships*, and *ethics* were used alone and in combination for online and hand searches of relevant research, other scholarship, and public documents including media publications. In view of its continued citation in contemporary work, a small selection of significant work on technology issued before the 1970's was also considered. The criteria outlined by Forchuk and Roberts for critiquing qualitative research[37] were used to evaluate historical, interpretive, and critical theoretical research. Empirical analytical research was included where appropriate, using Brink and Wood's criteria for critical review of research.[38] Philosophic research was admitted on the clarity, coherence, and merits of its arguments, and non-research literature was reviewed

10

and integrated on the basis of its relevance to the emerging critique. The literature

retrieved spanned work in nursing, medicine, health care economics, health

services research, health care management and health care policy, information

science, health care ethics, philosophy, environmental ethics, the general sciences,

education, engineering, sociology, history, women's studies, and technology

studies, including contemporary philosophy of technology. A complete list of the

databases and other sources searched is listed in Appendix A.

The central questions that guided the review were: What is our current

knowledge of nurses' work in modern health care? And What can we learn about

technology from our knowledge of nurses' work? To pursue these questions, a

dialectical, critical hermeneutic approach to critiquing the literature was crafted

from discussions in nursing,[26 28 29 39 40 41 42 43 44 45] education,[46] critical social

theory,[47 48] philosophy and hermeneutics,[49 50 51] and contemporary philosophy of

technology.[7 8] This approach, which also guided the research process, sought to

identify and interpret apparently contradictory warrants about technology and

nursing as they appeared in various bodies of research and other literature. That

is, nursing and technology as two objects of inquiry were critiqued in tandem to

develop a broader explanation of nursing in light of technology, and of

technology in light of nursing. The aim of the critique was to develop research

questions about nursing in the technological project of modern health care.

The critique completed the work of several earlier reviews and

summarized findings that were key for the present research. The resulting

interpretation considered technology under three critically related and overlapping

11

treatments: technology as myth, technology as problem, and finally, technology as a perplexing, pervasive phenomenon that characterizes our modern human existence. Selected aspects of the literature review and its conclusions are addressed in Chapter 2. For the purposes of this introduction to the research, the relevant point is that the critique supported the need for further inquiry into how the technology figures into practitioners' work, work relations, and work environments. Out of the review, the initial research questions became:

1. What do registered nurses describe as their work in acute care?

2. How do registered nurses characterize their care environments?

3. How do registered nurses characterize their work relationships, including their relationships with co-workers, patients, and families?

4. What can a dialogue between registered nurses' descriptions of their work and contemporary philosophy of technology tell us about the nature of nursing, health care, and technology in contemporary society?

To pursue the research questions, three prime objectives were developed:

1. to obtain narratives of registered nurses' work in acute care;

2. to use the nurses' narratives and contemporary technology theory to dialectically critique the forms and features of technology that characterize the nurses' work, work relations, and work environments; and

3. to develop critical propositions about the nature of registered nurses' work and about contemporary technology.

12

To accomplish these objectives, the critical hermeneutic, dialectical approach of the literature critique was incorporated into the design of methods. Essentially, the research sought to place two worlds that have studied technology apart into common discourse. The purpose of the dialogue was to develop a "re-constructive" critique of technology and registered nurses work. Critical reconstruction entailed two simultaneous endeavours throughout the research process: trying to ascertain and make visible (construct) in truthful dialogue what the nurses' work actually *was*, and trying to imagine, with shared critical thought (re-construct and critique), what the nurses' work could or should *be*. These dual intentions informed the research conversations with nurses, the critical hermeneutic dialectic between the nurses' narratives and technology theory, and the written works that are presented here for further external critique. This approach is intended to be consistent with Sandelowski's arguments on the uses and guises of theory in research[52] and with Morrow's critical theoretical position that questions should flow from methodological orientation, and methods should suit the questions asked.[47] The chosen method is also congruent with Fairman's observation that "technology influences nursing and nursing influences technology"[53] and with Choiniere's observations on the "complex or dialectical relationship" between technology and the work setting.[54] (p. 60)

The research goals entailed the collection of data from two primary sources or samples, registered nurses' narratives of their work and contemporary philosophic theory of technology. Accordingly, a purposeful sampling strategy of phenomenal variation or criterion sampling[55] was used to target the phenomenon

13

of technology in nurses' work. Initially, eight to twelve nurses were sought to provide a quality and range of data consistent with adequate qualitative sampling criteria.[56][57] Insights from critical theory of technology, paradigmatic theory of technology, and ecological restoration were drawn from relevant published and unpublished work, from seminars, workshops, and discussion notes, and from electronic communications and online journals. As Patton's guidelines suggest, the logic and power of a qualitative research sample is judged on the richness of the data retrieved per sampling unit, not the overall numbers in the sample.[55] Sandelowski's observations on sampling in qualitative research[57][58] and the use of case sampling in philosophic research therefore directed ongoing assessment of both samples' adequacy for the quality of the research data overall, rather than relying on total numbers of participants or pieces of literature. Sample sufficiency for both the nurses' narratives and the philosophic theory were continually re-evaluated against the intended uses of the data, the research methods and sampling strategies employed, and the expected results of the project.

Registered nurses practicing in Alberta facilities with 200 or greater acute care bed capacity were eligible to take part in the research. A minimum of three years' current acute care experience was required. These criteria were intended to improve the likelihood of recruiting participants with a rich working knowledge of acute care nursing. The aim of the study was not necessarily to locate expert nurses, although their enrolment was welcome. Rather, the preferred attribute of participants was the ability to describe their work in substantial detail.

14

To select a theoretical perspective on technology to guide the present study, initial attention was devoted to such critical forerunners of contemporary thought as Jacques Ellul[59] and Hans Jonas, [10][60] and to work by Ursula Franklin,[61] Langdon Winner,[62] and Don Ihde.[63] The nursing literature was also combed for references to technology and to ascertain the dominant contemporary theories cited within and outside the nursing discipline. Subsequently, the bulk of theory considered for the present project was drawn from the study of several works by Albert Borgmann[3][4][6] and by Andrew Feenberg.[7][8][64] While Borgmann is a philosophical communitarian and Feenberg clearly falls in a critical theoretic, neo-Marxist school of interpretation, their works interact to form a distinctive theoretical framework (see Appendix B).

The rationale for theoretical commitment to Borgmann and Feenberg in the present research is threefold. First, reviews of nursing research at the time of proposal development did not surface comprehensive studies of Borgmann or Feenberg, despite their significant influence within the philosophic community of technology scholars.[5][7][9] Second, despite their politically and otherwise different approaches, important connections are evident between their respective schools of thought. These points of theoretical congruence run parallel with a deliberate trend of theory building at work in philosophy of technology at the present time.[5] For instance, both Borgmann and Feenberg lay out disparate but notable critiques of the absolute determinism of Ellul's substantive theory, and both draw on other common sources of theoretical wisdom. In the case of Borgmann, these sources include thought from Jonas, Mitcham[65], and Winner, and Ihde's notion of

15

magnification/reduction[63] is cited in developing the concepts of *foreground* and

background in a technologically patterned world.[3] In Feenberg's work, Winner is

thanked for critique, and there is recognition of Ihde's argument that constructive

social change both can and must spring from the inherent context of an

undeniably technological world.[8] Finally, both scholars go the distance in

providing comprehensive theories of technology that have remained relatively

elusive to date. A summary of these competing theories of technology follows.

Two Philosophic Theories of Technology: A Necessary Tension

...the paradigm as a pattern or tendency in reality vies with other forces
of equal or greater significance; epistemologically, the paradigm
becomes a device to delineate and restrain developments on behalf of
things that matter.

Albert Borgmann[3] (p. 76)

Critical theory argues that technology is not a thing in the ordinary sense
of the term, but an "ambivalent" process of development suspended
between different possibilities...On this view, technology is not a destiny
but a scene of struggle. It is a social battlefield, or perhaps a better
metaphor would be a *parliament of things* on which civilizational
alternatives are debated and decided.

Andrew Feenberg[8] (p. 14)

The theoretical framework developed for this research draws on two

significant and significantly different scholars of technology, Albert Borgmann[3][4]

[6] and Andrew Feenberg.[7][8][64] Within the framework, Borgmann's *paradigmatic*

theory serves as a powerfully comprehensive lens to interpret technology as a

16

characteristic experience of our modern world. Through the paradigmatic lens,

both Borgmann's explanation and Feenberg's *critical theory* of technology are

considered for their divergent political accounts of what this experience of

technology means, and therefore what reforms are required. No effort is made to

reconcile their differing views of technology into one common explanation for the

purposes of the research. Instead, the work of both scholars is entertained in the

research for its potential to explain nurses' accounts of their work. While the

summaries that follow do not do justice to the depth of their thinking, each

theorist's position is now briefly outlined.

Borgmann uses the metaphor of a *device* to argue that contemporary life is

characterized by an experience of technology as "a deeply ingrained pattern" of

production and consumption that becomes an invisible but powerful device for the

fundamental shaping of our world.[3] (p. 35) The device has two significant

components: a *foreground* of readily available commodities and a much less

visible *background* where the machinery of technology maintains the means of

production. In the foreground of technology as a taken-for-granted way of life, a

flick of a switch turns on the lights, a few phone calls overbook the OR slate, the

dishwasher starts with a single button, and a keystroke on the computer orders

more dialysis machines. In the background where the consequences of production

unfold, another dam is built, sedated patients lie unmonitored in an understaffed

recovery room or hallway, more phosphates enter a stream, or those without the

financial wherewithal are not even reliably immunized, much less dialyzed.

17

The indifferent and voracious patterns of production, consumption, and depletion that characterize our present world, Borgmann claims, perpetuate with so little opposition because of the very nature of a device. That is, the costs of production in a largely recessed background rarely reach our awareness as we inhabit and consume a materially brilliant and pliable foreground of market stores. A steady supply of media culture and corporate advertising keeps the machinery out of mind as we encounter a multiplying array of goods for sale, and the pursuits of modern life are increasingly removed from the real costs of our conduct. An ethical divide emerges as a foreground of disposable commodities and a background machinery of production never meaningfully intersect or correct one another. We proceed as if a frenetic consumption and commodification of the world that Borgmann characterizes as *hypermodernism* or *hyperreality* is not a significant moral fact, even while our social and environmental ills multiply in its wake.

In his latest work on the nature of information in a technological world,[6] Borgmann expands on earlier arguments that our uncritical adoption of hyperreality includes the production of technological information itself as just one more commodity in a commodified world.[4] As the most abundant and transient commodity of all, he argues, technological information permeates our landscape to the point of assuming its own version of reality. Most worrisome, he notes that the prolific presence of technological signs distracts our attention from natural and cultural signs that provide us with different and indispensable forms of wisdom about our world. IMAX films of Yellowstone cannot be mistaken for

18

wilderness, Borgmann warns, and the steady ingestion of CNN does not equate with democratic participation in one's community and one's society. Yet, he argues, a steady displacement of natural and cultural signs accompanies the constant ingestion of technological information in modern life, and almost without notice, our thinking, experience, and reality narrow. Not surprisingly, he equally argues that as our reality shrinks to a technological interpretation, democracy shrivels, and wilderness dies.

Given these concerns about hyperreality, it follows that Borgmann cautions us on our unreflective acceptance of the device and its commodities. As the distorted technological promise of our modern "good life", Borgmann argues that the glut of commodities that typify the device displaces *focal things* and *focal practices*, along with the communal and other human values that such phenomena reflect. The former term describes those objects, images, and properties of the world that comprise a good life, and the latter concept of focal practices refers to the habits, rituals, and relations which orient us to focal things. For Borgmann, focal things are "commanding, centering, and deep"; they ask for our engagement, and they show us what matters, such as wilderness, a family table, a meeting place for neighbours or friends, good books, a path to hike. In turn, focal practices are the habits, relations, and rituals that orient us to focal things: a daily walk, taking a meal together, going to a church, hall, or other communal gathering; taking time to read and contemplate, time to write.

Unlike the hasty consumption of quickly replaced commodities, focal practices are not by nature easy, superfluous, or expedient; they exact an effort

19

that is commensurate with the riches they promise. If we walk through the forest instead of driving by, we exert our own energy and feel the energy of the living world around us. When we make a meal instead of "grabbing a bite", we prepare food and table to find fellowship; and as we volunteer at a school instead of just writing a cheque, we see and hear what children need. In this way, focal practices direct us to focal things, the things of central and ultimately moral significance in our lives. Thus even as forms of focal things and practices may evolve with time and vary with individual and communal life, Borgmann asserts that what does not change is how their thoughtful, regular engagement counters a technological pattern of unreflective consumption. Hence Borgmann's proposals for reform of technology after modernity concern the question of how we recognize and foster the public engagement of focal concerns. These are concerns of how we live together, how we exercise citizenship, and how we practice and cherish a good life that selectively incorporates but is not morally defined by technology. These focal concerns can be recovered, Borgmann urges, when we rebalance an overly materialistic culture with the materially moral "care of human practices" found in communal politics, celebrations, and economies.[4] (p. 121)

Turning to Feenberg's work, we find a more radical political interpretation of modern society, where it is argued that technology's design is "an ontological decision fraught with political consequences".[8] (p. 3) As such, he contests the view that technology is a distinctive and problematic feature of modernity per se, insisting instead that technology is a problem in current societies to the extent that it sponsors the implicit control and profit of a powerful elite.[7][8][64] To demonstrate

20

his thesis, Feenberg questions preceding philosophic views that either demonize technology (substantive philosophic theory) or neutralize it (instrumental theory), and then argues for an alternate view that places social reconstruction at the heart of a moral relation with technology. Essentially, Feenberg asserts that both the substantive and the instrumental lines of theory debate technology in a variety of futile "trade-off" models that ignore underlying problems of political rather than strictly economic or scientific origin. The language of trade-offs, he clams, leads to faulty reasoning where technology is *either* a monster of science (e.g. ecological disasters) that we must quell, *or* it is an innocent product (e.g. life-saving medical treatments) of good science that only requires our wise use to avoid harm. Feenberg then proposes that critical theory resolves the predicament of trade-offs by reconstructing technology's social purpose and design with a more democratic intent. To reach this more democratic relation with technology, the critical theoretical position assumes that the present power/knowledge relations that form the "technical code"[8] (p. 78) of a capitalist society must be exposed and dissolved.

The task of dissolving a repressive technical code leads to Feenberg's conception of the "dialectic of technology",[8] (p. 188) which he explains in the notion of *secondary instrumentalization*. For Feenberg, the fact of secondary instrumentalization is demonstrated by the observation that technology is always to some extent recontextualized *as experienced* and *as practiced.* The recovery of a fuller context in practice brings out secondary or unanticipated properties of technology, he argues, that allow the reflexive attributes of a technology to be

21

fully accounted for and to reveal suppressed or alternate possibilities. Thus he

argues that a computer program may be designed for one work purpose that is

profit driven, but workers may well find other uses that meet different needs of

the group, or even uses that counter the technology's original purpose. It is these

alternate possibilities, he asserts, that release "technology's integrative

potentialities" in society and create the potential for more ethical and sustaining

political and technical projects in society.[8] (p. 182) The reasoning of secondary

instrumentalization underscores the importance of obtaining first hand narratives

of nurses' work in order to understand the actual experience of technology, as

opposed to how it is theorized and designed. For example, the actual versus

expected uses of information technologies reported by nurses in Choiniere's case

study[54] illustrate Feenberg's notion that technologies regain "contextual

relatedness and self-development"[8] (p. 182) in the process of secondary

instrumentalization.

    Like Borgmann, Feenberg initiates proposals for reform of technology.

Particularly, he considers what he terms "four moments " of secondary

instrumentalization as part of an informed resistance and ultimate counter to the

dominant, undemocratic technical code of capitalist economies. He argues first for

concretization, describing it as "the discovery of synergisms between

technologies and their various environments".[8] (p. 189) As a way of

"recontextualizing practice",[8] (p. 189), Feenberg claims, concretization recovers

the skills of workers and ecological concerns into the structure of technology. He

then recommends a respect for *vocation* or the "acquisition of craft " to merge the

22

primary and secondary or integrative properties of technology, and *aesthetic investment*, which he briefly defines as rejoining production with the functional beauty of technological objects.[8] (p. 189-190) Finally, he discusses the importance of *collegiality* as the "praxis of voluntary cooperation that reintegrates "leadership with group".[8]

While Borgmann's and Feenberg's important arguments are considerably extended in the works cited and elsewhere,[5] the salient points for readers of the present research can be summarized as follows. First, Borgmann's theory does not place our present predicament with technology at the feet of capitalism, whereas Feenberg's clearly does. Indeed, Feenberg argues that the need for a socialist reconstruction of society is "at issue in struggles over all sorts of technical problems: at work, in education, medicine, and ecology".[8] (p. 90) His application of these arguments to medicine is illustrated in his 1995 work, *Alternative Modernity*, where the activism of AIDS patients to alter medial research practices is vividly chronicled. Despite their important differences, however, the points of convergence between Borgmann's theory and Feenberg's work may be larger than either scholar has recognized to date. Specifically, both theories raise our awareness of an implicit experience of technology in modern life that problematically splits out technical means from original and moral human ends. Thus regardless of their differing explanations, both theories warrant the opportunity to take their propositions "to market" so to speak; that is, the market of modern technological health care. In that spirit and with this brief overview of technology theory in hand, the next section outlines the process of the research.

23

The Research Process and Ethical Considerations

To lay there and let us torture them, because that's what we do for
another few days...I'll do it but I don't really feel good about it. I mean
I'm poking them full of holes and sticking things in every orifice. I just
think this is not, there is no dignity in this life and you are not going to
survive anyway... "How much longer are we going to flog this person?"
is sort of how we put it, and they say "Well, give them 24 more hours, or
if it's a case where they might be an organ donor ...then we'll give them
a little longer.

Blaze[2]

Research that asks nurses to talk about their work offers a way to voice what matters to nurses, and why. However, research about sensitive and confidential matters also holds the potential to create harm. To address the ethical and scientific considerations for the project, the research proposal, information sheet, and consent letter were first vetted by a supervising academic committee and then by the University of Alberta's Health Research Ethics Board (see Appendix C –HREB research info sheet, consent letter, and approval of research). In addition, the review of several external parties for funding purposes entailed three further reviews of the research. Information about the research was posted electronically and in print notices through the distribution mechanisms of the AARN, the United Nurses of Alberta, and the provincial schools of nursing with post-basic educational programs for nurses. Out of twenty-one nurses who inquired about the study, ten nurses who reviewed the study information decided to take part in the research (see Appendix D). All of the nurses enrolled in the

24

study met the original inclusion criteria with two partial exceptions. One nurse's hospital had been recently downsized from 210 to 185 beds, and a second nurse had moved from a staff nurse position to a managerial position within the past several months. The researcher's supervisory committee approved these two exceptions to the enrolment criteria.

Ethical considerations included the need to recruit without coercion, to protect the confidentiality and dignity of participants, to ensure that the research purpose and commitments were fully disclosed, and to share the findings with participants. While the research methods were designed to collect data for specific analytic purposes, the research conversations were also a place to create a mutual moral space for growth and learning.[65 66 67 68 69 70] The space of the conversations was moral to the degree that nurse participants were able to imagine and share what their practice is and what they think that it should be, and to the degree that the researcher was able to hear their words as intended. This required participants to share honestly what they see as true for them, irrespective of their pre-conceptions about the research, and it asked the researcher to listen fully to what was said, irrespective of particular expectations about nursing as practiced, technology as theorized, or the research process itself. In short, the integrity of the research process entailed mutual trust and disclosure. To the extent that such moral space was realized within the process of sharing and acknowledging stories, an emancipatory interest of moral growth was served by the research. That interest continues with the dissemination of the research papers and other continued opportunities to submit the findings to further question and critique.

The nurses worked in one or more of 7 tertiary care hospitals located in 5 cities across the province of Alberta, Canada, and possessed between 10 and 34 years experience of nursing practice. The clinical areas represented in the study include orthopaedics, neurosciences, operating room, recovery room, diagnostic care, cardiac and general systems intensive care, burns, general and cardiovascular surgery, and labour and delivery. The collective practice wisdom of the participants included clinical nursing, unit and program administration, staff and student education, nursing research, and data collection for medical research. The educational background of participants was diploma (5), post-basic degree completed or in progress (4), or Masters prepared (1), and the majority of nurses were also involved with at least one of the following affiliations: a clinical specialty group, professional association, nursing union, church, school, or community groups.

After informed consent was obtained, participants were individually engaged in successive conversations about their daily work. Appendix E contains sample questions that guided the research conversations. The initial questions were developed in light of the research purpose and contemporary technology theory. After initial critical hermeneutic analysis of the conversations with nurses, a second round of emerging questions was developed, and further conversations were conducted with the participants. Throughout the research, the guiding principle for scrutinizing both technology theory and nurses' accounts of their work was to question their respective texts.[51][71] The transcripts of conversations with nurses and contemporary technology theory were read and re-read together,

26

and a researcher's journal was used to track questions and issues for analysis as excerpts from the research transcripts and proposals about technology were integrated in several successive interpretations. To strengthen the analysis, expert criticism from nursing practice and theory, research methods, health care ethics, philosophy of technology, and ecological restoration was incorporated into the research design. In addition, an interim analysis and later analysis were provided to two staff nurses external to the study who served as bedside critics, and the developing analysis was shared with three interdisciplinary audiences.[72]

The critical hermeneutic dialectic of the research is articulated in successive interpretations of the data. Each transformation of the research analysis of technology and registered nurses' work emerges from the preceding interpretation. The successive re-interpretations can be visualized as expanding forays into the landscape of modern health care that nurses inhabit, as parallel themes emerged between nursing and ecological restoration (see Appendix F). The joint consideration of technology theory and nurses' accounts of their work created successive lines of questions about nurses' work and work environments that heal, about work and work environments that separate nurses from healing practices. The identification of recurring, problematic technological practices within the nurses' work environments that also trouble the work of ecological restoration led to using the metaphor of ecosystems, ecological integrity, and ecological restoration to re-interpret nurses' work in a technological world. The metaphor of ecological restoration opens more avenues for inquiry that continue at the close of this work.

27

Limitations of the Project

All research carries limitations inherent to its choices in design; good research acknowledges limitations order to strengthen the initial rigor of inquiry, enhance the credibility of its findings, draw lessons for future projects, and address criticisms that can be legitimately raised. Limitations to the research were progressively defined and addressed throughout the project, and continue to the present time. To identify limitations, the research benefited from several critiques at its outset and several more rounds of scrutiny at later dates. At the proposal stage, the researcher's supervisory committee, the university's health research ethics committee, and three funding parties reviewed and responded to perceived limits of the research design. During the project, the analysis and presentations of findings were shared for criticism with the participants and supervisory committee, two other staff nurses, Professor Borgmann, and three interdisciplinary audiences. In addition, versions of two chapters have been submitted to the scrutiny of blind peer reviews. From the initial design to the most recent feedback, there are limits that remain in evidence. These constraints are discussed below.

Limits to the research include the use of ten nurses' narratives to draw conclusions and recommendations about nurses' work. An analytic process that incorporated a complex and pluralistic theoretical framework compounded these limits. It is possible that the use of observation techniques or other additional

28

sources of data might have strengthened the validity of the findings that were obtained. However, the concern of overloading the project with data at the expense of cogent analysis outweighed the possible merits of these additional sources of data. In keeping with the tenets of critical multiplism, the warrants of the research continue to be tested as the findings are presented for criticism to as many stakeholders as possible.[31][36]

Recruitment strategies for gaining participation from registered nurses were limited by several factors. First, permission to recruit within individual facilities might have been misinterpreted by some nurses as employer-sponsored research. Second, the strain of health care work may have precluded many otherwise interested and qualified nurses from participating. Third, the least experienced nurse in the study had ten years of clinical experience, with an overall average of twenty years' clinical practice within the group. This is consistent with a system that has effectively downsized most of the nursing staff with less than ten years' seniority in unionized settings, and it is undoubtedly a influencing factor on the findings; newer nurses might have had very different things to say. What remains unclear is how those differences would or would not have played out in a dialogue with technology theory.

At its inception and to the present, the most significant limit to this project is its own topic. Philosophic views of technology are often described as inaccessible to wider audiences, and translating technology theory into readable accounts has been and remains the most difficult task of the research. This constraint was identified at the outset of the research, and several strategies were

29

developed to try to minimize its effects on the dissemination of findings. The tactics to "translate technology" included the preparation and presentation of several papers on both Borgmann's and Feenberg's work over a five-year period, course work and workshops with three philosophers of technology, and a site visit to Professor Borgmann at the University of Montana. In addition, the theoretical framework was developed at the outset of the project and discussed regularly with technology experts throughout the analysis. Most importantly, the analysis has been reworked and rewritten several times, to try to continually improve the clarity of thought and the argued links between the nurses' narratives and technology theory. It is hoped that the undeniable limit of a complex theoretical framework is also the attribute that enriches the analysis of the nurses' work in a complex, technological world. The reader is invited to judge, criticize, and respond to the research papers that follow, so that future work can be improved.

The Research Papers: A Synopsis

Chapters 2 through 5 of the dissertation are a series of papers prepared for publication. In each paper, select aspects of the research are discussed. In the critique of technology and nurses' work that is developed, a particular ecological perspective on modern health care emerges. The ecological view that is proposed is forged by a dialogue between the nurses' words, contemporary philosophic thought on technology, work in ecological restoration, and scholarship in ethics and nursing. Specifically, the acute care settings are determined to be

30

environments where both the inhabitants and the overall landscape exhibit key signs of disruption that interfere with healing practices. The disruptive phenomena that are identified by participating nurses are argued to pose significant threats to the intended and interrelated healing natures of nursing and health care. Of equal significance, the nurses describe counter efforts by individual practitioners and the environment to maintain practices that heal.

Both the denatured and healthier forms of nursing work and work environments alternately appear and recede during conversations with the nurses. These ambivalent signals are used to take a sentinel ecological reading of health care. The ecological reading of the nurses' work and work environments suggests divergent possibilities for how we continue to grapple with nursing and with health care. On one hand, the mutation of modern nursing and health care away from the properties of healing may accelerate. On the other hand, closer attention to the present signs of distress provides critical openings for necessary regeneration and reform.

Within the ecological view that is proposed, the contrasting futures of further deterioration or regeneration turn on our capacity to address several key areas for questions. How do we research and develop adequate understanding of technology, nursing, and health care in our complex modern times? How do we conceive the nature of our ethical commitments to all of the environments we inhabit and share with other life, including those of health care? With an exploration of these questions in view, the last question for this work becomes: How do we enact relations that foster healing with one another, with the

31

communities we share including health care, and with our world? Each research paper presents portions of the analysis in order to speak to one or more of these questions. A brief abstract of each paper follows.

Paper 1 (Chapter 2): Recovering ethics after technics.[1]

The purpose of this paper is to question how we research nursing practice and its ethical challenges in our modern technological society. Scholarship in nursing, ethics, and contemporary philosophy of technology is dialectically critiqued to demonstrate and discuss rationale for critical hermeneutic dialectic research on technology and registered nurses' work. The use of critical hermeneutics and dialectic as proposed for the research are defined, and the purpose of the method is identified as the development of critical text on technology. The notion of critical text as inherent knowledge of technology is explored, and it is argued that critical text is necessary if nurses are to provide ethical care in a technological world.

1. A version of this chapter is published. Marck 2000. Nursing Ethics 7 (1): 5 – 14.

Paper 2 (Chapter 3): Nursing in a Technological World: In Search of

Healing Communities.[2]

In this paper, an ecological metaphor is used to discuss the features of the

nurses' work and work environments in acute care hospitals across the province

of Alberta, and to pose several questions about systems and communities in

modern health care. It is argued that while first world health care systems are both

practically and ethically complex in nature, complexity cannot be equated with

refinement. Several questions are raised for discussion, including: Can modern

acute care settings be held up as exemplars of highly developed healing

communities, or do they increasingly resemble the deteriorating environs of

abandoned high-tech ghettos? Are the complicated challenges that registered

nurses confront in their daily work a function of diverse and restorative health

care environments, or of a degraded system where a mismatch between treatment

"options" and resources for care steadily grows?

The present research on technology and registered nurses' work suggests

that modern health care systems may be characterized by recurring, confounding

technological patterns of thought, relations, and actions that threaten to render

nurses' work incompatible with its intended healing nature. The presence of

denatured work across health disciplines is proposed and its consequences for the

welfare of patients, families, practitioners, and health care communities is

2. A version of this chapter is accepted for publication. Marck 2000. *Advances in Nursing Science* 23 (2).

examined. An ecological view of health care systems, healing communities, and the work of health disciplines that considers contemporary technology theory is introduced, using work from the interdisciplinary field of ecological restoration. The case for nursing science to develop an ecological literacy for a technological world is argued, and questions for further research are proposed.

Paper 3 (Chapter 4): Researching the Environment of Modern Health Care: Re-Reading the Signs.

This paper draws on the previous papers to discuss and elaborate an ecological perspective on nurses' work and on health care. The ecological view taken draws primarily on the text of the nurses' words, the work of Borgmann and Feenberg in philosophy of technology, and the work of Higgs and Light in ecological restoration. The explanations of ecosystems and technology that are furnished by these scholars are used to reinterpret how we read the nested landscapes of nursing and health care. The parallel concepts that are considered to construct the ecological view include nature and the nature of living things, living (eco) systems, and technological society. Other parallels for nursing and health care that are proposed and discussed include the notion of *home place* and the intricacy and complexity of interactions and relations between threats (including technological practices), ecosystems, and their inhabitants.

The metaphor of an ecosystem is used to propose that nursing and health care consider the difference in their home place between technically effective and efficient restructuring and authentic, sustainable reform. It is argued that the

34

sustainable nature or denaturing of nursing and the wider question of sustainable or denatured health care are two features of a shared health care home place that are inextricably and symbiotically linked. Out of the ecological perspective that is developed, the alternatives of further denaturing of nursing and health care or regeneration and renaturing of nursing and health care are both identified as possible futures in the analysis of this research. The call of Higgs and others to identify and live a different ethic to our earth as home place is used to suggest that in nested ways, the issues and challenges in nursing and health care echo those of our wider home place. The paper concludes with a plea to develop an ethic for health care that embodies a fuller understanding of the vitally linked notions of nature, technology, relations, and ecological regeneration.

Paper 4 (Chapter 5): Renaturing health care. An ecological ethic for a technological world.

In this paper, the research findings are summarized in order to join issue with the ecological concerns of Potter's "bridge bioethics", the Hastings Center's *Nature, Polis, Ethics* project, and the World Health Organization's project on global ecological integrity. Using the ecological perspective proposed in Chapter 4, excerpts from the research analysis are used to discuss three central areas of concern to nurses as they confront and struggle to ethically *nurse* their patients in a technologically patterned system, which are those of *relation*, *resistance*, and *response*. Concerns of relation are defined as ethical questions of how we treat

35

one another, and matters of resistance are interpreted as an ethical struggle to sustain the declining ecological integrity of healing work and work environments.

In light of the definitions provided for relations and resistance, the term of response is discussed under our obligation to regenerate the kinds of relations, processes, practices, structures, and context that sustain the ecological and therefore ethical integrity of modern health care. The example of root cause analysis is used to illustrate an adaptive ecological response to the management of sentinel events, and to make the case for incorporating ecological principles into the renaturing of health care. Adaptive renaturing of health care is envisioned as responsive, relational, and critically questioning that redirects the commitments of the system, practitioners, and patients towards an ecological understanding of our own health and that of the earth we collectively inhabit.

Paper 5 (Chapter 6): Renaturing Recommendations: An Ecological Approach to the Ethical and Scientific Integrity of Health Care.

In this chapter, the moral ecology of good nursing care is considered under three primary concerns of *relation*, *resistance*, and *response* to offer recommendations for strengthening the ethical and ecological integrity of health care. It is argued that exemplars of relations, resistance, and response form an ethical "counterpoise" to under-examined technology, in health care and throughout our lives. Concerns of *relations* are defined as ethical matters of how we treat one another in faithful, democratic and questioning ways; and *resistance*

36

is defined as the ways that we question and counter unjustifiable technical codes that threaten the moral ecology of our world. Concerns of *response* are then defined as the ways in which we address our relations with and resistance to technology and demonstrate commitment to the ecological integrity of the health care environment every day.

The response that is proposed to renature health care uses ecological knowledge of nurses' everyday work to reconstruct processes and structures that support the relations, resistance/resilience, and other attributes of ecological integrity in health care as a living system. The central features of healing rituals, ecologically literate language, and democratic redesign of technology are outlined, and examples in practice, research, education, and policy are provided. It is also proposed that the health system's capacity for ecological and ethical integrity are inextricably linked, and that failure to consistently attend to both attributes becomes a failure to sufficiently respond to either. As we exercise more adequate moral concern for healing places, we regenerate a sense of what matters for all of the places we need to heal in this world, including ourselves.

Chapter 7: Research and Renaturing: Limitations and Directions

From the discussion of the research that is presented in Chapters 2 – 6, an epilogue is developed to revisit the limitations of the research and to summarize recommendations for several "regions" of health care including education, research, practice, ethics, and policy. These regions are conceptualized as

37

essential, interwoven features of future health care environments that need to be nurtured and monitored with continuous and critical questioning. As essential features, every region possesses the capacity to enable or disable the potential of nursing, all health disciplines, and health care to contribute to ecological integrity and human health. In the overall context of ecological integrity, thriving future health care environments are proposed as ones that embrace an ecological ethic at the local and system levels of health care. The purpose of an ecological ethic is to foster ongoing examination of ethically and scientifically adequate relations with, resistance to, and responses for a biotechnological world.

From these claims, it is recommended that the ecological principles of relations, resistance, and response be used to guide our reapportion of financial, intellectual, environmental, and other human investments in health and health care across five critical areas. These areas are knowledge development, the critique and synthesis of new knowledge, the dissemination and practice of what we learn, feedback on our applications, and systems redesign. Examples from one or more of practice, research, education, or policy are provided to illustrate the different but complementary forms of knowledge work that these areas require. It is also pointed out that in predictably ecological ways, each area thrives to the extent that all the areas are well tended.

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38

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41

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43

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Chapter 2

text *n.* 1369, the wording of anything written...in Late Latin, written

account, content, characters used in a document, from Latin *textus* (genitive

textūs) style or texture of a work; originally, thing woven, from *texere* to weave.

Latin *texere* is cognate with Greek *téchnē* art, skill, craft...(p. 1129)

skill *n.* About 1175 *skil* that which is reasonable or right, differentiation,

distinction; later, the faculty of reason...(compare Old Icelandic *skil* distinction,

discernment)...The extended sense of practical knowledge, ability, cleverness,

expertness, is first recorded in Middle English before 1225. 1 (p. 1012)

right *adj.* Before 1121 *riht, rihte* straight, lawful, true, genuine...found in

Old English (before 830) *riht* just, good, fair, proper, fitting, straight...Cognates

outside Germanic include Old Irish *recht* law, Welsh *rhaith*, Latin *rēctus* straight,

right, *rogāre* to ask, propose, request (from a lost noun **rogā* an addressing, a

question), *regere* keep straight, guide, rule, straighten, Greek *orektós* stretched

out, upright...-*v.* Probably about 1150 *rigten* to correct, amend; later *rihten* to

straighten, set in order, govern...(p. 929)

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46

Abstract

Key words: technology; dialectic; technics; critical text; inherent knowledge

Considerable debate within modern science and ethics focuses on such high-profile problems as animal organ transplantation, genetic engineering, and fetal tissue research in discourse that assumes technical tones. Other work, such as narrative ethics, expresses the failed promise of technology in the vivid detail of human experience. However, the essential nature of contemporary technology remains largely opaque to our present ethical lens on health care and on society. The limited controversies of modern science and ethics perpetuate technics, a technical, problem-solving mindset that fails to successfully grapple with the complexity of technology. A critical dialectic between practice and scholarship widens the ethical conversation in nursing to consider technology as an ongoing set of daily and fundamental moral choices on how we live. Critical text on technology recovers ethics from the limits of technics, and assists nurses to develop inherent knowledge of technology that is needed to provide ethical care in a technological world. (151 words)

47

RECOVERING ETHICS AFTER TECHNICS[1]

There are overlooked ethical challenges in the mundane, everyday
routine activities of professional practice, and these have gone largely
unexamined. Ethical behavior is not the display of one's moral rectitude
in times of crisis. It is the day-to-day expression of one's commitment to
other persons and the ways in which human beings relate to one another
in their daily interactions.

Levine[1] (p. 845)

Technology and Nursing: Locating the Absent Text

The present account of nursing and technology is incomplete, and the

absent text contains essential knowledge for ethical care. In this work, the ethical

conversation is widened by closer attention to the nature of the everyday

commitments and relations that are found between nurses, patients, families,

coworkers, and communities in modern health care. As part of ongoing research

on technology and registered nurses' work, the intent of this article is to place

nurses' knowledge of daily practice into critical hermeneutic dialectic with

contemporary scholarship in nursing, philosophy of technology, and health care

ethics. Three distinct but related conceptions of technology are considered. First,

our treatment of technology as a mythical promise is scrutinized; then, our use of

'technics' to "solve" technology as a series of technical problems is examined.

Critique of these concepts allows us to re-interpret human intentions and

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[1] A version of this chapter is published. Marck 2000. Nursing Ethics 7 (1): 5 –

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48

technology as shared ground for the exploration of ongoing, deeply moral questions. The aim of the dialectical exercise is to generate *critical text* on what it means to nurse in a technological world.

In previous work, Bergum argues that dialectical examination of scientific, political, social, and personal knowledge is required to create *inherent knowledge*, defined as those insights that recover the unique meaning of each person's experience of health care.[2] For Bergum, inherent knowledge develops understanding of our ethical commitments to persons in relationship and in context, from a place where illness is not a problem to be solved, but in Gadow's words, a "situation to be lived through".[3] The dialectical analysis of the present research proposes that critical text on technology generates inherent knowledge to guide nurses' moral intents and actions in modern health care. Such wisdom is necessary to reconcile nurses' everyday lived experience of practice with the ethical, political, and cultural stake that technology represents for our times.

The rationale for dialectical study of technology and registered nurses' work stems from two significant though differing sources of contemporary philosophic thought. First, Borgmann argues that an adequate account of technology intersects "economy and culture, labour and leisure, science and technology, history and philosophy".[4] Secondly, Feenberg asserts that technology's dialectical properties yield "an ambivalent process of development suspended between different possibilities" for human civilization.[5] The analytic method employed to develop critical text on technology is therefore crafted from the work of these and other philosophers,[6] from nursing,[7][8][9] and from critical

49

social theory.[10] [11] The chosen approach alternately treats nursing and technology as two objects of inquiry (nursing *and* technology) on one hand, and as one object of study (nursing *in light of* technology) on the other. With equal scrutiny, everyday nursing practice is examined in light of contemporary conceptions of technology, and contemporary technology theory is dissected for its relevance to nurses' experience. Paradoxical content about technology and nursing is searched out and exposed, in order to reinterpret the nature of nursing in a technological world. The aim of the critique is to develop inherent knowledge of technology that fosters nurses' ability to recognize and provide ethical care.

Critical Text on Technology: Redirecting Ethical Discourse

The dialectic of critical text on technology seeks to move past the polarized debates that frequently typify our current ethical struggles with modern health care. Such discussions repeatedly converge upon persistent myths about technological health care, increasingly complex technical problems, or both. Where the mythic qualities of technology capture our attention, we alternate between an unworkable promise of conquering death and the despair of intolerable suffering. Discussions flounder in the mounting archives of the fantastic, as evolving scientific techniques place the unborn, the living, and even the genetic potential of human life at a perpetual biologic brink. At the precipitous edges of mythic technology our problems flourish, and we engage in increasingly difficult arguments about resource allocation, quality of life, beginning and end of

50

life, informed consent, and other dilemmas. To attend to the scientific questions that accompany such quandaries, we bog down in ponderous quantities of research on outcomes, costs, staff mix, patient acuity, and more. Yet even as technology relentlessly produces new and increasingly elaborate problems in health care, an intelligible narrative of *the problem of technology* continues to evade our grasp.

When we recognize technology as both promise and problems, a paradox emerges. Our fears and disillusionment with mythic technology do not give us adequate solutions for our predicament; yet the proliferating data, techniques, and formulae of modern science and ethics only illustrate what we already know: that neither patients nor caregivers are healed. Amidst the growing human costs of re-engineering, risk management, information science, managed care markets, and other *technics* of modern health care, nurses' moral distress mounts. We remain in search of the essential ethical questions that technology represents for modern health care.

To heal, we search for a more comprehensive dialogue. In part, the story on technology that the most principled ethical debates and rigorous scientific research cannot provide comes into view through personal narratives of giving and receiving high-tech care. These individual accounts allow us to reflect on . what it is like to question technological care for one's child,[12] to be denied choice,[13] or to struggle morally with "that ordeal which is nursing" in a scientifically managed health care system.[14] These accounts talk about who we are in a technological world, and what that means. We revisit the nature of our

51

agreements with health care and with each other, and we conclude that all is not well. The dialectical task becomes that of setting myths, problems, and personal stories about modern health care together into common and critical discourse. For nurses, this means that the tensions between our daily work and our professional ideals must be explored in open-ended conversation, as we struggle to understand what it is to strive for ethical care in a technological world.

Nursing in a Technological World: Moral Choices in the Everyday

Levine's words of two decades ago urge nurses to discover ethics in the daily, easily missed events and relationships of life. From distinct but equally provocative perspectives, philosophers Albert Borgmann and Andrew Feenberg would agree that local accounts as well as general knowledge constitute essential moral wisdom in a technological world. For both scholars, contemporary technology consists of more than the machines, techniques, or other products of our late 20th century lives. Instead, with significantly different explanations of the moral challenge at hand, Borgmann and Feenberg agree on the critical point that technology encompasses an ongoing set of everyday and more fundamental moral choices that constitute "the way that we take up with the world".[15]

Understanding technology as both "big" and "little" ethics encourages us to forge a wider explanation of the nature and challenge of technology, in health care and in society. We see that technology does not "happen to us", but rather signifies both mundane and profound decisions that we make each moment of our

52

practice, every day of our lives. Read together, the claims of Levine, Bergum, and Borgmann provide a critically different interpretation of both ethics and technology in the daily work of nursing. We recognize that as a "largely fulfilled promise"[16] technology disappoints us, and as a compounding set of problems, technology cannot be solved. Dialectical inquiry therefore seeks to outgrow technology as either promise or problems, and instead re-approach its study through different questions and different methods. The increasingly futile question of what to "do" about technology is retired, as we turn to the more fundamental ethical concern of how we *are* in our modern world, and how we wish to be. The question becomes: How do we ethically live out our individual and communal lives in a technological society that characterizes, but need not define, our human project? To investigate this question, we first overcome our attachment to technology's legendary promise by reinterpreting its myths.

Beyond Mythic Technology: Outgrowing the Promise

Kohrman notes that societies interpret what disturbs and intimidates, including battle, love, and technology, through the myths and images that are handed down in culture.[17] Cultural myths about technology include that it can be tamed with romanticism or care; that it is a neutral object of maximum potential and minimal risk in the hands of rational man; or that it is always a product rather than a source of modern science. These mythical accounts mark the fears and dreams we share but cannot always express about technology. These fantasies

53

include that it will help but never harm us; that it will cost but never cost too much; and that the forms and uses it assumes are always scientifically sound and evidence-based.

Notwithstanding our attraction, the very eloquence we find so fascinating in mythical technology carries human consequences that we continue to question. For instance, Sandelowski considers the ultrasound image of the fetus as a "spectacular patient" in technical relief, floating free and disembodied from the cut-away non-visualized mother.[18] The ultrasound fetal representation reappears at a pace and in forums that were never considered in its original, narrow diagnostic intent: television ads for computer software, photos on the fridge, gratuitous "eye-bytes" of increasingly questioned medical necessity. Sandelowski's work leads us to ask: What story about women and fetuses, parents and children, occupies our thinking, relations, and actions when the ultrasound image captivates caregivers and patients alike?

The fetal ultrasound image reminds us that myths are general stories that tell tales of the fantastic. By themselves, technical imaging and other icons of mythic technology do not adequately convey the experience of a pregnant woman "behind the screen";[19] parents who cannot take their child home from the NICU;[20] or a nurse whose work and knowledge is devalued.[21] Myths also fail to explain the rising concerns of nurses, physicians, and other practitioners who participate in care they cannot live with,[22] [23] and myths cannot illuminate the dehumanization so often reported by those in need of care.[24] For Sandelowski, the fetal ultrasound exemplifies several paradoxical features of our contemporary world. On one hand,

54

technology-as-myth powerfully commands our attention in the form of products

(in this case, an overly accessible technical image), experiences (looking at what

is inside oneself), relations (the fetal image is motherless), and thoughts that are

easily and often unreflectively consumed.[25] On the other hand, these potent

attractions of technology obscure our efforts to discern its actual nature within our

human context. Yet, re-contextualizing technology is essential if we are to move

beyond either indiscriminate acceptance or overly bleak predictions of its power.

Accordingly, the deepest value of general myths is their invitation to enter critical

discourse on the human hopes and terrors that their words conceal. To reach this

dialogue, we must first navigate the next dialectical turn, where myth is displaced

by the vernacular of technology as problem(s) for modern science and ethics to

solve.

Modern Science and Ethics: The Text of Technics

> Any moral theory that thinks of the material setting of society as an
> essentially neutral stage is profoundly flawed and unhelpful; so, in fact,
> is most of modern and contemporary ethics.
>
> Borgmann[26] (p. 110)

A mounting supply of expert advice for the problems of technology

signals implicit recognition of the increasing complexity of modern health care.

Science, ethics, management, and law collaborate to produce a proliferation of

directives for health care and its practitioners: professional and research codes of

ethics, risk management guidelines and liability contracts, conflict of interest

55

directives and financial formulae, procedures and policies, legislation and regulation.[27][28] Researchers and managers issue growing numbers of evidence-based guidelines with a similar problem-solving intent, striving to guide practitioners through a deepening maze of increased patient acuity, complicated treatment options, and limited resources for care. Another paradox emerges: Even as the instructions for technology-in-use multiply (for example, guidelines for fetal monitoring and the care of labouring women[29]), researchers and administrators note a repeated failure to change clinical practice as desired. Back in each hospital room a fetal monitor remains omnipresent, while dwindling numbers of nurses and midwives struggle to attend labouring women.

In part, the problem approaches of both modern science and modern ethics fall short when they treat any specific health care technologies, scientific formulae, ethical principles, or regulatory efforts as technical equations to be solved. Yet, however the numbers or words are juggled, we learn that equations do not suffice. Increasingly ill patients are attended by diminishing numbers of qualified physicians and nurses, and cost-cutting exercises generate significant "collateral damage". One glaring example of the damage wrought by under-examined technology is exemplified by "just-in-time" staffing techniques of scientific management that ignore credible research on nursing skill and patient outcomes.[30][31] In the wake of such ill-conceived health care re-engineering, the international dilution of professional nursing care has unfolded throughout this decade. Similarly, even as ethical frameworks for resource allocation are generated, distress with waiting lists and quality of care continues to grow.

As the gaps between scientific and ethical guidelines and actual practice enlarge, new disciplines emerge to tackle the problems of technological health care. Health technology assessment, health care economics, health care administration, and health information technology succeed to the throne first occupied by heroic myth, then by modern science and ethics. The aims of science and ethics are absorbed into the agenda of *technics* as we worry over such quandaries as the unanticipated directions of genetic research, the escalating costs of information management, and our inability to effectively regulate organ procurement practices. As with their predecessors, each new discipline increasingly notes its limitations for the tasks of technological health care as defined. Health care economists discuss the perplexing lack of fit between high-tech care and either traditional marketplace economic theory or its current refinements.[32][33] Health technology assessment experts openly declare the political nature of technology development and adoption,[34] and health information experts warn that the value of information is directly related to the quality of the questions we ask, and how we ask them.[35] Yet while researchers continue to accumulate scientific wisdom, their best insights are not consistently asked for by planners, the media, citizens or practitioners, who all seek palatable solutions for increasingly unpalatable problems. Problems only want answers now; "the fix" is sought in easily digested sound bytes of data, numbers, models, and equations. In the aftermath of myth, a new fable takes hold: that technology cannot only solve, but be solved. Technics is king.

57

Our dilemma with a technical problem-solving approach is partially explained in earlier historical work by Mumford, who contrasts the notions of authoritarian and democratic technics to propose alternative potentials for human relations with technology.[36] In Mumford's analysis, authoritarian technics prevail when prescriptions for human thought and conduct abound, even as the moral intents of the technical directives in question remain obscured from their intended audiences. Feenberg largely concurs with this part of Mumford's critique, and argues that scientific management techniques such as work redesign and deskilling exemplify the controlling mindset and morally ambiguous nature of authoritarian technics.[37] With a differing account of its etiology, Borgmann criticizes the way deskilling separates the moral ends from meaningful habits and practices of daily work.[38] The overriding fiscal agenda of reengineering in many health care settings lends support to the claims of both scholars. The tasking of nursing care decreases nurses' ability to adequately oversee the care of patients, and a decreased ability to watch over patients' welfare separates nurses from the moral ends of good nursing care.

Bergum's relational view of ethics also questions a singular focus on the problem-solving approach to clinical care, arguing that expert knowledge, position, or technology can generate coercive power that diminishes ethical relationships in health care.[39] Feenberg and other contemporary philosophers extend this critique of power imbalances, arguing that all of expert knowledge, position, and technology generate ubiquitous technical patterns of thought, relations, and actions in modern culture, patterns that both constitute and

58

perpetuate authoritarian technics. Claims of coercive power imbalances are consistent with stories from nurses and patients where expert knowledge of high-tech care privileges technical thinking over experiential or inherent knowledge, technique over being with someone who is suffering, or knowledge of machines over knowledge of healing.

As a technical orientation to both ethics and science, technics permeates our practice with a never-ending list of problems for "solution". How many mothers can one fetus or embryo have; how many embryos should be implanted in one mother? What are the ethical obligations surrounding informed consent in new reproductive technologies, in experimental clinical trials, in organ donation? What health care should be paid for with public dollars; what should be privatized? How much profit in the "business" of health care is enough; how much is too much?[40] How should corporate relationships with both research and practice be regulated, and how can they be monitored?[41][42] Are necessary questions in basic science pre-empted by funding policies that favour the growth of applied research?[43] Yet even as these and similar concerns preoccupy contemporary science and ethics, the "problems" of technology remain intractable to the methods of both disciplines. As Feenberg points out, the instrumental thinking of authoritarian technics leaves us mired in futile "trade-offs", where any option that we choose leads to the automatic loss of something else of value.[44] Good research does not translate to sound policy, and our multiplying problems with technology are not solved. In technics, the essential nature of our human encounter with technology remains concealed.

59

The limits of technics for understanding technology lead us to common questions for ethics, nursing, and contemporary philosophy. If the present trajectory of technology outstrips our ethical growth in health care, how do we recover ethics after technics? Can we rejoin the technological health care project with more viable human ends? The collaborative approach that Feenberg recommends for the ethical design and development of technology is not widely evident in the power relations between patients, workers, managers, and other parties that are characteristic of modern health care. For Feenberg, corrective action in a global market economy requires the democratic social construction of a "new technical code" that guides the design of technology in a more ethical way.[45] For Borgmann, a renewed commitment to those things and practices that can morally centre our lives is essential for meaningful reform.[46] If we sought to develop a new approach to technology that considered the work of nursing scholars and contemporary philosophy together, would we match our current devotion to evidence-based health care with equal funds for other types of human inquiry? If material support for philosophic, historical, phenomenological, and other research reached a fraction of the dollars that are allocated for random clinical trials, would we generate enough critical text to rewrite technology? Can we recover a more ethical approach to health care?

60

After Technics: Creating Critical Text on Technology

A nurse pointed out to me how Morgan would try to rouse herself every
time I arrived at her bedside...I too started to notice how Morgan opened
her eyes and looked around at the sound of my purse hitting the floor
each morning as I arrived...The part of me that I had held back, hoping
to protect myself, was held back no longer. Although the realization that
this child meant as much to me as my 3-year-old was terrifying, it was a
realization I was glad not to have missed.

Schroeder[47] (p. 22)

Sort of, what's on the monitor? People walk in the room to look at the
screen, and not a word is said to the patient sometimes. And, I think,
there is somebody attached to the monitor, and the monitor is not the
only thing that is coming on.

Haley[48]

If technology cannot invariably cure us, and if we cannot solve technology
as so many problems in health care, can a dialectical lens "dis-solve" our current
stalemate by casting a different light on everyday practice? Inherent knowledge or
critical text on technology is refined by ongoing, reflective conversation between
practice and theory. Lived experience and abstract knowledge cannot be held in
comfortably distant and thus sterile balance. Our inquiry into technology and
nursing must consider all of contemporary philosophic, scientific, ethical, social,
political, economic, personal, and cultural knowledge, and our practice must use
theory and story to challenge unreflective patterns of technical thought and action.
In dialectic, we reflect technology back to ourselves in the light of several
different and equally significant texts.

61

In Bergum's notion of ethical care, abstract knowledge about clinical problems must be returned to *inherent* knowledge that recovers the meaning of one person's experience, the person seeking care. Our disillusionment with technology as promise and as problem returns us to how we live out our commitments and relationships, and how we are as people and communities in a technological world. Re-understood as individual and collective moral choices of the everyday, technology shows up in health care as it does in all of our lives – in the nature of our thinking, relations, and approaches within ourselves, and with one another. The habits, practices, and orientations that pattern daily practice assume moral significance in a technological world. For better or worse, we face critical moments all day long in our ways of being with patients and each other, and each instance tells us about who we are in a technological world. Do we ask a labouring woman for her knowledge about her contractions, or does our attention linger more easily on a fetal monitor strip? Is there always one more task to displace our presence with a frightened family? Is our true nursing responsibility to "get the consent signed", or to build respect, trust, and dialogue with those in our care? In critical text, the crucial moral choices about how we will be are made one by one, each day.

In this critical view of modern moral life, there are also many questions about the corporate consumer model of health care. Who currently decides that health care is an industry instead of a commonly owned public good, and who should decide?[49] Are citizens entitled to any high-tech health service regardless of communal costs, and what counts as "cost-effective" health care, and to whom?[50]

62

Are there other criteria besides cost and therapeutic benefit to patients that matter to us when we plan health care for the next century? Will dollars for designer babies continue to flow while we neglect adequate primary health care for pregnant women who live in poverty? Will corporate profit and environmental activism remain at futile odds, or will the future agenda of corporate citizenship allow us to regenerate sickly environments and renew our own potential for health?[51] Technology cannot alter in modern health care what we will not face in ourselves and in our lives.

Inherent knowledge of technology is knowledge that we need for ethical care. Proposing a relational ethic of nurturance as one viable path to inherent knowledge, Bergum notes that "cure is only one of the many ways in which healing can occur."[52] What is the nature of healing beyond the technological project of modernity? Can we develop the responsibility and the commitments that we need to recover the ethics in technics? How can we articulate the human ends that matter most to us, and reinvest the modern means of technological health care with those ends? If science, ethics, nursing, other health disciplines, philosophy, and society forged a joint project of health in a technological world – what would it look like? Who would have expert knowledge, what would we recognize as a sustainable technological development, and why? What would constitute adequate ethical knowledge in health care, and how would we craft its development? In critical text we can ask these questions about technology and about ourselves, with a commitment to keep talking until there are no more stories to tell.

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64

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66

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68

Chapter 3

nature *n.* About 1275, bodily processes, restorative powers of the body; later, innate character or disposition (about 1380), and inherent creative power or impulse (about 1385); borrowed from Old French *nature,* and directly from Latin *nātūra* birth, character, from *nāscī* be born; see NATIVE. The meaning of the material world, the features and products of the earth is first recorded in 1662. The use of *nature* in the sense used in *human nature* is found in 1526.

Robert K. Barnhart[1(p 695-696)]

restorative *adj.* capable of restoring or renewing...borrowed from Old French *restauratif,* from Latin *restaurātus,* past participle of *restaurāre* restore;...*n.* a food, drink, or medicine that restores health or strength.

Robert K. Barnhart[1(p 919)]

strength *n.* 1106 *strengthe,* in *Peterborough Chronicle*; developed from Old English *strengthu* power, force, vigor, moral resistance (before 899, in Alfred's translation of Bede's *Ecclesiastical History*), from *strang* STRONG...

Robert K. Barnhart[1(p1075)]

70

Abstract

A research conversation between philosophy of technology and nurses' work in acute care surfaces parallel technological practices that threaten the healing nature of two modern projects: health care and ecological restoration. A metaphor of ecological restoration is used to explore the consequences of denatured health care work for the welfare of patients, families, practitioners, and healing communities. It is argued that in health care systems where the mismatch between treatment "options" and resources for care steadily grows, the nursing discipline must develop ecological literacy for a technological world. Key words: *nature, healing, communities, systems, ecosystem, technology, work, denature, ecological restoration, ecological literacy*

71

NURSING IN A TECHNOLOGICAL WORLD:

IN SEARCH OF HEALING COMMUNITIES[1]

...it just never stopped. As soon as your bed was empty it was being

filled...they are pushing you even two hours before the bed empties to get

that patient out, because you are getting an OR into that bed. Just when

you had a patient to the point where they were doing more self-

care...you would quickly get someone who was a total care again... he

workload intensified on an ongoing basis.

Ellen [2]

... the division of labor fits labor to the machine, not the other way

around. This tendency finds its first culmination in the time and motion

studies of Taylor and Gilbreth. The productive process, and human work

in particular, was regarded as a force of nature that had to be conquered

and rendered available...

Albert Borgmann[3 (p116-117)]

The mounting complexity of first world health care systems does not

equate with the development of better health care. For communities around the

globe, issues with the affordability, quality, and ethics of health services

relentlessly compound. Within a highly debatable classification structure,

"developed" nations wonder just what they have wrought with modern health

systems, and "developing" nations question what biotechnological advances they

should or should not adopt. The present research on registered nurses' accounts of

their work in acute care and contemporary technology theory indicates that

unchecked technological practices in acute care environments dismember and

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[1] A version of this chapter is accepted for publication. Marck 2000. *Advances in Nursing Science* 23 (2).

denature nursing care into assembly-line tasks that depart from the healing practices of good nursing care. The problematic technological practices that prevail in modern health care also confound efforts in the field of ecological restoration to repair damaged lands.[4] The presence of parallel concerns about technology in two healing endeavours lead to common unresolved questions of how to foster healing work, healing relations, and healing communities in our technological world.

Michael argues that metaphors are "powerful means for defining boundaries (barriers) and spanning them (bridges)".[5 (p476)] The metaphor of ecological restoration for health care that developed in the research reflects some of the concerns of other recent nursing scholarship. Proposing that "ecologies of community caring" concern the question of "self-in-relation" to a larger and dynamic living whole, Bent reminds us that the etymological origins of ecology are traced to the Greek word for *home*.[6(pp 33 – 34)] Bent asks us to search for "the way home" to a heightened ecological commitment through a variety of actions, including mindful *praxis* and a willingness to assume the care of all our communities on the earth we share.[6(p.34)] In other recent research, Bergum calls for a relational ethic that fosters shared respect and commitment, between persons and as we consider our place in the larger world.[7] Additional work in nursing and elsewhere [8-12] suggests that environmental concerns have sought the attention of modern health care systems for some time.

One question that arises from the present research extends the work of these scholars by asking: How do we find the way home to a deeper respect and

73

care for hospitals as healing communities in the complex health systems of a technological age? The research findings suggest that to counter the problematic technological practices that characterize acute care environments, nurses must develop an ecological literacy[13] that first reinterprets and then reconstructs our relations with a technological world. The path to a different ecological commitment in acute care begins with asking practicing nurses to speak about their everyday work in the complicated environs of modern day hospitals.

Nursing and Technology: A Method for Dialogue

> We do not stand alone in practice...It is vital that we all enter into the dialogue of scholarship and knowledge development in nursing, for we are diminished by the voices we do not hear. We can hear these voices through the stories and narratives of practicing nurses, which explicate, in an elegant manner, the meanings and values inherent in practice. In this way we can all be honored for what we do and the knowledge we create within our community.
>
> M. Katherine Maeve, 1994[14 (p21)]

To research technology and nursing in the context of hospital environments, ten registered nurses were engaged in successive conversations with the researcher about their daily work as staff nurses. Participants worked in one or more of 7 tertiary care hospitals located in 5 cities across the province of Alberta, Canada. The nurses possessed between 10 and 34 years experience of nursing practice, and the clinical areas represented in the study include orthopaedics, neurosciences, operating room, recovery room, diagnostic care, cardiac and general systems intensive care, burns, general and cardiovascular

74

surgery, and labour and delivery. The collective practice wisdom of the

participants included clinical nursing, unit and program administration, staff and

student education, nursing research, and data collection for medical research. The

educational background of participants was diploma (5), post-basic degree (4),

and Masters prepared (1). The majority of nurses were also involved with at least

one of the following affiliations: a clinical specialty group, professional

association, nursing union, church, school, or community groups. Individually,

the research participants possessed between ten and thirty-four years of nursing

practice; their collective clinical wisdom exceeds 200 practice years.

The critical hermeneutic dialectical method of the present research is

crafted from work in nursing,[15-17] critical social theory,[18-19] philosophy and

hermeneutics,[20-21] and contemporary philosophy of technology.[22] The

methodological intent is critical multiplism, where several sources of knowledge

are tapped in order to form questions, methods, findings, and sources of criticism

that correspond to the problems of everyday practice.[23] The aim of the research

design is to search out and probe competing truths about nursing and about

technology from a pluralist perspective. In this sense, the research design is

intended to be consistent with Sandelowski's arguments on the uses and guises of

theory,[24] including that methods should suit the questions posed.

Throughout the research, the critical hermeneutic approach of the research

was reflectively mindful of language and its particular uses, both in contemporary

technology theory and in the nurses' accounts of their work. From the critical

perspective, the research proceeded with the propositions that language constructs

75

rather than represents reality,[21] and that language develops "to understand the world and the world is simultaneously understood in language".[25(p3)] How we speak carries ethical meaning about how we are as people, and how we are with one another. The dialectical approach of the research is transformational as Dunning outlines it.[20] This form of dialectic equally departs from theoretical methods that defeat one side of a paradox to develop causal explanations and from transactional methods, where conflicting interpretations of human experience are reciprocally translated into a single non-contradictory proposition.[20] Instead, the interpretive aim of the transformational dialectic is to propose possible truths about all aspects of a given paradox within the context of a larger explanation, and some contradictory tensions within the larger phenomenon under study always remain. From this view of dialectic, opposing claims about the two primary phenomena under study, technology and nurses' work, were alternately interpreted within their own bounds and then together in light of a larger and often paradoxical phenomenon, the nature of nursing in a technological world.

The research process began with the question of how the fields of nursing, health care ethics, health policy, and philosophy of technology have grappled with the subject of technology to date, and the case for closer scrutiny of nurses' everyday experience of practice was established.[26] On the heels of this initial critique, several questions were developed for further research, including: How do registered nurses describe their work, work environments, and work relationships in acute care? and What can a research dialectic between registered nurses'

76

accounts of their work and contemporary technology theory tell us about the nature of nursing, health care, and technology in contemporary society? To investigate these questions, a purposeful sampling strategy of phenomenal variation or criterion sampling was used to target the phenomenon of technology in nurses' work. [27] Phenomenal sampling entailed the collection of data from two primary sources of knowledge: registered nurses' narratives of their work, and theory drawn from contemporary philosophy of technology. Ongoing assessment of sample adequacy was based on the intended uses of the data, the research methods and sampling strategies employed, and progressive critiques of the emerging research analysis. [27] [28]

After initial critical hermeneutic analysis of the conversations with nurses, excerpts from the research transcripts and proposals about technology were considered together in successive dialectic interpretations. To strengthen the analysis, expert criticisms from nursing practice and theory, research methods, health care ethics, philosophy of technology, and ecological models, especially ecological restoration, were incorporated into the research design. Throughout the research, the guiding principle for scrutinizing both technology theory and nurses' accounts of their work was to question their respective texts. The contradictions that come to light for nurses' work in a technological environment are not necessarily resolved. Instead, competing "truths" about the nature of technology and nurses' work are made more explicit, to raise open-ended questions about nursing practices that heal and about recurring technological practices that separate nurses from healing work. To locate the fault line where nurses' work

77

splits off from the endeavour of healing, we enter the ethical divide of modern health care.

Nurses' Work and Healing Places: Inhabiting a Fault Line

...my charting was so hard because of everything that's going on, of all the drugs I gave her...I had things to do in the computer, I had things to do on paper. So they sent in a nurse to relieve me. The girl they sent in of course is going to get thrown into this whole situation. Doesn't know the patient so I give her a report and I leave and I sit out at the desk, which is just around the corner. We really don't have a desk. We have a charting desk. I sit at the desk and chart and I'm thinking "Oh thank goodness, she is delivering." The doctor comes out, the baby goes to the NICU, and I can hear yelling...I went into the room and there the patient is half off the delivery table, trying to pull on her own nightgown. She still has the epidural in, she is still frozen.

Haley[2]

A core assumption that guided the research was that ethical nursing practice is pursued as part of something that heals. Yet, all of the nurses indicated that while their purpose was to bring about good care, their ethical concerns with patient care and with the health system were on the rise. The task of the research became to explore the nature of an ethical divide between nurses' best intentions and the actual nature of their work in the technological environs of acute care. The definition of technology adopted for the research was "the characteristic way that we take up with the world"[3(p35)] Research participants appropriated this definition of technology as "the way we do things and the way we are".[2] At the outset of the study the notion of health was defined as a resource for daily living,

78

[30] but in the research dialogue, health came to be re-interpreted as a source of thriving in the complex ecosystem of a technological world. This re-definition arises from recent work in ecology[4 31 32] and evolutionary biology[33] where a healthy ecosystem is discussed as one with structures, relations, and processes that cultivate the co-evolutionary renewal of all biological life.

In light of these definitions of health and technology, the definition of nursing that guided the inquiry was and remains a practical science of fostering human health in a technological society. The intended sense of the term *practical* is a critical one, where theory and practice generate an ongoing dialectic that questions the philosophy, art, science, historical context, politics, and ethics of fostering health in a complex technological age.[22 29] Here the notion of nursing as a practical science includes but encompasses much more than the particular problems we engage and solve in everyday research and practice. Specifically, what is scientifically sound for the nursing discipline must also sensibly and ethically align with human situations that we cannot "solve", but must equally engage and find our way through.[7 8 26]

The technology theory considered in this research draws primarily from two significant and unaligned contemporary philosophers of technology, Albert Borgmann[3 29 34] and Andrew Feenberg.[22 35] In Borgmann's paradigmatic theory, the metaphor of a device is used to develop significant criticisms of our personal and communal consumption in the commodities mindset of a technological culture. In Feenberg's critical theory, our problematic relation with technology is attributed to a global corporate economy that perpetuates technology's non-

79

democratic design. Despite the important political differences of their approaches, both theories are considered in the research for their capacities to explain the nature of nurses' work in acute care, or to be explained by the nature of nurses' work. With these notions of health, technology and nursing in view, we enter the environment of acute care to question technology, and to question nurses' work.

Questioning Technology, Questioning Nurses' Work

We have a video screen in the room and everybody is watching the video screen, and who is watching the patient? What if the patient is turning blue? I mean we had a respiratory arrest when that occurred. Nobody was watching the patient's airway. You know you are standing there, but you are watching a video screen...we've had the equipment aides suctioning patients rather than the nurses, because the nurses are so caught up in doing the technical end of things...what is our priority here?...somewhere along the line, somebody has identified that the technical part is the most important part...the physician is the one that is supposed to watch the screen. The nurse is supposed to watch the patient.

Michelle[2]

Bergum writes that sometimes, "ethical dialogue means finding the question for the answer we already have".[7 (p 167)] She argues that to approach ethics with a spirit of open-ended questioning acknowledges the ambivalent nature of moral experience in our lives. A sense of technology as characteristic ways of being in the world directs our attention to the objects, practices, relations, and habits of thinking that distinguish our modern existence. In addition to the more obvious ethical dilemmas that plague high-tech care, this notion of

80

technology refers to less reflective choices that implicitly shape the moral fabric of health care, and of our lives.[3][22] What we do without notice becomes as significant, if not more so, as the ethical issues that grab daily headlines. Everything is set into question, in pursuit of a dialogue that nourishes ethical praxis in a technological age.[7][26][35]

Bergum's notion of ethics as question[7] is reflected in the research conversation that ensued between philosophy of technology and the nature of nurses' work. The etymological source of the word nature is the Latin noun *natura*, which means birth or character, drawn from the verb *nasci*, which means to be born.[1(p 695-696)] Michelle's words reflect that the character of nurses' work and the character of technology are ongoing, vitally linked questions about what constitutes ethical praxis in our current hospital communities. We already know that the nurse should watch the patient (the answer), but which questions help us to understand what draws a nurse to the screen, or to the patient? Always, best practice for the nurses in the study included questions of what was and was not ethically acceptable in the provision of care. However, determining the ethics of sound clinical action was often a formidable challenge in the swamped environs of scientifically managed health care, where everything that mattered had to have a number, a rule, or both. In Borgmann's latest work on the nature of information in our modern age,[29] most ethical and scientific guidelines for clinical practice, however conceptually sound, would be categorized as technological signs that should inform but not prescribe our actions. Further, as endlessly repeating forms of modern technology, Borgmann warns that the boundless production of

81

information becomes no more than "a profusion of signs…that instead of irrigating the culture, threatens to ravage it.[29 (p 213)]

Borgmann's objection to a cultural preoccupation with technological information over other knowledge about reality is that we too often fail to thoughtfully balance and integrate our sense of what matters in daily practice. The nurses' accounts confirm Borgmann's concern, as every participant identified fellow practitioners who exhibited an undiscerning fascination with the technological signs on the monitor, lab result, or other technical data. They also noted that often, these practitioners neglected to attend as consistently to such natural signs[29] as the course of a woman's labour, or the abdominal guarding of a patient with evolving sepsis. In such instances, nurses, physicians, or other co-workers not only forgot to gather pertinent clinical information; they also frequently failed to express when or why such knowledge mattered for sound clinical care. Other accounts referred to situations where such cultural signs[29] as a complete shift report, a family member's questions, or a colleague's worries were devalued or dispensed with by co-workers, sometimes to the point of patient harm. These scenarios lend support to Borgmann's view that when we forfeit vital natural and cultural sources of knowledge for a preponderance of technical information, the compelling attraction of technological signs "threatens to displace reality"[29 (p1)] and to separate us from critical knowledge of things that matter for moral action. It becomes all too easy to lose a sense of who we are, and therefore, what it is that we must do:

82

...they are dying and we seem to be doing more and more things...this is
to me the time when I should be just stopping everything...instead, I'm
trying to explain to the family why there is 20 different colored things on
the monitor. "Please don't look at the monitor", I want to say to them,
"it's taken me years to understand it. Just be here for them". But they
can't help it, they can't help looking.

Blaze[2]

What is at work when families do not find ways to be with their loved

ones as they die, and instead watch a dazzling show of machines from an

anguished sideline? Why do nurses so frequently struggle to redirect the attention

of families and practitioners, including themselves, from a predominantly

technological interpretation of illness to one that is more whole? All of the nurses

who took part in the research recounted good nursing care in their own practice as

a complex awareness of far more factors than the ever-present technological

signs. Their narratives of good nursing care converged with the detailed

descriptions of skillful nursing found in other recent research by Cameron[38] and

Bjork.[39] As with these studies, nurses in the present research needed specific

knowledge at report time and careful organization of their day and their rooms to

"prepare to nurse".[38 (p 125)] Good nursing care depended upon continual translation

of a changeable stream of natural, cultural, and technological signs, and nurses

watched over patients and their environments for specific, complex purposes.[38-39]

As Kara put it, where such vigilant, coordinated awareness was lacking, anything

could happen:

83

*...I try to caution people that in our specialty, nursing in the operating
room, it doesn't matter the age or condition that we are going to be
dealing with. There are many other factors that could come into play,
and so with every case, we need to be on guard for the possibilities of
getting into trouble...you cannot brush anything off lightly...it could be
their first time under anesthetic. There's all the unknowns of what's
going to happen.*[2]

If we revisit Borgmann's explanation of technological signs, it becomes
arguable that when the nurse watches the video screen rather than an unconscious
patient's airway, the nurse has mistakenly assigned the technical image the status
of "information as reality".[29 (p 2)] Nurses in the study recognized and countered
this erroneous pattern of technical thinking with a variety of strategies designed to
reassert the fuller clinical reality of their patients' needs for nursing care. As Lara
explained, she routinely ignored directions for completing the hospital's workload
measurement tool, because the criteria ignored half of her patient load:

*Right, babies and moms and teaching, and there is no forms. What I would do is I
will add the baby on there and I'll put the baby's number, I'll give the baby a
number and that's not on our scale at all, but I don't care because they are a
part of my load.*[2]

Some might classify these and other actions that the nurses described as
sabotage, but we need to ask: When nurses perpetually struggle with the direction
of a technologically patterned reality in their work, what is at issue? In the present
research, both Borgmann's and Feenberg's concerns about technological
information gain purchase. First, the nurses' accounts support Borgmann's

84

contention that we frequently ingest technological signs with indiscriminate

consumerism, and just as easily discard them for the next supplement that

inevitably arrives a few moments later.[29] The thin but brilliant face of the screen,

the lab printout, or other constantly updated technical information proffers a

glamorous but disposable existence that smothers attention to deeper thought and

committed practice.[29 34]

However, the nurses' stories of resistance also support Feenberg's

argument that the technological and cultural signs of capitalist societies, including

the text of workload measures and other scientific management practices, effect a

non-democratic "technical code"[22 (p 79)] that maintains the economic and power

interests of a concentrated elite. Thus Borgmann shows us how easily the screen

lures practitioners and even families and patients into the false promise of

adequate knowledge for care, and Feenberg shows us how the covert script of a

"scientific" workload tool primarily serves the goal of fiscal constraint, not safe

patient care. Together, Borgmann's critique of technology's promise and

Feenberg's criticisms of its profit-oriented design explain nurses' growing

objections to system-wide initiatives of workload measurement, re-engineering,

and several other current trends in health care management, in this research and

elsewhere.[38 40 41] Yet, if nurses and contemporary philosophy share valid

concerns about technology and information, what does it mean for nurses' work?

How do nurses continue to nurse in a commodified world – or do they? What is

the nature of nursing in the marketplace of modern health care?

Nursing in the Marketplace: The Nature of Assembly Line Care

The ideal ratio that's accepted in obstetrical practice is one- on- one nursing when you have a patient in active labor. Of course on days when you are talking eight birthing rooms, three assessment, well five assessment beds in two other rooms, you would end up sometimes with two and three patients. So you would literally, if I had two drips going and you are doing your increases every 15 minutes...you could just about get it down to where you would run into one room, you know start your IV, start your drip up, and that would just be about enough time to do your charting on your partogram, run to the next room, turn her up, run back to the other room...

Lib[2]

na-ture n. About 1275, bodily processes, restorative powers of the body; later, innate character or disposition (about 1380), and inherent creative power or impulse (about 1385); borrowed from Old French nature, and directly from Latin natura birth, character, from nasci be born; see NATIVE. The meaning of the material world, the features and products of the earth is first recorded in 1662. The use of nature in the sense used in human nature is found in 1526.

Robert K. Barnhart[1] (p 695-696)

What is the nature of nurses' work when "efficiency" dominates rather than informs the equation of work –what is the character of their care? Lib's description of a hectic but typical evening mirrored several scenarios that other participants relayed where "information" about the numbers of nurses was supposed to "add up" to good patient care, but did not. When a given number of nurses did not translate into acceptable care, participants cited a variety of related circumstances. Nurses mentioned growing instances of inexperienced or "burnt

86

out" nursing, medical, or other staff. There were also reports of chronic shortages of functioning and available equipment and other supplies; dysfunctional communication between staff, with patients, and with other parts of the system; or staffing ratios that were constantly calculated "too close to the bone". To worsen matters, Smoky's story illustrated that where these or similar circumstances prevailed, the confounding role of modern information structures often came into sharp relief:

> *I didn't take a break and I ended up working an extra hour, just because I do all my patient care when I get into situations like that...but it was just one of those times when it took too much effort to get those sheets out of the chart and then to chart the care, because you'd get interrupted. You'd put your clipboard down with all of these different checklists for different patients and then you put it down somewhere and you get interrupted to go and stamp out some other little forest fire...I thought, the heck with it. I've got my little piece of paper in my pocket, I'll do my little personalized checklist.*[2]

As each nurse talked about shifts like Smoky's, the tone and pace of their speech often eliminated spaces for commas, periods, or other grammatical pauses that one might expect to hear in casual conversation. The rhythm of their talk took on the tempo of their work, an almost relentless meter that left no room for recovery before the next task arrived. Listening to the nurses during conversations, or listening again to tapes at later points in the analysis, was at times like holding one's breath. In many instances, the text of their stories took on an undertone of threat, the threat of unacceptable care or even patient harm. As Sarah recounted her frustrations with hospital equipment, it was evident that the

87

equation of good nursing care was far more complex than the calculation of any numbers could provide:

> *...either it doesn't work, or there's not enough PCA pumps and you have a heroin addict that has broken her femur and there's no pump, so you can't get in there with the morphine quick enough - whereas you could have a pump and just give it to her...we are struggling with all of that, so to me, you can pay me $30/hour. I mean sure I'd like the money but I mean it doesn't make it any easier to say to someone, I'll be there when I can get there.*[2]

When work is a steady production line of patients, equipment, nurses, and tasks that do not add up, even information itself becomes a commodity. Like other high-end products in the health care marketplace, the content of most technological information is designed by a relative few, but its' currency wields the power to significantly alter the lives of many. For nurses in the research, a system-wide tendency to treat technical information as a more accurate reality than the clinical judgements of seasoned practitioners brought about inevitable conflict. Whether the data at issue referred to staffing ratios, lab tests, or other "realities", the ceaseless production and calculation of technical information became the primary commodity in a deteriorating equation with patients, nurses, and treatments as lesser commodities. As nurses experienced the combined pressures of faster discharge and transfer rates, leaner resources, sicker patients, and superficial technical patient assessments, conflicts between ethical care and work demands increased. In a sense, the overuse and misuse of technical

information to "efficiently" manage the delivery of clinical care assumed the role of false advertising in a health care market gone wrong.

Several nurses referred to their practice settings as a "factory", and the most frequent comment on the ceaseless nature of speed up was variations on the observation that "the beds were never cold".[2] In between days of non-stop running and the ever-present threat of detrimental care, nurses noted that when brief respites did surface, few co-workers wanted to think about policies, continuing education, patient care conferences, or team meetings. As Michelle described it, nurses were tired and disinterested "factory workers. It's just: "You come in and you just do your job and you go home, don't get me involved".[2] Thus while lack of time was a perennial issue, it was not a full explanation of what was at stake. Rather, the nurses' fatigue seemed to centre around a systemic phenomenon of speed-up that confounded many aspects of their work and depleted their own reserves:

> *...you would expect to have much heavier patients than in days gone by*
> *....An empty bed for a few hours was all you'd ever see in a way of*
> *reprieve from your busy day. It was just always taxing, you'd just get a*
> *break and you'd have to get revved up and go and do it all over again.*
>
> Ellen[2]

The deleterious effects of speed up on nurses and patients were clear. Most of the nurses in the study reported recurring instances of work through mealtimes, into second shifts and on scheduled days off. Shortages of clinically experienced nurses were common for all but two of the units covered in the study;

and most of the participants turned down more extra shifts then they accepted. As Lara couched it, " I have to go far away or else. The phone rings every day".[2]

Patients rarely came to hospital pre-operatively and the timelines for discharge were often earlier than nurses believed to be safe. One result of this systemic "turnstile" was that the patients who presented for nursing care were constantly, pressingly ill. The course of nursing a patient or group of patients no longer ebbed and flowed in a rhythm that included moments to reflect, gather energy, support each other or a family member, restore the environment, or pursue a troubling clinical puzzle. In the rare free moment when another task did not arrive on the heels of its predecessor, a reprieve from the factory line became the greatest aspiration that most nurses could muster:

> *I know that there are times that I worked there I've been unsafe I've been so tired...it was around 4 o'clock in the morning and it takes a lot for an overtime call...I was already at that point looking after three or four patients and an admission, I hadn't sat down all night...you feel like you are swaying because you are so tired and she said "Can you take that assessment?" and I looked at her and I said I think you better find, I was just exhausted...I just knew that I could not do one more thing at that point.*

Lib[2]

Nurses discussed the speed-up of their work as an intractable feature of the setting that permeated the thinking, relations, and actions of practitioners and patients alike. They gave similar accounts of other nursing colleagues or physicians in a mode of speed-up, and they discussed patients or families who simultaneously held great expectations of quick relief from technological health

90

interventions and open mistrust in the system's ability to provide good care. In many settings, nurses sometimes felt as if the skilled assessments and wise judgements of good nursing care were almost anomalies or artefacts of a bygone era, as production became "the only game in town". For several nurses, such fundamental practices as preventing unnecessary pain, pneumonia, or skin breakdown too often became secondary to getting more medications out, completing another form, or getting another patient into or out of one of the scarcest commodities of all, a bed. The question that developed in this stage of dialogue became: How is it that nursing care breaks down into assembly line tasks even when patient care suffers – what accounts for an incessant, counter-intuitive speedup of nurses' work?

Speedup and Denatured Nursing: The Hyperreality of Modern Health Care

We were stamping out forest fires. So we would just go from one forest little fire to another little fire trying to get things corrected. Like this patient, did he have his PPT done, because he's on a heparin drip. And that hadn't been done since early this morning ...I'd better check the blood for this other too because this insulin shouldn't have been running with this. I gave him medication to help him settle down because he was all frustrated. He was having pain. The other patient then you get them going to try and do some teaching, this is what we are going to do for you tonight, dah, dah, dah. That whole four hours was like that. I didn't take a break, just boom, boom, boom.

Smoky[2]

91

de-na-ture vb. (tr.) 1. To change the nature of. 2. To change (a protein) by chemical or physical means, such as the action of acid or heat, to cause loss of solubility, biological activity, etc. 3. To render (ethyl alcohol) unfit for drinking by adding methanol or other nauseous substances 4. To render (fissile material) unfit for use...

Paul Hanks[12 (p 396)]

What does it mean for nursing care when nurses find themselves either caught up in perpetual tasks, or transiently drifting in scarce "down time"? Why does the nurse's experience of the pace and integrity of work matter anyway, and for whom? If nurses simply "managed" their time and other resources more efficiently, couldn't the frequently hectic rate and volume of work be effectively and efficiently "nursed"? Several stories that the nurses shared in the research suggest otherwise. For instance, Smoky is a critical care nurse who cherishes a recent award for clinical excellence from her peers along with letters and poems from former patients and families. Yet, her account of a horrific evening on a unit in chaos immediately draw us into a world where she could not nurse her patients, however she tried. From the first moment of report onwards, the shift just became one endless battle to stop further harm.

A critical hermeneutic of nursing and technology encourages us to question our assumptions about what nurses do in the nursing of their patients. We hear the driven nature of this nurse's work on this evening, boom, boom, boom. We almost hold our breath as we fly from room to room with her, trying to hold an impossible situation together with experience, skill, commitment, and camaraderie: "We were calling each other Smoky the Bear".[2] We can perhaps see

92

the charge nurse who phones one more time for more staff before jumping in to help, and then hear the phones ring away unanswered at the abandoned desk. Finally, near the end of her narrative, we hear the silent anguish of the dying patient who did not get the care that she should:

> *...I like to make myself available, okay I'm yours, I've finally got this time...in this particular situation I had to go immediately to things, the biggest problems...the squeakiest wheel first. I never even got in to see her. I never even really got in to see her and ask her how she was doing until probably an hour or two later.*
>
> Smoky[2]

Albert Borgmann claims that when "anything is added to life that takes time, the web of life is torn and rewoven; a hole is made by the new device...A timesaving device creates a hole in traditional practices no less than does a device that devours time".[3 (p 112)] In his critique of our technological culture's steady, thoughtless consumption of commodities, Borgmann discusses a notion he calls "final hyperreality".[34 (p 87)] Hyperreality, Borgmann argues, comes about through our mistaken and largely unreflective absorption of technology as reality. The features of hyperreality that become significant to our experience, he claims, include that it is "disposable and discontinuous"[34 (p 96)] from the actual context of our lives, and yet its brilliant presence is insidiously, remarkably persistent. In arguments that mirror some of Sandelowski's work,[43] Borgmann argues that the under-critiqued glamour of technology shapes our gaze towards a superficial orientation in daily life, a thinner reality that does not keep more fundamental moral practices in view.[3 29 34] As virtually unlimited technological signs imported

93

a potent yet shallow veneer over the deeper complexities of clinical care, nurses reported that such practices as narrative charting, thorough shift reports, being with patients, alleviating pain, and watching over patients and environments were often displaced almost without notice. Repeatedly, each nurse's talk turned to the steady supply of forms, graphs, and other documents that arrived for completion, and to the endless treatments, medications, and other tasks that were juggled in lieu of careful observations and sound integrated clinical judgements. They spoke of the patients who constantly presented for transfer, admit, or discharge; yet, were not always nursed. Whether numbers "added up" or not, most of the nurses found it increasingly difficult to find anyone who would listen to their concerns about patient care:

> *...there was one shift when we had six laboring women and two nurses,*
> *and I phoned for extra staff to the shift supervisor. Her first response to*
> *me was "Can't you cope?" and I said, "Pardon me?" I made her repeat*
> *it again. I said no I cannot cope, I cannot be in six rooms with six*
> *patients. I only have two hands, my colleague has two hands...and I*
> *don't have time to sit here and explain this to you when I have patients to*
> *care for. I need more staff and I need them now...*
>
> <div align="right">Lara[2]</div>

The use of fewer and increasingly strained resources to turnover greater numbers of acutely ill patients is counter-intuitive to the principles of good nursing care. Yet, a predominance of "turnstile" health care was reiterated throughout the course of the research. The hyperreality of speedup demonstrates Borgmann's claim that "the development and adoption of a technological device always and already constitutes a moral decision" of the fundamental kind, a moral

<div align="center">94</div>

choice of who and how we will be.[34 (p 110)] From endlessly dividing tasks to the persistently inaccurate staffing tools and unremitting demands for documentation, the assembly line nature of the nurses' work amounted to "nursing as a blue-light special".[40 (p 34)] A "big box store" mentality continually endangered the healing practices of thorough clinical judgements, vigilance, and comfort as intended nursing care mutated into a frenetic series of fragmented activities. As clinical assignments emerged from a task mentality rather than actual nursing relations with individual patients, nurses reported situations that deeply disturbed them:

> ...I had three patients, one was a young girl who was 17. I had two drips
> going when she came into the assessment room, and somebody had
> passed her off to me because they ended up going for a section or
> something, and they said "Can you keep an eye on her? Don't worry
> about her she's not doing much. She's in normal labour." I came out of
> one my rooms and I heard this strange noise coming from this
> assessment room, and I thought, What the heck, and went over there and
> this poor girl was just absolutely bent over and beside herself. I thought
> to myself, she's alone and I thought, you know, for somebody that's in
> early labour, she's looking pretty distressed. So I said to her, "It sounds
> like a contraction, it seems that the contractions are coming pretty quick,
> do you mind if I just examine you?" She was just about fully dilated and
> we ran her into a birthing room, and she had the baby. And I felt, I felt
> like I had betrayed her trust.

Lib[2]

While Lib indicated that sporadic attendance to women in labour was unacceptable from her viewpoint, an inability to adequately attend one's patients was frequently reported by most of the nurses in the research. As an expert in her specialty, Lib used several strategies to counteract the effects of speed-up on her

ability to nurse. At the same time, she and the other participants mentioned

several situations where the environmental imperative to "move along" could not

be overcome. Again and again, the nurses' stories indicated that when nurses

found themselves more focussed on speed than on the practices of nursing,

patients were not adequately nursed:

> *These were inpatients. We'd send them back to ambulatory care, they'd*
> *take a quick blood pressure and then say, "We've got to get them out of*
> *our hair" and send them up to the units, so they'd go up to the*
> *units...they go up fast asleep and they were having respiratory arrest up*
> *in the unit.*
>
> Michelle[2]

In the research conversation between nurses' work and technology theory,

it was evident that that where efficiency was the over-riding value of the

environment, the practices of nursing receded before a steady assault of technical

tasks. The thinking, relations, and actions of nurses and their colleagues split off

from original healing intents, and the nature of good nursing care was displaced.

An unquestioned and illegitimate privileging of technology rendered nursing

knowledge, skill, and commitment "unfit for use" [42 (p 396)] in a system that only

sought production, and nurses' work was denatured of its healing properties.

> *...even turning a patient on their side you know following a procedure,*
> *putting the pillows in right, you know, positioning them correctly.*
> *Changing a diaper because it's soiled. Not just ignoring it and flipping*
> *the blanket over it and saying they are on a stretcher when they get up*
> *the unit they will be taken off it.*
>
> Michelle[2]

The nurses' experiences of denatured nursing lead us to question further: What is it to nurse your patients? How do nurses know when they are nursing, and when they are not? What does a nurse reflect on at the close of a day's work; how do nurses decide whether or not their patients have been well nursed? What enables nurses to hand patients over to the next shift of colleagues with reasonable comfort; how do they determine that patients will be nursed adequately after they go home? How does a nurse decide that the healing work of nursing, not just the day's "work" of modern health care, is satisfactorily done?

Borgmann proposes that before the advent of hyperreality and our current fascination with technological information, an "ecology of things used to enforce an economy of signs".[29 (p 213)] In effect, he argues, we searched our environments for a web of natural and cultural signs that referred us to the things that morally mattered in the material world. Thus, just as the flow of a creek was studied in order to ford it safely; nurses listened for the lull of a hospital ward at night to determine if patients were finally getting some rest; or checked the cleanliness of a sink because lethal organisms could colonize vulnerable patients. Out of this purposeful attention to nature, culture, and their respective signs, Borgmann asserts that a meaningful and sustaining reality was apprehended and woven. We practiced ecology as "the study of the relation of living things to their environment",[1 (p 313)] and in our practices, we learned what mattered most about being with each other, nature, and ourselves. With the irreversible accession of technology, Borgmann insists, our task is not to erase technological information, nor to mistake it for reality. Rather, our discriminating interpretation of

97

technological signs "is best allowed to develop freely within a world whose natural and cultural ecologies are guarded and engaged in their own right".[29 (p 221)]

Unfortunately, the nurses' stories repeatedly demonstrate the barriers to bringing such ecological commitment to fruition. What's missing in part, Borgmann's theory suggests, are the focal practices that enable nurses and their co-workers to recognize and nourish a viable ecology of natural and cultural signs.[29 34] By the term of focal practices, Borgmann means those habits; activities, rituals, and regimens that ensure a fuller moral commitment and regular engagement with "things in their depth and integrity"[3 (p 210)] that nourish a good life, focal things. For nurses, this means such practices and things as inspecting someone's skin thoroughly during the bath to prevent the breakdown that causes patient harms, or remaining with someone who is dying to respect as well as physically tend those who leave this world. It means the ability to spend extra time with an anxious mother because she is the sole caregiver of a fragile premature infant, or surveying a unit to ensure that everything is in order for the next, inevitable emergency. As Borgmann intends the term, focal practices orient nurses to the nature of what it is to nurse, and turn the nurse towards what is needed to nurse in the moment at hand. An economy of signs convey an ecology of things that matter for good nursing care, and the nurse attends to these signs, regardless of what captures the attention of others:

...often times, the patient's kind of squirming and...I often say, "Can I
give more sedation?" Sats are good, everything is, I can give them a
little running total of how the patient is doing, how much we've
given...and they'll say okay, sure. You know, they kind of have to be
reminded that there is a patient there.

Michelle[2]

In the research, it was evident that a commitment to focal practices

retained nurses to the nature and purpose of nursing, the well being of patients

and their care environment. Nurses gave accounts of care where balanced

composites of natural, cultural, and technological signs were synthesized into

meaningful knowledge of patients and nursing, this patient, and this nurse. A

select number of signs in the patient and environment referred the nurse to the

ecology of what mattered to good nursing care, and the nurse was true to the

nature of what it is to nurse. For nurses, focal nursing practices were expressed in

their stories about their patients.

...Guillian-Barre, as you know paralyzes a patient basically from the
neck down for quite some time...you nurture them and help them to hang
in there until the thing resolves itself. So he had learned how to
communicate with just a wink of the eye and his wife and he and his
family members had an incredible way of working through the
alphabet...often I have the ability to figure out what he is trying to say
without even starting to use the alphabet...I can guess a lot of what he
needs without even having to worry about writing it down...He was
having lots of pain with any kind of movement, so I was learning how to
move him so that it didn't create the pain.

Smoky[2]

99

As technological signs saturate the landscapes of contemporary health care, Borgmann's work and the nurses' words challenge us to query: Does the present ecology of most hospital environments encourage us to orient to a thoughtful balance of natural, cultural, and technological signs? Or, do we find along with Borgmann that the path of least resistance, in work or any aspect of modern life, increasingly favours the consumptive practices of continually absorbing and dispatching technological information as reality?[29] In contrast to vivid examples of nursing one's patients, nurses described the failure to nurse through accounts of work where focal nursing practices were diluted or even absent from view. At its extreme, failure to nurse became the actual lack of a nurse, as for the dying patient that haunted Smoky. Yet, failure to nurse one's patients did not necessarily mean physical absence. Often, inability to nurse patients was expressed in terms of tasks that seemed to take precedence. As another critical care nurse discussed why she was leaving acute care, she talked about what it was like to realize one day that she was not nursing her own patients.

I've had two ventilator dependent patients come on a floor of mine. You know, they're both ventilated, they're both on insulin drips, they're both on TPN, and all you do is test. You do nothing for the patient. You just put out one fire after another. Okay what's the blood sugar, give the insulin, what's the blood pressure, change the drip; now it's time to suction, now it's time to turn; that's all you do. And I'm finding more and more on any given day I'm just a task- orientated nurse.

Blaze[2]

100

Borgmann argues that "the reduction of work in technology to a mere means has resulted in the degradation of most work".[3 (p 114)] When nursing is reduced to a series of tasks, the end of nursing is separated from the means with which to nurse; the nurse does not nurse. Technological signs continue to be obsessively collected and read, but the relative significance of technical information is not integrated into sound clinical judgements and actions for particular patients in their unique situations. The cultural signs that nurses use to commonly interpret and share their work break down in misuse or neglect. The accurate and specific report that ensures the safe hand over of patients between nurses is lost; the well organized chart or care plan that assists a new nurse to begin to set priorities is forfeited to a bulging plethora of rhythm strips, lab reports, and fractionated graphs. Of even more fundamental importance, the natural signs within the care environment recede from the vigilance of nursing staff. The relaxed or distressed look of a patient is not noticed; the order or disarray of a hallway is not checked for new emergency arrivals. The regularity or absence of family visits for an injured child or new mother is not noted; a steady supply of soap, towels, and vigilance for adequate hand washing practices is not provided. A new mother quietly haemorrhages under several layers of warming blankets; an elderly man falls when he cannot wait any longer for a nurse to help him to the commode. The patients and the environment cease to be nursed:

*For instance, before you start a case, during the intubation time, the
circulating nurse is with the anesthetist at the head of the patient to
assist. But if they have not recognized changing conditions in the patient
at that point in time...they are not anticipating the next thing that they
may need at this point - such as different equipment for the procedure of
intubation. They won't ask and start to gather or delegate somebody to
go get the equipment they need...they can't think far enough to assess the
entire situation, to ask: "What is the status of this patient?"*

Kara[2]

Inadequate balancing of the natural, cultural, and technological signs that
formed the ecology of good nursing care was uniformly described in participants'
accounts of failure to nurse. In effect, a deficient ability to "read the signs" of a
patient's situation constituted a lack of "ecological literacy"[13] that nurses
repeatedly observed directly or after the fact. As Blaze said of a particularly
upsetting shift on a neurosurgical unit, "Nothing had been done. There wasn't
even a mouth care tray at the bedside. Suctioning hadn't been changed and it was
dry so I know they hadn't done a thing. They still had their medic stockings on
from the OR".[2] However, when patients were not nursed, this did not mean that
obvious tasks were not completed. Often, the work superficially appeared to be
"done", the lack of nursing only gained visibility with sharper scrutiny. The post-
operative patient was neatly arranged beneath crisp top covers. Her chart was in
order, including a vital sign graph that proclaimed "all is well", and the IV
medication was running on time. On closer inspection, however, the dry suction
bottle and chest auscultation indicated that the patient was full of secretions. She
still lay on rumpled 14-hour-old bedding from the OR, and had not been bathed to
remove the sticky Betadine and massage her limbs. In this and many similar

102

instances, nurses reported that they were able to effectively respond to the ethical distress that neglect of this kind invoked. The patient was suctioned and continued to improve, as pain medication, a warm bath, a clean bed, and movement all brought about a more stable and more humane post-operative course. At other times, failure to nurse resulted in losses that could not be retrieved. In the sense that each instance of deficient nursing added to a cumulative environmental deterioration, every individual failure to attend to the ecology of good nursing care was also a collective loss of a larger kind:

> *...if something does go wrong it certainly doesn't go past that*
> *room...Often times I don't think it's recognized...Nine times out of ten,*
> *no one talks. It's certainly not reported to the manager. It's certainly*
> *never looked at as how can we do things differently next time.*
>
> Michelle[2]

To part ways with the essential nature of what it is to nurse patients is proposed in this research to constitute a denaturing of nursing work. As an assembly line of tasks pervades the nurse's experience of her situation, the practices of nursing are displaced; and the nurses' work is reduced to mere means as Borgmann outlines them. The raison d'être of nursing to foster health is degraded or even lost, and avoidable mistakes are made. As Sarah and other nurses explained, inadequately nursed patients usually showed deepening signs of clinical trouble that had been discounted or even ignored. In such situations the ecologically illiterate nurse "worked" her shift and the work was "done", but the patient suffered from lack of nursing care; the work of nursing was not done:

...she would look at the vitals...but she wouldn't carry on because she
might not have that sense that gee this patient knows what they are
talking about...I'm thinking about this particular man that we had with
abdominal pain and we went through the usual sort of things, but she
really didn't listen to him and he ended up with a great big huge
distended bowel...She looked at everything, everything looked
"fine"...but she didn't look at him and he was just distressed...I mean
she did the usual and looked at that and didn't go over why he wouldn't
be feeling well. This was working and he did have some bowel sounds
and he did have this and that, but he felt awful.

Sarah[2]

Nurses ascribed a variety of factors to instances where nurses did not

nurse, including the phenomenon of "burnout". Burnt out nurses demonstrably did

not care, and their patients exhibited the neglect of nurses who "ought to know

better": the patient was not suctioned, or did not get proper perineal care during

their bath, or failed to receive other expected nursing care. However, several

nurses insisted that failure to nurse was not something that could be consistently

linked to a nurse's failure to care about patients. Haley and other participants

observed that even apparently caring nurses could regularly display the failure to

nurse. She described a perplexing deficit of nursing in several of her colleagues as

follows:

104

...these nurses still care about their patients, it's not like they don't care. But there is more focus on...the technical things that can go wrong...(they forget) the overall assessment. Nothing drives me crazier than when one of those people who start to spin come in my room... if one of these kind of people relieves me...in the time that you go for coffee, which is like ½ an hour, they can have your room turned upside down... You come back and you think, Oh my goodness, now I've got to start over again.[2]

Haley's description of "caring" nurses who "over-read" the technological signs of clinical situations to the detriment of balanced clinical judgements and actions was reiterated in other accounts of both nursing and medical care. Nurses described situations where a fetal, cardiac, or other monitor mesmerized inexperienced or experienced nurses and physicians alike. They talked about charting, clinical trial forms, reports, and other documentation regimens that consumed their intended time with patients. They mentioned rewards within the system from other practitioners and even families for a focus on technical information; the nurse who could interpret the diagnostic image, a medical role, was the "astute" nurse. Most significantly, virtually all participants discussed variations of the message that a good nurse is a "fast nurse":

The expectation from all the physicians is the nurse will pick up the pace. The nurse will pick up the lag time. If we get behind we'll just work faster because the nurse can work faster...A good nurse is the one that can move fast. A good nurse is the one that can get them in and out quickly...That's the hardest thing to get used to being down there. It's like oh God I can't do this. Then it's like come on again the production line get things going, let's get finished.

Michelle[2]

105

While the study focussed on nurses' descriptions of their own work, several examples of similarly denatured medical care were also raised. Even though nurses analyzed patient care from a nursing body of knowledge, the characteristics of denatured medical care corresponded with those of denatured nursing care. In such cases, the physician's attention to the composite technological, cultural, and natural signs of each particular clinical situation was seen to be unbalanced, and connected relationships with practitioners and patients alike were forfeited to the expediency of getting "the work" done. Evidence of adequate preparation and reflection at the outset, during, or after medical interventions with patients was lacking, and the rationale for many treatments was not provided to patients or staff. As with nurses' work, many instances of denatured medical practice diluted the quality and ethics if not the basic safety of care. Consents were not signed or patients showed blatant lack of understanding of the treatments they were to receive: As Michelle relayed, it was too often a case of "You know rush, rush, rush, get this patient in. 'Oh my gosh, this consent hasn't been done.'".[2] In other instances, research participants insisted that denatured work resulted in unacceptable patient harms. Discussing her dismay over a physician's inappropriate interventions with a normally labouring woman, Lara said: "He was impatient, he didn't want to let her push. He had to be home at 6 o'clock...He puts the vacuum extractor on to help her push. I just, my heart was just in the basement".[2]

The nurses' narratives raise disturbing questions about the work of nurses and other practitioners, administrators and other hospital staff, and the modern

106

health care institutions they inhabit. Can nurses and patients engage in healing work in hospital environments that operate like factories? Are "turnstile medicine" and "work speed-up" properties of hospitals as healing communities – do modern hospitals still aim to heal? Can a health system that treats high tech care, patients, and practitioners as so many commodities reliably shepherd vulnerable people and families to good births, healthy lives, or peaceable death? The research shows that denatured work threatens the integrity of sound nursing care and possibly other health care, and that a technological mindset endangers patient care. The accounts of nursing and philosophy both call for nurses to counter denatured work in health care, and to recover a more focal reality that enables good nursing care and healing to come forth. The task at hand is to reconstruct a thriving ecology of nursing care for the complex landscape of a technological world.

Nursing, Technology, and Ecological Restoration: A Reconstruction

I'll be busy with a delivery or something and I'll say, "Okay what's happening with this other lady?" They'll say, "Oh she is 10 weeks early, 30 weeks. She says she is having contractions but there is nothing on the monitor", and the first thing I'll say is "The monitor is a machine. I never go by the monitor." If I am in the room and I palpate a contraction and it's tracing on the monitor that's a bonus to me, but I don't go by the machine. I go by palpation, by examination of the patients. I have to say that over and over again. Some of the, it could even be some of the older nurses that I work with, are so trained that these machines are the end all know all, and they aren't.

Lara[2]

107

What counts as natural is shifting ground in the wake of technological
transformations...Restoration in the year 2015 risks being much more a
matter of shaping ecosystems to our interests than reflecting the character
of the ecosystem through sympathetic understanding and imagination.
This reverse adaptation constitutes an inversion of what conservation
biologists, ecologists, and restorationists have been striving for...To
avoid this specter those concerned with restoration must address an
expanded context in both practice and theory.

Eric S.Higgs[4] (p 340)

In recent work on the criteria for good ecological restorations of natural
environments, Higgs writes that it "is not a technological nature we are after;
rather it is a nature, or natures, that are a counterpoise to technology".[4] (p 340) Higgs
uses the term of ecological restoration as it is employed by the Society for
Ecological Restoration, where it is defined as the process of assisting the recovery
and management of ecological integrity.[45] The concept of ecological integrity
includes a critical range of variability in biodiversity, ecological processes and
structures, regional and historical context, and sustainable cultural practices that
significantly shape an ecosystem's potential for health and healing.[45] This notion
of integrity encompasses the concerns of science, ethics, politics, economics,
relationships, and more, and aligns with the etymological roots of integrity, the
Latin word "integer", meaning whole.[1] (p 535) With these concepts of ecological
restoration in view, the research conversation between technology and nurses'
work leads us to question what the presence of denatured nursing tells us about
the ecological integrity of the technological environs of acute care and the health
system overall.

108

Using the work of Borgmann and others to discuss the persistence of technological practices within environmental work and throughout society, Higgs argues that in ecological restorations where efficiency mutates from one of several important goals into an overriding virtue, problems tend to surface that are characteristic of technologically patterned environments. To demonstrate his argument, Higgs reminds us of a concept that enlarges our understanding of both denatured nursing and acute care environments, Langdon Winner's notion of *reverse adaptation*.[46] Simply put, reverse adaptation in a technological system is conceived by Winner as "the adjustment of human ends to match the *character* (author's italics) of the available means".[46 (p 229)] Citing reverse adaptation as a problematic mode of instrumental thinking, Higgs notes that the presence of reverse adaptation is "common in advanced technological settings where the sophistication of technique alluringly distracts the practitioner from normal goals".[4 (p 344)] Higgs continues that in ecological restoration projects, a recurring tendency towards reverse adaptation produces a perverse devotion to efficiency and effectiveness that only superficially "improves" the lands at issue in narrow technical terms. Short-term efficiency and effectiveness, he warns, do not restore damaged lands to a viable long- term relation with broader human and environmental goals.[4]

Higgs suggests that along with the companion technological doctrines of products for sale and the separation of actions from consequences, reverse adaptation displaces the broad environmental and human aims of healing restoration practices with the technical spaces of corporations, specialists,

109

regulations, bureaucracies, and cosmetic repairs.[4] The prevalence of these problematic technological doctrines underscores the concerns of Feenberg, Higgs, and others with implicit technical codes that favour efficiency and effectiveness on behalf of a more covert power and economic status quo.[22 47-48] Citing corporate restoration projects and ecological theme parks as examples of technically proficient but morally impoverished restorations, it is argued that technical restoration exercises superficially "beautify" settings without fundamental reform of our use or relations with particular landscapes.[4 47-48] The land looks "better" for the moment, but only to the casual and consuming eye. Those who dwell in the land as a community they care about have a different story to tell. Where we live rather than tour, we come to understand that unchecked wastes continue to accumulate, and further ecological degradation ensues.[4 47-49] Every witness to the aftermath of "cost-efficient" re-engineering and work redesigns in health care may be able to recognize the danger of technical ecological restorations, to people and to the land.

Lara's words and the lessons of ecological work remind us that the source of health and healing is not found in the over-valuing of technical knowledge, or in its neglect. Instead, the source of healing in a hospital community comes from a committed attention to what kind of place we think that a hospital is, and what kind of place we wish and will it to be. Healing comes to places where healing practices and the signs of healing are cherished and carefully balanced against a countervailing weight of other signs. The source or place of healing begins with the intricate and unique relations between nurses, other practitioners, patients, and

110

environments that tend to an ecology of that which matters most when we are broken, ill, or inescapably dying, but not inevitably unwell.[6-7, 38] Healing and healing communities can never be located in or nourished from the hyperreal; the properties of healing are only found in and nursed from that which is real.[32 38]

Higgs' observations about the future of restoration propose that a thriving earth will depend upon a science of ecology that broadens its practical and theoretical ground. He calls for an expanded context for restoration projects that considers issues of historical, cultural, social, political, aesthetic, and moral significance for the communities in which restoration projects are undertaken.[4] Nurses might well ask how a viable context for the healing work of health care could be any less extensive in reach. The ecological reading of this research on registered nurses' work in acute care seeks to reinterpret the threats and responses that characterize technological health care when we view it as a living, complex, and dynamic system. We start to track the intricate web of structures, relations, and properties that characterize our health care communities and systems as parts of a complex and commodified world, and we rethink how healing may actually take place in an era of biotechnology, and how it is most often thwarted. We probe nurses' ecological knowledge of the system to examine how they sustain their capacity to nurse, and to discover what happens to healing when they fail. Instances where nurses or others "sabotage" the system are reconsidered as possible efforts to right a problematic technical turn,[22 44] and "the alerting role of loyal heretics"[31 (p xii)] becomes an inevitable and essential healing property in the damaged environs of modern health care.

111

Of equal significance as the phenomenon of denatured work, the nurses' descriptions of sound nursing judgements and acts are consonant with focal practices that nourish a literate ability to interpret and safeguard the ecology of good nursing care. Attention to a balance of signs fosters the practices of nursing that heal, and nurses can readily recount the signs of good nursing care. Good nurses know when they, their colleagues, and their patients are in a healing place. Perhaps the reconstruction of a healing place starts with relations that place our shared sense of what is whole, sound, and focal on level ground with the pace and press of a technological world.[3 4 7 32 38] This is an ecological sense of connections which re-examines all the relations that currently characterize our hospital communities and health care systems from deeper conceptions of both healing and technology. Like others who consider the influence of technology on threatened environments,[3-4 22 29 34 47-49] we ask things like: What is the culture of this community; what are its healing practices, and what technological practices are in evidence? Which practices are developed and refined by healers and patients; which ones are designed and implemented by managers or other decision-makers; and under what conditions and with what stated ends? Which practices are actually followed with commitment in the course of a typical workday, and for what reasons? If technological practices predominate in a particular practice setting, who resists, in what ways, and with what results? For instance, does resistance invite repression, relationship, or restructuring – and if new structures come about, who designs them and to what ends? In other words, like any good nurse, ecologist, or restorationist, we enter an environment with a

112

host of questions about how does this place works "on paper" and how it actually works. Then we ask: Do the differences between the predicted and concrete workings of this place favour health and healing, or something else?

From these understandings of technology, nursing, and restoration work, we can reassess the apparent "efficiency" and "effectiveness" of our present hospitals for the presence or absence of healing properties. If the "good nurse" becomes the fast nurse, the one who puts the drugs in the quickest, moves patients most rapidly, and manages to continually "pick up the pace",[2] a reverse adaptation to an exhausting rate of work signals that the nursing of patients is not good. If cost-efficiency becomes the primary criterion rather than one of many equally important indicators of sound clinical care, then variations of an efficient fiscal line such as admission, procedure, transfer, and discharge rates have become the bottom line, period. Like the theme park,[48] the patient's top sheet is crisp and clean; like the corporate project tour[47] the patient's medications, treatments, and vital signs are done on time – but underneath the surface, the degrading effects of the factory continue. The land, and the patient, are soiled.

113

Ecological Restoration of Health Care: The Task at Hand

*It's the whole system. We have physicians, then we have residents, then
we have nurses, and then we've got patients. It seems the patients are left
'til the end but you know, we have patients come from admitting the day
of procedure...We don't know them pre-op. We get them post-op. They
come to the unit, we admit them, and we do their vital signs...We come
out and check the orders quick, then you're back in looking after their
physical needs...You sometimes don't get back to that chart to look at the
medical consult until late, you know maybe it's the end of your shift...It's
always being left, and not with everyone but with some...for instance the
other day, someone should have been on IV antibiotics for six doses,
well, they missed a whole evening and a night of medications...or they
come in and they're on pills and they don't get reordered for four days
until someone comes and says, Well, look, they were on this when they
came in. Why aren't they on it now?*

Sarah[2]

The assembly line...achieves traditional management goals, such as
deskilling and pacing work, through technical design. Its technologically
enforced labor discipline increases productivity and profits by increasing
control. However, the assembly line appears as technical progress only in
a specific social context. It would not be perceived as an advance in an
economy based on workers' cooperatives in which labor discipline was
more self-imposed than imposed from above...one arrives at a very
different distinction between societies in which power rests on the
technical mediation of social activities and those that democratize
technical control and, correspondingly, technological design.

Andrew Feenberg[44 (p 11-12)]

A metaphor of ecological restoration offers a different source of
interpretation for our "problems" with modern health care than the scientific
management expertise that has redesigned, restructured, and re-engineered health

114

care to date. Perhaps subsequent research will demonstrate that the ecology of good nursing care points to the ecology of good health care environments and sound systems overall, and a highly questionable hierarchy of expertise will disband. However, nurses need not and possibly cannot afford to wait for other parts of the health system to more accurately and ecologically "read the signs" of a deteriorating technological environment. For the practices of nursing to thrive after the ethical and environmental denouement of a voracious health care marketplace, nurses must use their own healing wisdom and that of ecological restoration to become a source of ecological literacy that enables healing in a technological world.

The denaturing of nurses' work in acute care opens up further questions within the present research and elsewhere. Do nurses and other practitioners equally struggle with denaturing forces in other environments, such as community, home, or long term care? Does a healing ecology for acute care resemble the ecologies of community caring that Bent explores, or do significant differences come into play? Do present theories, methods, practices, and structures within nursing and health care, including those that call for ecological frameworks of care, adequately account for the fact of technology in our lives? What constitutes an ethically and scientifically adequate ecological reading of nurses' or other practitioners' work in acute care, of hospital environments, or of modern health care systems as a whole? Are the criteria for ecological integrity similar for ecosystems and human health systems[31] or not, and how do we obtain the knowledge to decide? If a metaphor of ecological restoration does fit the

115

concerns and challenges of our health care system, which model of restoration should we adopt? Can we actually restore our current system of health care to healing with any amount of resources, or do we need to regenerate[4] and reconstruct a more ecologically sound health system for a biotechnological age?

The task of subsequent research and dialogue is to cultivate an ecological praxis that sustains the healing practices of nursing in all of the communities where it is needed, including the environs of acute care. If nurses and other practitioners are to develop sufficient ecological literacy for the health care marketplace and its environmental aftermath, further inquiry is warranted on technology, health care, and ecological restoration. Many lives' worth of work are needed to rejoin the earth's wisdom with adequate human insights for a healthier future; perhaps many more lives depend upon our work. Surely, the patients, families, and practitioners who inhabit acute care deserve our best efforts to get on with the task.

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116

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119

120

Chapter 4

ecology *n.* study of the relation of living things to their environment. 1858, in Thoreau's letters, also with the spelling *oecology* (1873); borrowed from German *Ökologie,* and, perhaps by influence of the German word, also formed in English from Greek *oikos* house, habitation + English *-logy* study of.

<div align="right">Robert K. Barnhart[1] (p. 313)</div>

relation *n.* About 1378 *relacion* connection, association, correspondence, in a version of *Piers Plowman;* borrowed through Anglo-French *relacioun,* Old French *relacïon,* learned borrowing from Latin *relātiōnem* (nominative *relātiō*) a bringing back, restoring, a report, narration, association, reference, from *relāt-,* serving as the past participle stem of *referre* refer...

<div align="right">Robert K. Barnhart[1] (p. 906)</div>

restoration *n.* Probably before 1500 *restoracion* renewal, alteration (influenced by *restore*) of earlier *restauracion* a restoring to health (before 1393, in Gower's *Confessio Amantis*); borrowed from Old French *restauration,* and perhaps directly from Latin *restaurātiōnem...*

<div align="right">Robert K. Barnhart[1] (p. 918-919)</div>

health *n.* Probably before 1200 *helthe*; later *helth* (about 1450) and *health* (probably before 1425); developed from Old English (about 1000) *hælth* a being whole, sound, or well, from *hāl* WHOLE...

<div align="right">Robert K. Barnhart[1] (p. 470)</div>

RESEARCHING THE ENVIRONMENT OF MODERN HEALTH CARE:

RE-READING THE SIGNS

Our behaviour toward the land is an eloquent and detailed expression of
our character, and the land is not incapable of reflecting these statements
back. We are perfectly bespoken by our surroundings...nobody
consciously sets out to wreck a piece of land, but that is a common result
of our accustomed habits of land use.

Stephanie Mills[2] (p. 3-4)

*...we are using blood pressure cuffs, fetal monitors, we are using
epidermal pumps, you are watching - and then inevitably your labor
slows down when you have an epidural, so then the next thing is
oxytocin, and on it goes...we all jump around when we have a patient
who delivers without an IV, without anything for pain. When you have a
woman come in and deliver, we jump around and celebrate...it doesn't
happen anymore.*

Haley[3]

How does a hospital become a place where birth without technical
intervention is sighted as rarely as a species on the verge of extinction? Surely, no
one set out to make it so. Yet, like so many other damaged landscapes, somehow
it has come to be. If we inspected the environment of acute care from the
perspective that an ecologist takes towards other modern habitats, what would we
see? What characteristics of our hospital landscapes would assume significance
for us, and what wisdom about health care, and about ourselves, would this
ecological story of a technological world yield?

The purpose of this paper is to develop an ecological understanding of
modern health care by examining parallel concerns about technology that

123

challenge two healing projects, those of ecological restoration[4] and nurses' work

in acute care. Specifically, research and practice in ecological restoration and

ecosystems management is used to re-interpret findings from research on

technology and registered nurses' work[3] into an *ecological reading* of acute care.

This ecological account of acute care builds on research findings discussed

elsewhere,[5] in which particular technological practices are identified as persistent

patterns within seven different acute care environments where ten registered

nurses practice. The problematic practices that continued to resurface in the

nurses' hospital settings included an overriding allegiance to efficiency and a

recurring tendency for actions in one part of the system to be separated from

consequences that accrue elsewhere. The entrenched character of these

technological practices infused the nurses' environments with a relentless speedup

and fragmentation of their work into technical modes of tasks, relations, and

thinking. When a technical mode of work predominated, the nurses' work or that

of fellow practitioners became *denatured* or split off from moral ends, practices,

and relations of a healing nature. By dissecting nurses' actions away from nurses'

healing intents, the denaturing of nursing effectively separates nurses from the

ability to reliably provide safe, competent, ethical nursing care. In effect,

denatured nursing becomes a reverse mode of adaptation to an ailing

environment, the current environs of acute care.

124

Reverse Adaptation, Restoration, and Nurses' Work

...you could have 10 drips going or they don't understand ventilator

settings...it's just so much more critical now because there is just so

much more that can go wrong and they are so unstable and by the time

they've made the decision...it's too late.

Blaze[3]

In the research, it is argued that the speed up and fragmentation of

denatured nursing are central features of a technological phenomenon defined by

Langdon Winner as *reverse adaptation*.[6] For Winner, reverse adaptation in a

technological society is present when we find our intended goals or ends

insidiously altering towards the character of the available technological means,

means that are frequently inconsistent with the original good that was expected

from the activity at issue.[6] The recent difficulties of some online businesses

illustrate the process of reverse adaptation. The slide begins with a marketing

strategy to gain large volumes of e-mail orders for a product. As marketing

techniques and online capabilities rapidly deliver a growing volume of customer

orders at the speed of the technology employed, the corporation does not devote

equal attention to other values, such as the training and retention of adequate,

qualified staff to fill the orders. The enterprise's original purpose of growing a

healthy business, which stems from gaining satisfied, repeat customers with

timely and reliable service, is replaced with the counter-productive end of taking

unmanageable volumes of customer orders by the available technological means.

Noting that humans already tend to adapt for survival purposes to the

overall pace and regimen of the organizations where they work, Winner argues

125

that by its subtle yet steady takeover of original human purposes, the
technological phenomenon of reverse adaptation deepens an already problematic
social tendency:

> ...people come to accept the norms and standards of technical processes
> as central to their lives as a whole. A subtle but comprehensive alteration
> takes place in the form and substance of their thinking and motivation.
> Efficiency, speed, precise measurement, rationality, productivity, and
> technical improvement become ends in themselves applied obsessively to
> areas of life in which they would previously have been rejected as
> inappropriate...efficiency takes on a more general value and becomes a
> universal maxim for all intelligent conduct...similarly, speed...is taken
> to be an admirable characteristic in and of itself. The faster is the
> superior, whatever it may be.
>
> Langdon Winner[6] (p. 229-230)

Eric Higgs uses Winner's concept of reverse adaptation to illustrate the
differences between a technically efficient and effective cosmetic restoration of an
industrial park, and the much deeper work that ensues with community,
researchers, and government to restore the fragile ecosystems of a national park.[4]
[7][8][9] Noting that a corporate greening does not adequately address polluting and
other practices of either industry or the area's human and other inhabitants,[4]
Higgs and others demonstrate that an over-riding value of efficiency cannot heal
or sustain ecosystems in a technological age. Specifically, scientists, philosophers,
and others increasingly point out that immediate returns on efficiency of rapid
growth or increased production do not account for the complex web of relations,
processes, and structures within ecosystems that foster ecological integrity over
time.[10][11][12][13]These attributes include the diversity and reproduction of an

126

ecosystem's species, the capacity to respond effectively to nature's threats and opportunities, the pollutants and practices of local and distant industries, and the daily habits and activities of its human and other inhabitants.[14][15] Set into the context of a region's politics and global economic forces, restoring ecosystems to health becomes the thoughtful and committed care of a fragile relation between the human dwellers of a technological culture and our threatened lands.[2][4][16]

In the present research, findings on nurses' work suggest that the health of hospital environments and their inhabitants may be just as threatened as those of ecosystems in our modern age. For instance, the speed-up and fragmentation of nurses' work spawn a state of reverse adaptation that displaces nurses' original moral ends. Nurses in the research describe repeated instances where against their own better judgement, the goal of "getting patients through" receives more attention than the careful assessment of patients' readiness for transfer or discharge, or where attention to omnipresent technological data pre-empts the thoughtful evaluation of patients' conditions and needs. An unmanageable rate and number of tasks outweighs environmental supports for the provision of good nursing care, and original nursing ends of patient well being and environmental safety are displaced by efficiency ends of speed and volume. As relations become mere means to get things done rather than an essential end of good nursing care, nurses receive more reinforcement to accelerate a procedure or move a "bed" than to adequately prepare patients and families for the pain, suffering, and fears that they face. The overall picture of nurses' work that emerges is one of an assembly line, a place where the demands of technical "piecework" overshadow an

127

orientation towards actions and relations that heal, perhaps even actions that prevent further harm:

> *...many times in the hurry hurry situations and in the hurry two things happen. One is that you often feel like you are rushing the patient, you know moving them over and that kind of thing well maybe they would like a moment to ask a question...and the other thing is you are in this mode of rush, rush, rush you often feel like you are not doing things as well as you could and maybe there are details being missed.*
>
> Kara[3]

In the remainder of this chapter, the ecological reading of acute care that is developed establishes that the speed up and fragmentation which characterize denatured nursing also typify and link with an overall environmental degradation of our modern hospitals. It becomes evident that the unchecked technological practices which plague nurses' healing work also problematically fragment and mutate the relations, processes, and structures of their habitat of acute care. The ecological reading that emerges is one that registers variable levels of environmental damage and a diluted overall potential to heal. Concepts from ecosystems management and ecological restoration are related to the current denaturing of nurses' work and work environs, and proposals are outlined to renature nursing care and health systems for a technological world. To undertake this exercise, we start by "thinking ecologically" about nurses' work.

128

Thinking Ecologically About Nurses' Work

...they were so short of staff that there were things missed at the desk, orders missed at the desk because the charge nurse had to take over the medication giving for the orderly and then one other nurse around. They couldn't answer phones. It was just like chaos...the previous nurse was overwhelmed when she gave me her report, and then I walk into the guy that was confused. There was one medication linked in with another medication in the IV that shouldn't have been connected. They were going together.

Smoky[3]

Thinking ecologically about nurses' work entails that we ask about the relations, processes, and structures of their everyday work environment. Since reverse adaptation is identified in the present research as a technological threat to both nursing and restoration, most of the ecological restoration work that is used for this analysis considers contemporary thought in philosophy of technology.[4 7 8] [10 17] In these works and within the Society for Ecological Restoration (SER), the practice of *ecological restoration* is broadly viewed as assisting the recovery and management of an ecosystem's ecological integrity.[18] In turn, *ecological integrity* is taken to include a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices that foster and sustain the overall health and wholeness of a living system.[4] Additional research on ecosystems and ecological integrity that is incorporated into the present research contains varying accounts of technology, but these broad concepts of ecosystems and ecological integrity generally hold.

129

The definition of ecological integrity provided by the SER leads us to search the habitats of nurses for several specific things. We investigate whether a healthy balance of different and complementary life forms (human and other) is or is not present, and how the processes and structures of a place nourish or obstruct its relations and healing properties. The history and geography that shape the present character of a given hospital environment become significant clues to its ecological challenges, and the beliefs and practices of its inhabitants are understood as profound influences on present and future possibilities for health and resiliency.[4][11] In addition, as we scrutinize these inter-related features of ecological integrity, we try to understand how they co-evolve in the complicated context of a technological world.[4][9][13] From this perspective, the geography of a "re-engineered" hospital begins to take on a different light:

> *...they are trying to make the two units into one...But they've got a big stairwell in the middle of it, they've got a storage room or a kitchenette in the middle...So you are trying to look after patients and trip over all of these physical barriers at the same time, and deal with the lack of nurses to work with...they've added an extra double door...that refuses to stay open if you push the doors open, because of fire or infection control...it sure is infecting our nursing care...*

> Smoky[3]

Smoky's observations about work redesign in her facility illustrate that the ecological integrity of a nursing unit, and of the larger health system, encompasses a variety of inter-connected features. It becomes necessary to develop a more relational sense of the places where nurses, patients, families and others come to take part in healing.[19][20] It comes to light that whether it is

130

downsizing or other changes to the nurses' environments that transpires, the practices of nursing are affected, and there is uptake of these effects into the nature, or alternately the denaturing, of nursing care. "Little things" that supported or diluted the integrity of a healing habitat repeatedly surfaced in the nurses' stories about their work, as an intricate, layered system of relations, processes, and structures interacted at varying rates and in many unpredictable ways. Thus as nurses and other practitioners struggled through a double door with patients and equipment several times per shift, perhaps they stopped to wash their hands properly before and after every patient contact, or perhaps not. As equipment was continually moved from one part of the hospital to another to maximize its use, it was sometimes found in clean, working order, or at other times in neglected disarray. Frequently equipment could not be found at all, as staff on various units hid scarce pumps or other devices away to ensure their availability when the need arose.

Other nurses in the study echoed Smoky's frustration with various ways that re-engineered workplaces confounded the details of providing nursing care. Participants reported that new supply carts or ordering procedures, changes to pharmacy or other department policies, or other "innovations" steadily arrived, often at an uncoordinated or even incessant pace.[3] Each new technical "efficiency", usually supported by a popular management trend and rarely developed with meaningful input from clinical staff, demanded that the nurse further interrupt and re-route one or often many of the "little things" that needed to come together for there to be good care. Even where nurses saw the possible

131

merits of a new practice, it could complicate their day. A new respirator would arrive with no instructions or staff education on its proper use or maintenance, or a new charting system would commence with no clear instructions on what parts of the former system were to continue. As "efficiencies" piled in one upon the other, there was rarely reflective critique on how they were all to come together, or why they could not. It seemed that the system and all it contained was unwieldy, and unable to comprehensively track itself or be tracked. There were too many pieces, and they did not necessarily fit:

> *...even poorly run codes, there's never the opportunity to debrief. You know we don't even discuss what happened pre-code. Like was it an artery? How did we get to this point? Did the physician not listen to the nurse when they needed to? Was it something else...I think part of it has been there has been no time and there has been no initiative to even do that. There's been no initiative to say, What happened here? How can we do better next time?*
>
> Michelle[3]

In these and other accounts of the nurses' work, two considerations that figure largely in an ecosystem's ability to sustain ecological integrity become significant, those of *resilience* and extensive *fragmentation*. The former term refers to a critical attribute of healthy, adaptive ecosystems, and the latter characteristic is a hallmark of deeply damaged ones.[11] Further exploration of how these aspects of ecosystem dynamics inter-relate, as well as their opposing implications for an ecosystem's ability to thrive, illustrate the effects of efficiency-driven restructuring on the nurses' work and work environments. Essentially, the concepts of resilience and fragmentation reconfigure many stories

132

of health care re-engineering from ones of "right-sizing" and "cost-effectiveness" to stories of short-term, isolated efficiencies that unleash unexpected and harmful consequences throughout the health system over time. In effect, an ecological account of the nurses' work suggests that as in ecosystems, restructuring projects in health systems that consider efficiency to the detriment of resiliency produce a lingering legacy of needless suffering, damages, and even permanent loss.

Ecosystems and Health Systems: Resiliency and Fragmentation

The very success in managing a target variable for sustained production of food or fiber apparently leads inevitably to an ultimate pathology of less resilient and more vulnerable ecosystems, more rigid and unresponsive management agencies, and more dependent societies. This seems to define the conditions for gridlock and irretrievable resource collapse.

C.S. Holling[21] (p. 8)

In the research of Gunderson, Holling, and Light,[11] the concept of *resilience* is explored as a complex property of ecosystems that enables its optimal adaptation and development over time. Specifically, they argue that resilience is positively associated with a favourable synergy of an ecosystem's relations, processes, and structures, and inversely associated with the unchecked, isolated growth or dampening of any given attribute in the ecosystem. These proposals about resiliency are supported when the actual management of several ecosystems across North America and in the Baltic Sea is examined. In each case study, it becomes apparent that when "engineering, technological, economic, and

133

administrative techniques" (p. 7) are used to over-control any particular

ecological variable that is defined as problematic, larger problems unfold.[21]

Specifically, a variable that normally fluctuates in response to other developments

in the ecosystem now responds differently, or not at all. Other subtle responses

and changes to this new selective control ensue, and an overall rigidity within the

system builds. As a loss of resilience progresses, the excessively managed

ecosystem becomes "more likely to flip over into a persistent degraded state,

triggered by disturbances that previously could be absorbed".[21] (p. 8). In essence,

the very success of one intervention eventually leads to a much larger and more

systemic collapse.

For health care, the ecological lessons that the concept of resiliency offers

to the school of efficiency-driven management is a complex but critical one. The

first lesson is that however essential each particular attribute or function is to

sustaining a strong adaptive habitat, it is their complex interactions over a series

of co-evolutionary cycles that predicate the health, resiliency, and sustainability of

the overall ecosystem. To the same degree that ecosystems thrive when their

development and functioning is optimal, they also tend to deteriorate when any of

their functions are selectively over-controlled.

For Gunderson and his fellow researchers, the lasting lessons of lost

resilience are clear. As the naturally occurring cycles of growth, destruction, and

renewal in forests, rivers, or other ecosystems are disrupted by over-management

of pests, fish stocks, or other selective components, unanticipated larger problems

emerge. Fires that should remain contained rage out of control; salmon are over-

134

fished to the point of extinction, or other adverse outcomes materialize.[21] [22] [23]

With each ecosystem that is examined, the results are similar. Whether the initial

goal was to maximize or minimize the effects of selected variables, "successful"

control inevitably set the stage for over- control, which in turn rendered the

ecosystems' processes and interactions increasingly rigid and unable to adapt

effectively over time. Each ecosystem lost resilience, and when the threats that

inevitably confront living systems surfaced – lightning, hurricanes, or other

natural events - they became full-scale disasters that exacted significant and

sometimes irretrievable damage.[11] [21]

> *There were something like eight patients who spent the night in recovery*
> *room the other night because we had no beds in the hospital. In recovery*
> *room?*
>
> Sarah[3]

From the nurses' accounts of their work and work environments, the over-

managed and under-resilient results of re-engineered health care environments

seem equally transparent. Recurring pressures to work overtime and on scarce

days off, to watch over unusually high numbers of new and inexperienced staff,

and to move sick people through the system at an unrelenting clip were all

features of "efficient" environments that fragmented the habitat of nursing care

and denatured nurses' work. Narrowly targeted efficiencies like increasing the

number of cases per day with less staff eventually generated deeper inefficiencies

like "hot bedding", staff illness, or increased adverse incidents, and the overall

ability of the system to provide safe care was diminished. However clear each

135

nurse remained about the goals of nursing care for individual patients, the

system's needs for "nursing care" seemed to take precedence. As restructured

environments imposed more and more expectations on each nurse, the system's

needs, not those of their patients, hijacked and consumed the nurses' days,

thoughts, and energies. The system lost resiliency and with it the ability to

respond to new stresses to any meaningful extent, and nursing suffered. As went

the integrity and wholeness of the system, so went the integrity of nursing care:

> *...people were getting tired, sick and tired of that constant. Having to*
> *give a 100 percent...there was just no break in the system.*
>
> Ellen[3]

Comments that Ellen and other nurses made about the assembly line pace

of their re-engineered settings introduce a concern that is linked to the loss of

resiliency, that of *fragmentation*. As a technological by-product of

industrialization, fragmentation of habitats occurs with the excessive harvesting or

production of particular products, and threatens ecosystems and health systems

with markedly similar results. As Michael Soule notes, the fragmenting effect of

mankind's technological "progress" is "to harry habitats" in a variety of

unanticipated and toxic ways.[24] (p. 233) For Soule, this means that as

industrialization alters the migration routes, food and water access, and other vital

characteristics of particular habitats, "more so-called wild places on the planet

will be relatively denatured and will need intensive rehabilitation and

management".[24] (p. 233) Daniel Licht supports many of Soule's concerns, stating

that the "detrimental effects of fragmenting extensive tracts of habitat" are

complex and often insidious.[25] (p. 53) Discussing economic development on the Great Plains, he observes that the grazing of livestock, construction of roads, and other human "progress" have exponentially divided and diminished the biodiversity of the region over time.

Licht elaborates that our alarm should not be "so much that agriculture has converted 43 percent of the prairie biome to cropland, but that it has *fragmented* virtually 100 percent of the entire prairie system".[25] (p. 53) Thus while the loss of specific species seems more obviously worrisome, Licht and others remind us of larger ecological concerns that threatened species represent.[7][12][15][26] Specifically, by the time that the disappearance of one or more species is noted for a particular region, far less noticed "distinct habitats, species assemblages, and natural processes are diminished or degraded in quality" at the ecosystems level.[26] (p. 1) Expanded roads transect natural migration corridors for wildlife; rivers and streams harbour increased amounts of animal feces and other pollutants; for many forms of life, the living is not good. The fragmentation and disrupted resiliency of industrialized habitats leads us to question: What are the ecological consequences of industrialized health care?

Fragmentation, Resiliency, and the Health Care Industry

...I had to quickly check the blood sugars because it was insulin and
some other medication that shouldn't have been going together...I tried
to get my medications out. I tried to go through all of the orders to see
where I was at...a lot of things that weren't completed or weren't done
quite right or follow-ups...They did the best they could under the
circumstances and the nurse that was in charge...was just about in
tears...I said...oh man this is a real hellhole tonight. You are doing the
best you can and I want you to know that.

Smoky[3]

With the ecological consequences of industrialization, fragmented habitats, and disrupted resiliency in mind, acute care habitats can be re-imagined on three inter-related levels. The first level can be understood as the nurses' immediate habitat of patients' bedsides and hospital surroundings. The second level consists of the larger health system within which nurses, patients, other life forms (for instance, viruses and antibiotic-resistant bacteria) and technological forms (for instance, computer viruses, monitor readings, workload measures, and lab results) collectively dwell. The third or outermost level can be visualized as the increasingly globalized society from which nurses, patients, and all of the health system draw resources for the provision of high-tech care. For modern health care, such resources include pharmaceutical, biotechnology, and information technology products that are increasingly produced and sold at uncalculated financial, cultural, and environmental prices.[27][28][29][30]

With these inter-locking layers of the health system in sight, Smoky's description of a chaotic evening shift portrays a bedside habitat that is fragmented

138

by a rising volume of competing tasks, threats, and demands that originate from all three levels. The phone rings at an empty desk with what could be a crucial lab result or a family or physician inquiry, and a patient's IV in one room runs with costly but incompatible drugs. Two fresh post-operative patients elsewhere are overdue for pain medication; and a dying woman lies alone at the end of the hall. Placing too many acutely ill patients in the care of too few nurses constricts the system's immediate labour costs, but Smoky's nursing expertise is dispersed across increasing distances and other obstacles, and nurses fall ill or leave in mounting numbers. Along with other nurses in the study, time is spent hunting down equipment that functions, an empty bed for another admission, dressing materials that weren't re-ordered, or clean linen that is in reduced supply. To varying degrees for all of the participants, similar experiences of work meant that the coordination of complex nursing care was disrupted by the constant and disjointed arrival of more tasks:

> ...*you have too many patients and you can't get into the details. You just sort of fly by the seat of your pants and you are maintaining. You are just really putting out fires one after another.*
>
> Michelle[3]

The healing properties of ecosystems are harnessed when the relations, processes, and structures of a habitat interact without the disruption that excessive fragmentation and technical management approaches unleash.[2 8 11 25] The animal's path to water or prey is not blocked by another pulp mill; cycles of growth and reproduction are not altered by over-grazing; migration routes are not

139

dissected by ski lifts or pipelines. In nursing, too, healing requires undisrupted moments, places, and relations, openings that are not fragmented by tasks and tools that obstruct rather than expedite the provision of nursing care.[20][31] For Smoky and other research participants, the recurring dilemma of multiplying pressures and dwindling resources meant that the nursing practices of staying with, assessing, and comforting patients often dissembled into a perpetual criss-cross to cover off unmanageable amounts and types of work. Completing tasks displaced the original foci of nursing effort, and nurses' work departed from the work of healing care. A denatured form of nursing ascended, as the completion of endless "jobs" overrode the prudent judgements and actions of good nursing care. Each nurse's time, habitat, and attention was only somewhat fragmented, but like the cumulative strains of industrialization on agricultural lands, the fragmenting demands of health care as an industry surpassed a threshold, a point where there was almost complete fragmentation of the ability to nurse:

> *You know we were always struggling to get the right information in report. Like if they had chest tubes we needed to know if they were fluctuating or bubbling and that wasn't something that the nurses were... They may never have dealt with one before. They were overwhelmed....And (family) having to hang around so much because they were worried that their family member wouldn't get the care that they required.*
>
> <div align="right">Ellen[3]</div>

Nurses observed that the dilution of nursing care and the overall environmental degradation that accompanied the fragmentation of their work abandoned patients to unnecessary and even unacceptable harms. A condition of

<div align="center">140</div>

reverse adaptation becomes apparent in each nurse's work environment, as nurses describe situations where the available means of doing work, an accelerated series of technical tasks, is detached from their original goals of care. Meaningful nursing goals were such ends as the comfort, vigilance over, relations with, and protection of patients and their care environments.[3] In contrast, the ends that characterized examples of reverse adaptation were ones of volume, production, and output. For instance, the transfer of recovery room patients to nursing units became predicated on the press of more patients arriving from the operating room, rather than any individual patient's clinical stability:

It's move them out, we've got more coming in. The pace. It's more of okay, we've got nine that we don't want to send to the floor but we want to bring in more, so who is the one that we are least worried about?

Elva[3]

Elva's comments raise a further problem with the technological fragmentation of the nurse's habitat, which is the technically fragmented thinking of modern management. In effect, the nurses' accounts suggest that the treatment of health care as an industry both fragments the landscape of acute care and invites a fragmented approach to manage the inevitable problems that result. Thus in ecosystems or the health system, efficiency-driven management approaches seem to initiate a self-defeating sequence of events. First, problems of technologically fragmented habitats are identified, but their relationship with the whole system is inadequately considered. Then, the specific "problems" that are targeted are over-corrected. Over-correction brings on a decrease in resiliency

141

throughout the system, and successive problems brought on by lost resiliency bring on more waves of technical management.[20][29]

Examples of this "futile fragmentation" can be found in both ecosystems and health systems management. For instance, decision-makers determine that there is decreased availability of one species, nutrient, or artefact, such as salmon in the Columbia river,[23] nurses in the health system, or beds for patient care. However, there is incomplete questioning of how the growth or shrinkage of these components interacts with the other parts, processes, and levels of the ecosystem or health system, over what time spans, or with what effects.[11] A low amount of salmon, nurses, or beds is simply defined as a "problem", and its rapid production is sought. Down the road, salmon disappear even faster as fisherman increase their harvest of larger fish populations,[23] or nursing vacancies multiply as system policies of scarce full-time employment, chronic overtime, and other difficult working conditions persist.[32][33] The ecological consequences of fragmented habitats and our fragmented responses therefore range far beyond the disappearance of a few local life forms, and noticeable losses of species are only some of the most visible manifestation of far deeper threats to ecosystem health.[7][14] Gunderson and colleagues conclude that for human systems as well as ecosystems, extensive fragmentation holds similar perils.

The deleterious effects of overly fragmented habitats for patient care become even more evident when we consider contrasting examples of what it is to be nursed.[20][31][34] Nursing practices orient the nurse to his patient and surroundings for signs of what matters, for that patient at that moment. The nurse sees that an

142

elderly man does not help move himself in bed like before, and stops to feel his pulse. The nurse whisks by a room, and as she glimpses a young teenager's eyes she sees her terror of a pending labour, and goes inside. The nurse stops to see if a formerly lively child who is now subdued is febrile, bleeding, or "resting quietly". A bedside is adjusted to create the right space for nursing care,[20] or a patient's pain is attended to before ambulating.[31] A door is left open slightly to give privacy but not isolation, or an extra pillow and ten minutes of quiet encouragement help a new mother relax into successful breast-feeding. As nurses enact these and other practices, in essence they continually read an "economy of signs" in patients and their environments that refer them to an "ecology of things" [28] (p. 17) that matter to the provision of nursing care:

> ...through my practice and experience, it's not worth it to escalate the
> push and exert that energy unless she is feeling the need to push...you
> know it's very exhausting...If the baby is traveling down further and
> doing well by itself, well, leave her alone. Why would you want her to
> exert?...that is my practice and it's best when one nurse is there with the
> patient and has rapport...
>
> Lara[3]

As Lara's account of nursing a woman in labour indicates, an ecology of good nursing care does not invariably point to the need for technical interventions or the completion of more "tasks". Patients and their situations are not problems to be solved; they are unique persons who need safe passage through a vulnerable time.[35 36] In fact, a nursing ecology seems to provide what Higgs terms a "counterpoise"[4] (p. 340) to the efficiency tendencies of a technological culture.

143

Technological interventions and purposeful tasks are frequently appropriate, but several participants noted it is equally possible that the best nursing care comes about in moments of invisible judgement. Someone may need to share their fears for a few moments rather than "pop a pill" in order to sleep restfully, or stay several hours past "standard" discharge time to be ready for recuperation at home without complications. A restless post-operative patient may need better ventilation rather than pain medication, and recurring incidences of post-op respiratory arrest may require that a team debrief and examine its transfer policies, instead of continually pressing to put more patients through. This suggests that environments with a thriving *nursing ecology* generate knowledge that is both local and "system-wise". Nurses read a balanced economy of natural, cultural, and technological signs about their patients and their worlds, and the ecology of what matters for good nursing care emerges. The healing properties that characterize healthy ecosystems find their parallels in the health system; the relations, structures, and processes that foster resilience and adaptation are present, and the nursing is good:

> *If they trust you they are not struggling and fighting, and you reassure*
> *them that you are there. I also find that with some of the patients*
> *that...come back often for procedures, they recognize you: Oh Michelle,*
> *you were my nurse last time. It went really well. They are already feeling*
> *more relaxed. They are okay with it.*
>
> Michelle[3]

From the ecological account of the hospital environment that the nurses' work contained, a constant emerged. The common ground was that whether the

144

concern at hand was rapid restructuring, more monitors than nurses, more patients

than beds, or some other defined problem, technical "wrong turns" invaded the

nurses' work when system-wide pressures for efficiency dominated the practice

environment. Relations and problem solving between practitioners, patients, and

families foundered, and patients came to harm. As in ecosystems, when too little

resiliency in the health system was met with more fragmented approaches,

inaccurately identified problems unravelled into larger and sometimes devastating

disasters. In short, fragmented habitats and fragmented management responses

fuelled each other into a state of ecological disrepair.

Ecological Degradation in the Health Care Industry: Sarah's Story

> Even when prescribed fires are conducted on small remnant
> prairies...they can have unforeseen harmful effects if not managed
> properly. The smaller the remnant, the less margin for error.
>
> Daniel S. Licht[25] (p. 81)

> remnant *n.* fragment; part remaining. Before 1375 *remnant*, contraction
> of earlier *remanant* ... from Old French *remanant*, present participle of
> *remanoir, remaindre* to REMAIN[1] (p. 909)

Fires hold considerable interest for researchers in ecosystems management

and restoration work. It is now understood that while a healthy, resilient

ecosystem eventually renews in a different but creatively viable form after a fire

that occurs as part of a natural cycle, a relatively small initial fire can tip a

degraded ecosystem into a condition of long-term damage and loss.[8][11][25] As Licht

and others note, the chain of events that transforms a small fire into a disaster

145

begins with a habitat that is not ecologically ready for much more in the way of threats. Whether infestations of pests, excessive logging, or other assaults have already fragmented its structures and processes, the ecological integrity of the ecosystem is too far reduced to keep a small burn from becoming a large wound. The ecosystem has lost its capacity to set an effective response into motion. Sarah's story suggests that when health systems are re-engineered without sufficient attention to the ecological integrity of a hospital's habitat, a similar loss of capacity results. The web of relations and structures that keep the care safe are steadily fragmented, and one initial mistake unravels into no remaining margin for error.

The chain of events in Sarah's story began with a woman's transfer to and from the nursing unit for special diagnostic tests. When the minimum stay that policy required after the tests expired, the critical care unit made it plain that they needed their bed back for another patient. The chart arrived on Sarah's unit with the declaration that this patient was "stable to transfer", and with limited numbers of experienced staff, a relatively new nurse was assigned to the patient. Despite her own heavy assignment, Sarah spent much of her shift re-assessing the patient and trying to obtain what she viewed as necessary medical attention. Her cumulative nursing wisdom fed her vigilance, and she started trying to contact the physician right away. Still, things deteriorated into irreversible harm.

146

...when I went in to help sit her up, I was appalled...I called the resident back, because it was a dramatic change. Called the physician...but he was in the operating room. It took sort of all morning. I had talked to the resident, I had talked to the doctor...and he said well, he didn't have time...by 4 o'clock he came back, well then it hit the fan, because there was a definite shift and the next thing we know, the lady is being rushed off to ICU and intubated.

<div align="right">

Sarah[3]

</div>

As Sarah recalled this devastating incident, she reflected that despite her best efforts to get help for a deteriorating patient, the system broke down in too many instances, and on too many levels. In essence, her story described a health system that had lost its resilience and healing power. The question that lingered for Sarah, long after the doctor, family, and other colleagues absolved her of culpability for the outcomes of this situation, was why she could not adequately nurse a malfunctioning system. Her inability to overcome a degraded system left her unable to sufficiently nurse her patient, even though she knew how.

...it was a series of miscommunication, not enough information, not enough documentation. She should never have come to us. She should have stayed under neuro for that sort of a thing, but the politics came in there that they needed that neuro bed for somebody, so send her back to us...we did everything we could, I did the best I could to get people there...a totally different resident to look at her...Totally different nurses...I mean, I looked over the chart and it said, you know, stable to transfer...the lady died.

<div align="right">

Sarah[3]

</div>

147

Sarah's story is particularly useful because she identifies her nursing unit as one with strong clinical leadership and a respect for the value of nursing care. Her head nurse encourages Sarah's other roles of clinical teaching and nursing input to the computer systems. Learning is valued, and there is considerable effort to provide adequate numbers of qualified staff for care. Yet, both Sarah and other nurses described system-wide patterns that seemed to surpass the coping abilities of individual nurses or even nursing units. Repeatedly, there were "log jams" of patients, along with breakdowns of other resources that defied the possibility of giving good nursing care. Admitted patients waited for unavailable hospital beds in Emergency, or women laboured alone as scarce nurses hurried into the next OR for a C-section, or off to NICU with a new infant. Post-operative patients were sent home without adequate recuperative time under a nurse's observation; or post-anaesthetic patients were shoved into recovery rooms, wards, or even hallways with unacceptable levels of nurse monitoring.

In the judgement of the Joint Commission on Accreditation of Healthcare Organizations, an event is *sentinel* when "it sends a signal or warning that requires immediate attention" because of its present or potential capacity to cause harm.[37] (p. 9) The Commission includes individual practice in their definition of what requires scrutiny after a sentinel event, but Kobs,[38] and Friedman[39] note that the Commission's guidelines for examination of sentinel or adverse events prescribe a detailed investigation of "an organization's systems".[38] Ecological overtones can even be detected in the Commission's goal of "root cause analysis",

148

which searches for the less visible factors and "variations in processes" that lay the ground for sentinel events to unfold.

The ethnographic research of Andrews and colleagues on the care of 1,047 critical care and surgical care patients on three teaching units supports the Commission's requirement for system-wide analysis.[40] In a strong sense the study by Andrews' team illustrates an ecological research approach, with attendance at case conferences, debriefings, nursing shift changes, resident rounds, and other meetings to witness analysis of incidents and actions first-hand. Over two years, these researchers identified an average of 4.5 adverse events in each of 480 or 45.8% of patients, including "aborted" adverse events or ones expected to result in "serious harm, if it had not been for the chance intervention of another health-care professional".[40] (p. 310) One quarter (25.4%) of the adverse incidents detected were ascribed to "interactive or administrative causes",[40] (p. 312) and for 185 patients, the adverse events that occurred led to temporary disability or death. Perhaps most significantly, the study revealed that the greatest proportion of adverse events did not occur during surgery, but during "subsequent monitoring and daily care".[40] (p. 311). The findings of Andrews and colleagues also support the nurses' accounts of adverse incidents in the present research. Both studies identify that the essential, "everyday" aspects of "monitoring and care" include such individual practices as proper antisepsis, correct placement of tubes, or timely clinical judgments and actions; interactive practices like adequate communication between professionals, specialties, and facilities; and sound administrative practices such as maintaining sufficient equipment and staff.[40]

149

An ecological interpretation of adverse events adds a warning to the nurses' accounts that is patently clear. Nurses, patients, and other practitioners in a health care "industry" that over-values short-term efficiencies collectively labour to generate healing in the face of systemic ailments that jeopardize their best efforts. When the everyday components of the health system's ecological integrity are not consistently valued and placed on an equal footing with other more obvious "efficiencies", knowledgeable and committed practitioners like Sarah find that their best efforts do not overcome a systemic ill. The systemic roots of adverse events constitute a sentinel ecological reading of nurses' work environments that levels a "warning shot" across the bow of health care. The warning is this: Where healing work is perpetually assailed by the speed up and fragmentation of nursing practice, an overall degradation and ecological disintegrity of healing habitats is also present. In short, denatured nursing is but one symptom of an environment that is denatured of its healing properties.

The warning that denatured work provides is even more evident when we consider that persistent technological threats to the ecological integrity of healing places also pressure the ecological integrity of wild places. If nursing is denatured by the environmental threats that accompany our current approach to high tech care, and if denatured nursing is a sentinel warning about the degraded ecological condition of our health care environments, we are faced with a fundamental question. Can we renature both nurses' work and work environments with relations, processes, and structures that regenerate healing and healthy hospitals in a technological world?

150

Renaturing Health Care: Regenerating and Reinhabiting a Healing Place

> ...in 1998, 57,966 nurses (more than 25% of all nurses employed in
> Canada) were over 50 years of age, up 19 per cent since 1993.
> Meanwhile, 4,435 (less than 2% of nurses) were under 25 years, a
> decrease of about 29 per cent since 1993. The number of nurses
> graduating each year is painfully small. What would we think if we saw
> these statistics applied to one of our endangered species? Should we fear
> for the survival of that species? Should we fear for the survival of our
> profession?
>
> <div align="right">Colin J. Eddie[41]</div>

The nurses in this research are not alone in their fears for patient welfare, and at times survival, in the degraded industrialized habitats of acute care. A growing body of research evidence demonstrates that the factors influencing nursing care are complex and frequently ignored, often with serious consequences for patient well being.[42] [43] [44] Nor is Colin Eddie alone in his fears that nursing could be a threatened species. In fact, *attrition from the healing practices of nursing within the ranks of employed nurses* may pose as grave a danger as attrition from nursing employment itself, as those who stay in the health system to perform largely denatured work effectively cease to nurse. While not discussed as denatured nursing, the steady displacement of necessary and even life-saving nursing care with a mounting pyre of technical tasks is studied with rising concern within the nursing discipline. Arguing that the challenge for nurses in industrialized health care is to find roles that enable them to actually *nurse*, Nagle asserts that a "workday consumed by assembly-line history and physicals"

confronts nurse practitioners with a question of "extinction or distinction".[45] (p.

75, 71) Liaschenko voices the concern that if "nurses are denied the relation to the

process and product of their work through an organization of that work that

reduces time and staffing, the work is no different from assembly line work."[46] (p.

364)

Varcoe[47] and Rodney[48] add to these concerns about nurses' work and

work environments in their respective studies on emergency and critical care and

medical nurses, providing examples that support the present research findings on

efficiency-driven re-engineering, speed-up and fragmentation of nurses' work,

and reverse adaptation. In subsequent integration of their findings, the practice

setting is described as a "corporate wasteland"[49] (p. 29) where the skilled

judgements and actions of nurses, along with the prudent use of resources and

personnel, all become "disposable corporate casualties" to the drive for greater

system efficiency. (p. 16) They cite instances where the practice of highly skilled

nurses is clearly denatured, such as an experienced medical nurse who relays her

distress with missing a patient's bladder distension on a typically overwhelming

and task-filled shift. Examples also emerge of the nurses' efforts to overcome the

system's constraints on ethical practice, and like the nurses in the present

research, nurses in Varcoe's and Rodney's studies frequently "bent the rules" in

search of better patient care.[49] (p. 27)

Historical studies reinforce that for several decades, hospitals' persistent

determination to "scientifically" task nurses' work have sabotaged nurses' efforts

to integrate tasks into the provision and oversight of sound bedside care.[50 51 52 53]

152

In particular, Sandelowski's analysis of U.S. nurses' assumption of hospital intravenous therapy in the 1950's supports the present research finding that the tasking of nurses' work is a denaturing phenomenon. Noting that administrators and physicians have increasingly delegated medical tasks to nurses since the end of World War II, she critiques the growing displacement of bedside nursing with narrower technical functions as an "inversion of nature" which nurses simultaneously mourn and feel unable to escape.[51] (p. 54) Other recent work supports these historical findings about the devaluing of nursing ends, as nurses' work in re-engineered health care is critiqued as an "ordeal",[54] a "blue-light special",[55] or other forms of labour whose raison d'etre of healing care is too readily squandered, or even altogether misplaced.[31][56][57]

If we wish to reclaim hospitals as healing places, where do we start? The findings of one study do not provide a comprehensive answer, and the recommendations that flow from this work must be tested with more research, and in the ultimate court of nurses' practice and patients' experience of care. Still, despite the necessary limits of this research, three healing endeavours inform its findings with some degree of common wisdom. The practice of nursing as intended is primarily concerned with the health, healing, and potential of people, families, and communities, and the practice of ecological restoration as intended is primarily concerned with the health, healing, and potential of threatened and degraded ecosystems. It is also arguable that the project of contemporary philosophy of technology is equally concerned with health, healing, and potential, as applied to the concerns and ills of modern society. Out of these common

153

concerns with technology, ecology, and healing work that the research uncovers, the three worlds of nursing, ecological restoration, and philosophy form a basis for initial proposals. These proposals integrate knowledge from all three fields with the nurses' words to outline some essential directions for healing nurses' work and regenerating the ailing health care environs of a technological world.

Restoration and Regeneration: Healing a Technological World

Restoration is about accepting the brokenness of things, and investigating the emergent properties of healing. It's the closing of the frontier – ceasing our demand for open land to "develop" – and the reinhabiting of exploited or abandoned places.

Stephanie Mills[2] (p. 2)

Restoring the wounded environs of modern health care begins with questioning how we came to be so broken. What did we lose sight of in our modern health system; what did the system misplace in its fragmented technical management of patients, hospitals, and nurses' work? If we probe the healing worlds of nursing and restoration further, the foundation of an answer begins with further exploration of a central and shared value, the value of *relation*. Essentially, an ecological reading of the nurses' work illustrates that relations are vital and complex connections of integrity, in both the most personal and the most systemic ways.

For Bergum, relationships "make it possible (not just necessary) to be moral",[58] and include questions of how we are in ourselves, with one another, and with the larger world.[19 59 60] For the nurses of this research, relations were central

154

in all of the ways that Bergum outlines. Their own sense of what it was to be a good nurse shaped their relations with others, and their understanding and experience of relations provided ecological knowledge of patients and families, other practitioners, units and hospitals, and the larger system in fundamental ways. Their accounts illustrated that the ways in which nurses and others carefully minded or carelessly neglected relations within their settings carried the potential for very different outcomes in patient care. Each situation became a question of how one minded a call for ethical relations in one's own actions,[20][58] regardless of whether those actions concerned the care of individual patients, the care environment, or even the system overall.

Nurses' valuing of relations is mirrored in the work of Mills,[2] Higgs,[4] and others who draw on the legacy of Aldo Leopold,[16] as they discuss two healing aims of ecological restoration that they believe are inextricably linked. Those aims are to heal damaged lands and to recover a relation with the land that cherishes it as a *home place*. A place that we treat as home, rather than as a factory assembly line, is a landscape that we more thoughtfully and carefully inhabit. Or, as Mills notes, home places are those damaged lands that we need to *reinhabit*, in ways that are more faithful to our world and to ourselves.[2] We glimpse a healing home when we listen to Ellen's recollection of her former unit, one that restructuring disassembled:

155

...when things were good we were one service, so we only had two or
three neurosurgeons that would come and visit us. The same residents
were coming all the time so it was like family. You learn very quickly
about what practices each doctor likes, and you know quite often you just
make judgment calls on your own... Your ear was always listening for
when someone needed help...you knew that the patients were getting
good care...the patients were safe...I could identify a deteriorating
patient very quickly, and took a lot of pride in that.

Ellen[3]

While recognizing that the unit she cherished was gone, Ellen was equally
certain that many of its values could and must find root in her new unit, values
that could make it another home for good nursing care. Things could never be the
same, but she also believed deeply that nurses needed to transplant and re-grow
what they knew about patients and their environments into a changed health care
world. Ellen's conviction is supported by researchers who recognize that we
cannot actually restore our modern environs to some fantasized better past,[7, 61, 62]
and with the best of the past and a different future equally in sight, Higgs replaces
the concept of restoration with the notion of *regeneration*.[4] Regeneration, he
argues, is the complex task of ethically inhabiting our threatened ecosystems in a
technological age. Citing Leopold,[16] Borgmann,[63] and others, he urges
restorationists to work with communities, government, and others to nurture the
development of the knowledge, values, and practices that matter to a better way of
living with the land, and with each other.

A regenerative intent towards modern health care extends the need to
identify the components of ethical and sustainable repair, for either ecosystems or

156

health systems. Enduring ecological repair fundamentally differs in kind from the short sighted and mechanical changes of technical redesign, and it is here that Higgs' concerns about technical restorations become highly relevant to the project of renaturing health care. In brief, Higgs argues that technical restorations persist because our ingrained cultural tendency to adopt a mode of reverse adaptation disrupts the *ecological fidelity* of many restoration projects.[4] Citing principles of structural/compositional replication, functional success, and durability as the components of ecological fidelity that produce effective restorations, he then points out how each of these principles is violated when a mindset of efficiency overshadows an ethical commitment to restorations that are enduringly *good*. This ethical commitment is realized when we develop not only scientific but historical, political, economic, and cultural knowledge of particular places, and engage with communities to regenerate ecosystems by building more ethical relations between humans and the land.[4][8]

The present research, Bergum's exploration of a relational ethic in health care, and Higgs' research in restoration all converge on several points for the viable reform of our troubled health care environments. Among those points, we realize that when the production of efficiency, volume, and "average stays" dominates our conduct in health care, we may have green industrial parks and impressive treatment statistics – yet, pollutants keep entering the ecosystem at unmanageable rates,[4][10] and healing wisdom drains from health care.[19][29][49] In effect, we arrive at a deeper concern with the technically narrowed relations that accompany a counter-adaptive quest for efficiency. Perhaps technical relations

157

and their morally shallow base not only separate restorationists from healing the land and nurses from healing people; such deficient relations may also infiltrate and corrupt our attempts to heal the habitats and systems of modern health care.

If relations are as key to system-wide integrity and individual health as the present analysis suggests, the failures of re-engineering in health care are further explained. As technical fixes, many redesigns do not adequately account for critical relations either between persons or across the system, and overall resiliency decreases. For instance, consider the ecological consequences of replacing large numbers of expert nurses in an area with lesser numbers of inexperienced and casual staff over a short period of time. At the same time, systems were re-arranged to process more acutely ill patients faster than ever, and physician services were spread across two or more sites. Then, watch several dynamics proceed to synergistically disrupt the system's capacity to respond. A unit of co-workers becomes a fragmented culture, there are suddenly multiple gaps in collective local knowledge, and a skeletal staffing pattern leaves no room for error when the chances of error are greater than ever. The structures, processes, and relations of ecologically sound health care are not put in place; the dynamics of a healthy system are disrupted, and our designs are neither scientifically nor ethically sound:

> ...she comes back to us and again we have part-time staff, we have full-
> time, we have casuals. It was a casual girl who was working with her
> that day and she came out to me, I was in charge, and she said Sarah, I
> don't know this woman, can you tell me anything about her?
>
> Sarah[3]

158

Sarah's legacy to this research combines with the insights of nursing,

philosophy, and ecological restoration to view this and other sentinel events as a

vital source of learning. For the ecological integrity of acute care to sustain

healers and healing in a technological world, the next step to meaningful reform is

to embrace our errors,[64] and to reconstruct the very way that we view the world.

To the extent that we face our failure to account for the relations that matter to the

ecological integrity of the health system, we recover the resiliency we need to

renature health care.

Renaturing Modern Health Care: Errors and Learning

...Error embracing is a means for alerting the learner to opportunities to
adjust proactively, to be resilient. Of course, learning what kind of error-
embracing system works is in itself a learning task.

Donald M. Michael[64] (p. 479)

The idea of looking at systems is not new. Systems concepts serve to

underline most modern management techniques, and we faithfully pursue a

growing variety of data to improve the performance and outcomes of health care

practitioners and environments. However, the healing disciplines of nursing,

philosophy, and ecological restoration offer guidance to the project of renaturing

health care that scientific management strategies cannot. The guidance comes in

understanding that *our pursuit of performance and production is inadequately and*

over-technically conceived. This misreading has profound implications for the

ecological integrity of modern health care.

The outcomes of an overly narrow and technical appraisal of health care persistently reappear in the nurses' accounts of their work, and there are several instances in which the necessary conditions and resources of a resilient system break down. Beds are jammed, equipment is lost or malfunctioning, physicians are unavailable, and so on. Nurses also note with distress that they make technical errors in their own practice, or note such errors in the work of their fellow practitioners.[5] Patients are not adequately assessed, technological information is assigned an inappropriate significance, or patients are transferred or discharged before it is clinically prudent.

From an ecological perspective, the "technical errors" that nurses' work expose introduce three vital concerns for the renaturing of health care, those of *relation, resistance*, and *response*. All of these concerns have received successive attention in the analysis to date, but we now consider them as inter-related properties of the nurses' work environments. As interlocking matters of ecological integrity that are critical to the ethical organization of health care environments, the concepts of relation, resistance, and response are discussed at length elsewhere.[65] For purposes of the present chapter, we start to examine how these environmental attributes interactively shape a health system's capacity to nurture an ecology of good nursing care. What becomes apparent is that as common elements of a healing system, the synergistic regeneration of relations, resistance, and response is indispensable to enduring reform.

Relations, Resistance, and Response: Common Elements of Healing Systems

She stood up for herself: "No, I don't deserve to be treated like this", but there was never any discussion as a group, or a debriefing for her, or a sense of, "You know, this is a problem, we need to deal with it as a group, we need to stand behind this one nurse".

<div align="right">Michelle[3]</div>

When we start to look for the less visible ecological dynamics of a health system, we begin to find the supports and threats to its resiliency, and we apprehend our health care environments with different eyes. The culture of a unit becomes not something to "redesign" for efficiency alone, but instead a complex web of relations within a larger health care habitat, a living network that carries the secrets of survival for good patient care. We recognize that large numbers of nursing or other staff cannot be abruptly moved from one unit to another without a critical loss of nursing memory and common commitments. We also realize that one manager may somehow juggle the budgets and scheduling for four units on paper, but cannot know intimate details of staff and patients that provide for best use of valuable practice wisdom. A clinical manager that is spread too thin in the name of efficiency also cannot reside faithfully enough in any one unit to foster learning and commitment. Nor can an absent leader steadily reinforce the fundamental importance of simple acts like hand washing or re-ordering supplies, or of complex relationships and clinical judgments. Yet, all of these commitments and more are essential elements for an ecology of good nursing care.

The concerns that the present research raises with many current restoration projects and with health care re-engineering do not suggest that we cease our

<div align="center">161</div>

efforts to redesign and regenerate either damaged wilderness or damaged health care systems. However, the interdisciplinary nature of this study originates with research like Bergum's[59] and Higgs[9] where the respective voices of patients or communities are included alongside a wide range of sciences, arts, and professions. This inclusive approach indicates that the renaturing of health care must be more democratic, less consumptive, more relational and communal, and less technical, than the bulk of redesigns have been to date. None of these stipulations precludes the judicious and even vigorous use of technology in the service of many purposes. However, as guideposts for more ethically adequate conduct, more communal criteria require us to engage with technology as more than either mere means or reversely adaptive ends. This means that in an industrialized health care world, technology presents an ethical, scientific, political, economic, cultural, and thus ecological "parliament of things"[66] for our careful vigilance, questioning, and ultimate actions.[4][8][11][28][63] In this assembly of technology, our task is to find those ways of thinking, doing, making, and being that strengthen the *ecological* integrity, the healthy, resilient relation of all living things to each other,[1] within our ecosystems and health systems alike.

To faithfully engage in this ecological task with the assembly of technology, we need to commit to more deeply ethical relations with each other and with our home places, relations that consider how we treat one another.[59] We will equally need to question what constitutes ethical relations with the patients, staff, and others in the hospitals, communities, and global markets that make up our health care world.[19][29][60] We will need to personally resist and also listen to

162

others who question counter-intuitive technological practices,[4][49][54][67][68] and dig deeper for ecological wisdom when technical fixes stand within easy but misleading reach. For these kinds of relations and resistance to be nurtured within health care, we have to identify, in painstaking detail, those processes and structures that increase the ecological integrity of our health system, and those that do not. We have to probe the resilient responses of better functioning practitioners and settings, and be willing to part with those responses within health systems that are less ecologically sound, for either nurses' work or for other healing care.

To close with one example of thinking ecologically to develop the relations, resistance, and response that we need for a technological health care world, we can try to creatively expand our understanding of fragmentation and its effects on habitats. For instance, Licht discusses how the conditions that result from fragmentation "invite new species, especially predators".[25] (p. 61) An ecological reading of acute care that considers technology's fragmentation of nurses work and work environments introduces the notion of new and problematic species and predators, both of the technological and the biological kind. In this sense, the "technological toxins" of speed up and fragmentation can be re-understood as widespread environmental contaminants. In the research, failure to check the spread of these environmental threats established the conditions for the "technical species" of reverse adaptation to invade and prey on the healing intents of nurses' work.

Continuing our exemplar, we saw in the nurses' accounts that the "efficiency virus" was a stealthy predator. As a mindset with narrow but highly visible goals like volume, length of stay, and per patient costs, it took insidious hold within the nurses' settings, and rapidly reproduced. Nurses were frequently thwarted when they resisted the predation of efficiency with attempts to maintain or retrieve safe care, and the true costs of predatory efficiency were sometimes only recognized when sentinel harm occurred. While the parallels may not be exact, this ecological lens on the nurses' habitats develops our capacity to construct an effective response. Like antibiotic-resistant bacteria, the technological toxins that have settled into health care are systemic ills that cannot be resolved with a piecemeal approach. To the contrary, when basic practices such as adequate hand washing continue to lag behind the guidance of scientific evidence and administrative policy,[69] the ecological reading of this research suggests that super-infections, speed up, fragmentation, and other environmental ills may be interwoven phenomena in modern hospitals.

As infectious agents, it may be that all of our technological and biological ailments invisibly interact and proliferate when we fail to value and enable the vital relations, ethical questioning, and sound nursing practices that prevent their spread. The worrisome symptoms of our neglect are often ignored until full-blown illness is in evidence, and the cost of our ignorance is steep. Like the environmental ailments of damaged ecosytems, it is entirely possible that these inter-related toxins of acute care only significantly alter, for better or for worse, *in relation with* each other and the rest of an ailing health system.

164

Like nurses' work itself, ecological warnings for acute care environs may gain sufficient respect and attention within health care to make a difference, or they may come to pass unnoticed, like so many falling leaves from a dying tree. Insufficient consideration of ecological concerns in modern health care may persist, and the health of health systems and its inhabitants continue to erode. To ensure the former outcome, we need to build a bridge[11] between the practice, research, and healing knowledge of nursing and ecology. That is, just as timely nursing attention to the status of patients and their environments can foster the necessary conditions for patients to heal, judicious concern for the ecological status of acute care can bring about the conditions that renature nurses' work and work environments. In service of that concern, we need to keep exploring what this sentinel reading of acute care tells us about the corresponding challenges of ecological restoration and nursing, where the struggle to care for and heal wounded environs and their respective inhabitants proceeds. What do we need to study, what do we need to learn? As we explore the relations, resistance, and response of a reformed relation with technology further in the next chapter, it becomes evident that "a quantity of engaging work"[70] awaits us all.

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166

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169

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172

Chapter 5

This chapter has been prepared for future submission to the *Hastings Center Report.*

civic *adj.* 1542, borrowed from latin *cīvicus* of or for a citizen (chiefly in the phrase *corōna cīvica* civic crown or garland, awarded to one who saved the life of a fellow citizen in war), from *cīvis* citizen, see CITY...The meaning "of or having to do with a citizen or citizens" is first recorded in 1790, in Burke's works on the French Revolution.

<div align="right">Robert K. Barnhart[1]</div>

city *n.* Probably before 1200 *cite* town, borough, especially a walled town or city and its government; also a cathedral town with its bishopric, in *Ancrene Riwle*...from Latin *cīvitātem* (nominative *cīvitās*) condition of a citizen, citizenship, citizenry, the state, city, from *cīvis* citizen...Latin *cīvis* is cognate with Sanskrit *śivá-s* trusty, worthy, and Old English *hīwen* household, family, from Indo-European *kei-uo-,* root **kei-* lie down (Pok. 539); related to HOME.[2]

home *n.* Probably before 1200 *hom* dwelling, house, village...developed from Old English (about 725) *hām* dwelling, house, estate or village; cognate with Old Frisian *hām* home or village...Old Icelandic *heimr* residence, world...Old Irish *cōim, cōem* dear, beloved...[3]

<div align="center">174</div>

RENATURING HEALTH CARE:

ECOLOGICAL CITIZENSHIP FOR A BIOTECHNOLOGICAL WORLD

I was saying we've got to change the sheet, we've got to clean them

up...Can't we just change the sheet? Well, we don't have time, we've got

to get on with the next patient...I really struggled with that...I don't think

it's a problem to take that extra minute to really clean them up and

change the sheet underneath them...it was, "Get them in, get them done,

get them out. You are wasting time."...A "good nurse" is one that can

move fast. A "good nurse" is the one that can get them in and out

quickly.

<div style="text-align: right;">Michelle[4]</div>

Ethics is about questioning: questioning ourselves, questioning our

relationships with others and questioning our place, as humans, in the

larger environment...Openness to the question of ethics, of 'what we

should do', increases the possibility of learning to live together in

increasingly respectful and considerate ways.

<div style="text-align: right;">Vangie Bergum[5] (p. 167, 179)</div>

At its core, the Hastings Centre *Nature, Polis, Ethics Project*[6] [7] [8] [9] [10]

embodies the spirit of Vangie Bergum's call to question our relations with others

along with our human place in the larger environment. The democratic relations,

social equity, and moral ecology of environmental and human health that foster

ecological citizenship all encourage us to ask how we might live together more

respectfully, with one another and with the home place of our earth.[11] [12]

Particularly, Strachan Donnelly urges us to "forever critically ask of present

regional perspectives: "What has been left out of account"?[13] In the work that

follows, research findings on registered nurses' work in acute care[14] and proposals

<div style="text-align: center;">175</div>

from the work of *Nature, Polis, Ethics* on Chicago regional planning are examined together in order to develop questions about the moral ecology of healing in modern health care. The questions that are raised lead us to reconsider what counts as adequate ecological citizenship for a technological world.

The present research stems from two sources of inspiration. The starting place was registered nurses and others across North America who voiced ongoing ethical distress with the aftermath of health care downsizing and re-engineering throughout the past decade.[15][16][17] The second foundation was the *Relational Ethics Project*, where a research team with expertise in nursing, medicine, psychology, health care ethics, law, contemporary philosophy of technology and ecological restoration, native studies, and other disciplines explored the nature and commitments of a relational ethic for health care.[18][19] From these sources of practice and research, common concerns about relationships, resources, and the capacity for ethical practice in high-tech care were identified, and the present project was launched. The central purpose of the research was to explore the practical ethical challenges of nurses' work in the complex technological environments of modern health care.

To accomplish the research, ten registered nurses were enlisted in successive individual conversations about their work, work relations, and work environments at seven urban acute care facilities located around the Canadian province of Alberta. The nurses who took part in the study possessed between ten and thirty-four years' of nursing practice in one or more clinical areas including orthopaedics, cardiac and general systems intensive care, neurosciences, operating

room, recovery room, diagnostic care, burns, general and cardiovascular surgery, and labour and delivery. In addition to professional practice, all of the nurses engaged in one or more extra-curricular activities, including clinical specialty groups, professional association, union, school, church, and community commitments. Collectively, the practice wisdom of the nurses exceeds 200 years of nursing experience.

Throughout the study, research conversations with nurses were placed in dialogue with contemporary philosophic theories of technology[20][21][22][23] to develop a critical interpretation of technology and nurses' work. As the analysis progressed, two central findings that emerged become particularly relevant to the goals of democratic ecological citizenship. The first salient finding is that widespread technological tendencies in the nurses' hospital settings speed up and fragment their care in ways that task, split off, and effectively *denature* nurses' work from practices of a healing nature.[24] The second point is that in the research conversations, denatured nursing is closely associated with industrialized hospital environments and a wider health system that exhibit a common and disturbingly deep state of *ecological degradation* and disrepair. In essence, nurses largely recounted hospital environments where a recurring predilection for short-term "efficiencies" prevailed. Decisions in one part of the system were routinely separated from consequences in other areas, and the necessary relations and processes to correct problematic situations were often absent or in deteriorating condition. As narrow, technical targets of quicker discharges, more procedures, and "just in time" staffing were pursued within the nurses' settings, the core

177

properties of healthy systems and healing work were often neglected or dismantled in their wake, and longer term damage ensued.

In the nurses' accounts, it was evident that the combined effects of denatured nursing and ecologically compromised work environments frequently culminated in a state that Langdon Winner describes as *reverse adaptation* to a technological society.[25] According to Winner, reverse adaptation is at work when the original ends of human effort unreflectively drift towards the nature of the available technological means, regardless of how this unintended adaptation alters the goals achieved. In the research conversations, the phenomena of reverse adaptation was evident when the nurses critiqued judgements, actions, and preoccupations of themselves and others that they saw as counter-intuitive to basic principles of good patient care. Thus instances of reverse adaptation included times when concerns and criteria for patient monitoring, clinical decisions, scheduling of staff, maintenance of sufficient equipment and supplies, communications and coordination between areas, or other resources and processes for care faltered in lieu of "getting the work done". In many instances, nurses indicated that they felt unable to rely on either fellow practitioners or the system. Nurses spoke of patients who "fell through the cracks" and incurred preventable suffering and harm, or of staff who toiled to exhaustion and fell ill, or left.

An overall theme in the research emerged. It seemed that amidst a rising tide of data, directives, and work redesigns, nurses found that an essential nursing vigilance over both the overall environment and patients' individual situations and clinical conditions was too often misplaced.[26] As a necessary balance between the

178

technology of modern health care and the ecology of healing environments was lost, the system and its inhabitants foundered, and things went wrong. To explore what it means for either the present research or the work of *Nature, Polis, Ethics* when things go wrong in modern health care, we turn to the nurses' words. There we find the stories of practitioners who struggle against rising odds to exercise ecological citizenship, on behalf of healing places that have lost their way.

Technology, Ecology, and Nurses' Work

... the lady shows up and it's "Oh while she's here and she's 3 centimeters, let's just rupture her membrane"...wait a minute, the unit is busy, this baby is fine, the patient is fine. "Well she's just tired of being pregnant."...they are trying to talk us into letting them induce her... the problem is, you tell someone who is 38 weeks pregnant who hasn't slept for three days that you want to induce her, she is going to jump at it. Whereas if you tell someone who is 34 weeks... they might say "Well, wait a minute, how is this? Is this okay for my baby?

Lib[27]

The ecological ailments of the hospital environments and health system that were examined in the present research confirm the need for democratic ecological citizenship, within health care and throughout our lives. However, the nurses' accounts also signal that to develop a fuller ethical sense of ourselves as communal ecological citizens, we need to form a deeper sense of the offspring of technology we have become. In the present research, *technology* is understood to be a growing number of characteristic ways in which "we take up with the world".[28] This broadens our understanding of technology from that of machines,

179

products, or even complex technical systems to a wider notion of unreflective

habits, approaches, and mindsets that shape our human sensitivities to and

capacities for a moral way of life. For philosopher of technology Albert

Borgmann and several colleagues, the pervasiveness of technology in this deeper

and less scrutinized sense becomes a problematic pattern that characterizes our

contemporary existence.[29] [30] [31] [32] In large part, this technological patterning of our

daily lives becomes problematic to the extent that we do not even notice its

presence:

> *...we have great, great discussions about how many scopes are out on*
> *loan, or how we can decrease the equipment failure and decrease the*
> *cost of repairs of equipment. But we don't discuss how can we facilitate*
> *the patient, the patient care...we never discuss patient care.*
>
> <div align="right">Michelle[33]</div>

In the present research, a dialectical analysis of technology and nurses'

work led to unexpected findings about the ecology of nurses' work in acute care.

In effect, the denatured nursing and degraded environs that surface in the nurses'

work chronicle a *sentinel ecological reading* of modern health care. This urgent

ecological warning raises the ante for healing our earth, ourselves, or any other

part of nature. The warning is this: The counter-intuitive combination of sicker

patients, proliferating technology, and corporate "cost-efficiencies" that typifies

so many present day hospitals inflicts significant ecological damage on the

people, habitats, and systems of modern health care. In turn, ecologically

degraded health systems leave a deepening ecological footprint on our global

environment, in the form of a predominantly biotechnological and corporate

<div align="center">180</div>

approach to health care.[34][35] In effect, with more and more visible damage, the factory of modern health care consumes our world and those within it:

> *There's been suggestions that you don't need to be a nurse to lead a*
> *patient care unit. You need to be a business person. Well, if you are*
> *running a factory for profit, you could use that. You could use the*
> *business background.*
>
> <div align="right">Michelle[36]</div>

When we reinterpret questions of technology as ones of who and how we are, inquiry into technology and nurses' work comes to include questions about our collective capabilities to be ecological citizens. It becomes clear that intricate and often infinitesimal "matters of the earth"[37] inform the nature of all living systems, and we realize that human and environmental health are related matters of how we inhabit and care for our bodies, communities, and earth. People are not separate from nature after all, nor are matters of health in modern technological health care separate from vital matters of health for our earth. As ecological damage mounts within and around our present day hospitals, we need to join nurses and others who question the direction of our modern health systems[38][39][40] to ask: What has gone wrong with the ecology of health care?

To pursue this question, research findings on the nurses' work are synthesized with thought from relational ethics, ecological restoration, philosophy of technology, and ecological citizenship. To adapt from Donnelly, it becomes evident that foundational relations, processes, and structures are required to sustain a *moral ecology*[41] of good nursing care, an ecology that can be understood as a complex, living web where the practices of nursing thrive and create

<div align="center">181</div>

openings to heal.[42] [43] [44] By diluting and at times completely stripping healing practices from nurses' work, the emergence of denatured nursing in modern hospitals flags a dangerously unbalanced tension between the moral ecology of good nursing care and the degraded, polluted environs of industrialized health systems. In the backcountry of nurses' work environments, shrinking wilderness, third world sweatshops, and other seldom noticed places, a common conclusion is reached: We evade a closer examination of technology at our common ecological peril. By considering knowledge of healing, technology, and ecology that nurses' work gathers to a common place, the home place of nursing, a fuller sense of our ethical task becomes clear. We see that an adequate reckoning of ecological citizenship requires us to nurture the relations, processes, structures, and creative tensions that foster more democratic and therefore more ethical design of technology, in health care and in our world.[45] [46] [47] [48] To fundamentally redesign technology instead of technically tinkering with health care, we need to consider further the inner workings of two vital healing projects, ecological restoration and nurses' work.

182

Ecosystems, Health Systems, and the Complexities of Healing

On the surgical floor and because of the turnover, get them out. Beds are being made as we go into the room...At our end, it's "we need the space, move your patient now" - and instead of saying "No, my patient isn't ready to go"...I would have to say that the majority of the time, we stop thinking the nursing part when the pressure is put on us to move them out...

Elva[49]

Elva's words remind us that, to adapt from Joan Engels and others, we assume more democratic relations with technology on behalf of a heightened moral concern for places that are meant to *heal*.[50] [51] By simultaneously examining the work of nurses and the work of restoration, we come to understand that a reformed relation with technology is equally necessary to sustain healing properties in health care systems and in the ecosystems of our world. Ultimately, we remember what we once knew about health and healing places: that they are part of and not a conquest over nature. To demonstrate the merits of these claims, we consider two kinds of damaged wilderness that bear the marks of the same technological age. That is, we think about the damaged backcountry of parks and other wild lands that many ecologists and restorationists work to reclaim, and about the disrupted healing places where most nurses still work in the year 2000, the increasingly dangerous tenements of acute care:

183

...unless there was a drug error or there was imminent danger for the patient, incidents were never really recorded. Even falls and things like that were very rarely reported unless the patient got damaged, then you knew you had to...It was just too petty for the time that it took...When things were so cutback and fast.

Ellen[52]

The "moral ecology" that Donnelly urges for renewal of the Chicago Region[53] introduces an important question for the increasingly disturbed landscapes of modern health care. Specifically, what contributes to or detracts from a moral ecology of good nursing care? Much of what nurses do in order to *nurse* patients is invisible to the casual observer of nursing care. Like so many of the indiscernible workings that steadily nourish the co-evolution of a healthy ecosystem, when the nursing of patients is *good*, the invisible reparations of nurses' work render patients more comfortable, safe, and healed than would otherwise be the case.[54] [55] [56] Needless pain and suffering are avoided, preventable harm is anticipated and warded off, and patients and families are helped to find their way through whatever they must face, including inevitable death. The ecology that makes up healing care and healing places, the relations of living things and parts of a complex, dynamic system, is a moral one. With committed vigilance over the conditions of patients and their environments, an ongoing series of timely, knowledgeable judgments and actions interweave with a complex web of relations and structures to form an intricate, moral ecology of good nursing care.

In addition to nursing their patients and families and immediate environments, nurses "nurse the system" to maintain an ecology of good nursing

184

care that keeps chaos and harm at bay. They become the equivalent of expert backcountry guides, employing intricate and often imperceptible knowledge and skill to navigate the increasingly risky clinical wilderness of high-tech care. In the research, it was evident that to execute this critical healing work, nurses simultaneously inhabited and interpreted the space of bedside care and the larger landscape of an increasingly complex system, in order to obtain the necessary conditions and resources for ethically adequate nursing care.[57][58] For instance, they scrutinized the clinical expertise as well as the numbers of staff in order to safely juggle patient assignments, and ensured that their units are stocked so that patients do not wait for medication refills, lifting devices, or infusion pumps. They investigated why anaesthetized patients kept returning prematurely from the recovery room to the unit, why a new machine arrived without instructions for its safe operation, or why a critical drug or lab report did not arrive at all. In essence, nurses nursed the system to enable the moral ecology of good patient care:

> *...it's the background knowledge of what the requirements are for that case and that surgeon. Each case is unique...another case at that same particular point in booking time doesn't require the same amount of time or even equipment, depending on the surgical technique of the surgeon...A child has different needs than an otherwise healthy adult, or an elderly person with several other medical conditions....So booking cases requires a lot of thought and problem solving, to make sure you haven't got double bookings or other things that you've missed...*
>
> Kara[59]

The moral ecology of nursing care that emerges in the present research and other studies encompasses critical aspects of watchfulness over patients and

185

environments that are usually known only to nurses, and perhaps to discerning patients or other practitioners at times.[60] [61] [62] [63] [64] And, as long as a moral nursing ecology prevailed in most health care settings, the invisibility of its integrity was just fine with most nurses, *because the nursing of patients was good*. However, what happens when the moral ecology of nursing care is threatened, and nurses find that despite their best efforts to nurse a health system, people and places come to avoidable harm? What is at work when a health system fails to reliably serve the projected recovery of patients from illness or injury, or the expected advent of good births and good deaths, and the nursing or other care of patients and families is "not good"?

To understand health systems and their threatened healing work, we turn to other healing work and living systems, the ecological restoration of damaged ecosystems. The definition of restoration used for the research, developed by the Society for Ecological Restoration (SER), is the process of assisting the recovery and management of the ecological integrity of an ecosystem.[65] In turn, the SER considers an ecosystem's ecological integrity to include a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices.[66] This concept of restoration draws on a variety of basic and social sciences and arts to consider matters of science, technology, ethics, culture, politics, economics, relationships, and more.[67] [68] [69] [70] In other words, in ecological restoration as in nursing, an indiscernible synergy of complex phenomena is required to create and sustain conditions that heal. These invisible and discounted workings of healthy ecosystems are

186

significant to David Strong, who argues that the damaged ecology of Montana's over-logged Crazy Mountains confronts us with a different account of technology than the popular cultural mantra of unabated "progress".[71] Wilderness can never be rescued in an enduring and viable way, he claims, by methods of restoration that simply seek to replenish nature's resources for further thoughtless consumption.

Given the criteria for restoration that Strong and colleagues ask us to consider, the pursuit of cost-savings at the expense of adequate nursing care forces us to differently *weigh technology* in the re-engineered systems of modern health care.[72] As Strong notes, we cannot accurately probe the deeper ecological footprint of technology on threatened wilderness "from the road",[73] where all we really discern is that a logging quota is kept and the viewpoints on the main highway are still pristine. Similarly, to assess the true ecological condition of modern health care, we have to leave the "front desk" where case loads, dollars, data, and press releases are continually re-shuffled, and head into off-road country. There, we find that smaller numbers of clinical staff and managers are spread over larger volumes of acutely ill patients, and the rapid "throughput" of transient patients makes it more difficult for nurses to assess the significance of subtle changes to their conditions. The staffing resources, clinical education, medical coverage, and other structures and processes that invisibly nourish nurses' abilities to watch over their patients and units are frequently rearranged, and other support systems such as dietary, lab, housekeeping, and central supplies

187

are downsized and reorganized in successive waves. Away from the "main road", the ecology of good nursing care is placed under increasing strain:

> *They are changing the pumps all the time, or if they are not changing*
> *that...the last 6 months I bet you at least once a month I've seen a new*
> *ventilator...there's no inservices. It's... "Oh we are trialing this*
> *one"... "Well, how do I silence it? How do I get the mixture oxygenated?*
> *How do I hook up my ventolin?" So you spend a lot of your day doing*
> *that, and you learn it, and the next ten times you work, you have to show*
> *somebody else.*
>
> Blaze[74]

Using the proposals of the SER, Strong, and others to re-examine the nurses' narratives of their work, we uncover a range of threats to a moral ecology of nursing care in the degraded habitats of re-engineered hospitals. For instance, many of the nurses spoke about the responsibilities they felt to report a rising incidence of small mishaps before large errors occurred, to order more supplies before they ran out, or to ensure that other staff knew how to safely operate new equipment. However, in the face of relentless workloads and diminished resources for care, nurses increasingly focussed on keeping their own patients safe in the moment while wider environmental concerns went undone. In effect, the decreased support services, thinly spread managers, disrupted unit cultures, and other stripped down systems of re-engineered hospitals often meant that no one reliably "watched over" nurses and patients to ensure a healthy environment for the provision of care. In turn, overtaxed nurses ceased to reliably "watch over" the work of themselves and others, and conditions deteriorated in their environments over time:

My unit in particular has gone through five supervisors in five years. The
last three supervisors have not stayed longer than eight months...Do you
see what it's like? It's just terrible.

<div align="right">Lara[75]</div>

When the nurses' accounts of their work environments are collectively

heard, the persistent disruptions to healing work of a faltering system gradually

build to the steady white noise of an over-zealous logging operation in a once

vigorous forest. Despite the best efforts of knowledgeable, skilled nurses, and

notwithstanding many instances of conscientious care, the prevalent environment

becomes one of cases done (acres logged), tasks completed (logs shipped), or

other "efficiency measures" that siphon nurses' attentions away from healing

work. As Elva's example clearly illustrates, when the factory takes precedence, a

relentless pace dislodges even the basic clinical wisdom that vulnerable patients

need the close attention of expert nursing care:

...you have two more patients come in that are requiring one-to-one
attention, so now you have one nurse looking after eight patients...our
patients' safety could be so easily compromised, but it's seen as, "What
do you mean you can't handle it? You have two empty spots - what do
you mean you can't take two more patients, you have two empty spots.
There's no nurses? Oh, you can look after the patients."

<div align="right">Elva[76]</div>

In our larger earth environment, scientists argue that there are threshold

conditions under which ecosystems can no longer repair and recover their

optimum development.[77] [78] [79] The present research suggests that when vital

<div align="center">189</div>

nursing commitments of watching over patients and their environments become threatened practices, similarly critical threshold conditions are at work for hospitals - conditions below which the intended healing nature of nursing and other health care work does not reach fruition. In the research, nurses observed that such "threshold crossings" were often discounted or even unnoticed when the "noise" of the factory was maintained. For instance, many nurses noted that as more patients arrived and fewer nurses cared for them, the care was often compromised – but, the speed, volume, and consistency of the "production line" was maintained. Amongst other things, this meant that while there was often too few nurses to adequately care for labouring women, there was always a fetal monitor for every room: As Haley wryly noted, "even low risk are monitored. It's not that I agree with that, it's that for liability purposes, you want to make sure you are covered".[80]

The ecological degradation of the nurses' work environments and the attendant consequences for the health of its inhabitants raises questions for *Nature, Polis, Ethics*, and for all who care about ecological citizenship. Can we truly expect to become good ecological citizens on behalf of our earth, if we cannot exercise effective concern for the wounded habitats of modern health care? Does our capacity to repair the damaged regional landscapes of our industrialized world correspond with our abilities to restore all the home places of our earth, including the ailing health systems where nurses and others struggle to provide healing care? If the denatured work that threatens nurses' healing work reflects the environmental ills of a failing health system, we need to ask: How can we use

190

the moral ecology of nurses' healing wisdom to renature the technological world

of modern health care?

Nurses' Ecological Wisdom: Renaturing Principles for Healing Places

...as a practitioner you feel safe in that environment, because even when

things do go bad, horribly bad...the approach is to say "That's right, we

are all to blame or we are all responsible, and this is what we must do".

Lib[81]

Basic ecological concepts tell us what we must fundamentally attend to

when we talk about the home place, sustainability, or about the

preservation of "nature". These concepts give us the parameters for

reasonable talk about equity and commerce. They provide the framework

in which democratic ecological citizenship and decision-making must be

exercised.

Paul Heltne[82]

How do practitioners, policy makers, and citizens reconstruct a lasting

moral ecology of healing in an irreversibly biotechnological world – how do we

restore a healing nature to nurses' work and to the damaged, industrialized

habitats of modern health care? As Heltne notes, ecological concepts give us a

way to think about what biologically and morally matters in a corporate world.

When Lib compared a healthier unit to one with a poorer standard of care, the

place where nursing still thrived was one where nurses and other practitioners

actively questioned what relations and conditions made up and sustained a range

of possibilities for good care. Other nurses equally noted that healing practices

191

were nurtured when an automatic acceptance of "efficiencies" was questioned on behalf of a moral concern for place:[83]

> *...it seems like it's just...carry on with the next patient, next patient, next patient. Only recently have we had staff meetings...we're finally having staff meetings where we have had a chance to discuss issues about the unit. You know why aren't things being done? Who's not stocking what? Why are some people always in the same rooms...we are finally starting to talk about that.*
>
> Michelle[84]

Yet, questioning the present direction of high-tech care does not mean that we can restore either health care or our larger world to an imagined former time when technology seemed a simpler factor, and our earth, bodies, and healing places seemed more whole.[85] [86] [87] Instead, the moral struggle that arrives with technology is that of rejecting temporary fixes for the more painstaking work of gathering and acting upon intimate, inclusive knowledge of a given region, hospital, or other threatened landscape and its inhabitants.[88] [89] [90] [91] [92] For Eric Higgs, this deeper undertaking entails the respect for both the past and potential future of a given ecosystem in its historical, cultural, economic, and other context, an endeavour that requires us to re-imagine restoration as *regeneration*.[93] With a commitment to regeneration, Higgs proposes, we merge "what we have accomplished and practiced well," in the past into more "workable, creative, and faithful engagements"[94] with home places in the future. In short, we work to more ethically reinhabit all of our home places, including those places where we go to heal.

To reach a more substantial ethical relation with healing places, however, we need to re-examine the tensions that arise between a moral nursing ecology and the blighted landscapes of industrialized health care. These tensions point to three initial principles for transforming the wounded environs and inhabitants of modern health care into places that once again heal, those of *relations*, *resistance*, and *response*. These fundamental directions for ecological reform are considered at length in other discussions of the research (see Chapter 6 and 7) where detailed recommendations are generated for research, practice, education, and policy. However, the example of error management which follows illustrates all three principles in brief, and offers both a more ethical and more ecologically sound way to address one of the most troubling events in health care, those times when despite our efforts, things go horribly wrong.

When Things Go Wrong in Health Care: A Renatured Approach

...she was probably too scared to ask for help, probably didn't understand what was happening to her...things like that do bother me, they really do...unfortunately you can't say this is just one bad incident...there's a lot of incidents like that...

Lib[95]

...there is grave danger of losing one of the meanings that the word treatment has – the manner in which one acts toward another. When treatment means only technological therapy or remedies that may effect a cure, the question of "how should you and I be treated?" loses its meaning.

Vangie Bergum[96]

The first principle of renaturing that emerges from the nurses' accounts of their work is the principle of *relation*. A moral ecology of good nursing care, like the healing practices of ecological restoration, situates the ethics of our relations with home places at the heart of ecological citizenship in a biotechnological world. In a moral ecology of nursing, home places include our own person and those of others,[97][98][99] our communities and healing places,[100][101][102] and the land.[103][104][105][106] In this sense, *concerns of relations are ethical questions of how we treat one another*, and how we research, practice, or "treat" a patient, colleague, or larger home place become questions of who we are. This definition is drawn from the nurses' accounts of their work and from Bergum's research, where ethical relations are described as contextual, "full-blooded" commitments that find expression in our way of being.[107] Lib's comments underscored the maxim that ethical relations were essential to healing work, and their absence, between individuals or with organizations, translated into errors that haunted research participants.

The second renaturing principle that becomes apparent in the nurses' accounts is that *resistance to the technological practices of industrialized health care constitutes an ethical struggle to sustain the declining ecological integrity of healing work and work environments*. As attempts to shore up the threatened ecological integrity of a technologically over-determined system, acts of resistance therefore provide essential clues about the "barriers and bridges"[108] that remain between our current ailing state and a health care system that is more ecologically sound. The nurses continually questioned problematic conditions that

194

were associated with recurring errors, and cited frequent examples of their efforts to identify corrective practices. Even in situations where no response was forthcoming, nurses continued to question; to do otherwise was to give up on making things right, and thus to give up on good nursing care.

The ethical obligation to heed the concerns of relations and resistance leads to the third principle of *response*, which refers to *our obligation to regenerate the kinds of relations, processes, practices, structures, and context that sustain the ecological and therefore ethical integrity of modern health care.* With the need to counteract unreflective technological practices in mind, the principles of relation, resistance, and response enable us to recognize what Borgmann might call critical landmarks[109] on the complex terrain of high-tech care. As an incomplete list, these landmarks can be thought of as ecological maxims or sentinel warnings. These sentinel cautions have been noted by a variety of experts, and include the following:

- When things go wrong, intense focus on one or a few isolated variables to the exclusion of the broader context often produces problematic actions that at best, fail to correct error and at worst, compound it;[110] [111]

- The ineffectual or even damaging results of narrow concentration on one or a few variables in error management accelerate the loss of resiliency in an already ecologically compromised system;[112]

195

- Ecologically adequate error management accounts for the broader context of errors by carefully examining and then taking responsibility for how system-wide actions play out in local consequences;[113][114][115] and

- Taking responsibility for "how things play out" requires that we regularly scrutinize and take necessary actions to ensure that a system's relations, processes, and structures match the intended healing ends of human activities with ethically and ecologically adequate and sustainable means.[116][117][118]

To determine the usefulness of these ecological caveats for error management in modern health systems, we need look no further than the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).[119] Specifically, when serious mistakes or sentinel events occur, the JCAHO's systematic search for *root causes* illustrates all of these ecological principles and maxims. For instance, the event of error raises several relational concerns about "treatment" that must be addressed. There are concerns of whether the patient has been adequately medically treated, and of how the patient and family feel treated by the staff and the organization. If staff have erred, there are issues of how they are treated by those who are harmed, by their fellow practitioners, and by management. In turn, these matters of treatment are shaped by the way the organization treats its responsibilities to every party, including the patient and family, the staff and managers, the board and risk carrier, the relevant regulatory bodies, and the community at large.[120] With these concerns of treatment in mind,

196

the Veterans Affairs Medical Centre (VAMC) in Lexington, Kentucky and other

ecologically sound risk management programs primarily use errors to learn and

correct, instead of to punish and blame.[121]

As those who practice it can attest, the ecologically sound approach of

root cause analysis departs from the habits of organizations that routinely "'solve'

problems by criticism, by disciplinary action, or by dismissal of employees".[122] In

effect, the principle of relation is honoured by the conduct of root cause analysis

as staff and patients alike can trust that errors are dealt with promptly, honestly,

and accountably. Information is collected about "system breakdowns, holes in the

medication administration process, staffing, environment, safety, orientation

processes, competency, communication, technological support, and other factors

that contribute to errors".[123] This is the necessary information that detects the

tracks of inadequate resistance to avoidable errors, as difficult but essential

questions are asked and answered, one by one. For instance, were repeated

warnings about missing supplies, wrongly labelled medications, malfunctioning

computer systems, or inadequate staffing discounted, or even completely ignored?

Was a patient transferred without all of the pertinent records, did phone orders go

unnoticed, were pharmaceutical incompatibilities undetected? And, when any of

these or other missteps occurred, what else was going on at the time? From these

types of initial queries, further questions about the relations, processes, and

structures that support better future outcomes can be plotted, and an adequate

response to error begins to come into view.

197

For the JCAHO, the components of an adequate response are key.[124] Starting with relations, a commitment to truth telling entails a personal and sincere apology, an explanation of what is believed to have happened, and an outline of the steps that are being taken to prevent reoccurrence. Corrective steps are designed to "improve the systems and processes that support providers and patient care", and remedial actions for resistant deficiencies are instituted.[125] Such shortcomings might be a chronic failure to adequately staff a unit or provide minimal orientation, problematic practices for checking and re-ordering equipment, or habitual tendencies to discount staff reports of clinical problems. The assessment, monitoring, and evaluation of patients are considered along with the condition of resources, procedures, and the overall environment. With this comprehensive ecological picture in hand, clear, concrete recommendations can then be crafted into a "fitting response".[126]

Notably, Johnson and Roebuck-Colgan argue that root cause analysis "can provide the emotional healing an organization needs to recover after a sentinel event occurs".[127] Such healing may even be system-wide, as the VAMC reports a significant reduction in litigation costs and a "focus on fair treatment of injured patients and full support for nurses and other practitioners who make an error".[128] In essence, the discourse of root cause analysis may be one mode of civic dialogue that fosters ecological citizenship in health care. It becomes clear that ethical organizations are ones where we all search to understand "what really went wrong",[129] on behalf of a moral concern for what it is that "we must do".[130] Perhaps to no one's surprise, ethical integrity and ecological integrity turn out to

198

be reciprocally linked, and the task before us comes clear. Ecological citizenship is an act of civic faith, and sustaining our civic faith requires a heightened ethical attention to all of our vulnerable home places, including the healing places of modern health care.

Continuing the Dialogue: Sustaining a Civic Faith in Health Care

It amazes me that we are entering the 21st century and yet...rarely are nurses and physicians ever in the same rooms, in meetings or in discussions at the practice level. Certainly at an administrative level they talk...but at the practical level...even looking at nurses and saying, "You know...you have something to contribute to this. You have something to say".

Michelle[131]

The properties of ecological integrity that are considered in this work, along with several additional attributes that have not been sufficiently explored in the present research, offer as many possibilities for renaturing health care as the intricacies of living systems allow. Additional research is needed to examine all the strengths and limitations of ecological thinking for nurses' work and for health care, and there are undoubtedly many limits that need to be outlined. We do not reach utopia with a more ecologically sound health care system; we simply arrive at the best option on offer in a complex technological world. That option is a dynamic, co-evolving living system that sustains the capacity to heal, both for people and for the home places they share.

199

To reach a more civic dialogue in health care, examples from restoration work aid our cause. For example, many criticisms of health care re-engineering echo critiques of ecological restorations that are "technically efficient" and cosmetically pleasing, but are not necessarily ethically, culturally, or scientifically sound.[132][133] With this viewpoint, Jennifer Cypher and Eric Higgs argue that Florida's Disney Wilderness Lodge demonstrates the unreflective adoption of technological practices that disconnect our experience of nature from its real-life consequences.[133] In effect, they assert that Disney's manufactured wilderness "colonizes our imaginations" in ways that narrow our understandings of what matters for nature, and therefore, what needs to be done to preserve it. In light of the nurses' stories of speed up, the technically narrowed thought processes that Cypher and Higgs discuss bear further scrutiny for their possible replication in health care. For example, with a media diet of *ER* and a consumers' "fast food" menu of treatment options, did citizens, politicians, managers, and re-engineering experts collectively obscure and then misread the signs of good health and health care? For instance, in pursuit of "improved health outcomes" we sought the "efficient delivery" of the most technologically sophisticated and potent treatments, by the most "flexible, multi-skilled" workers, for the least short- term financial cost. On the other side of this increasingly technical jargon, we find health care and its increasingly harried inhabitants with no significant commitment to health in view. Eventually, we could misplace a substantial sense of how to respect and foster health or places that heal altogether.

The proposal that our cultural imagination occupies narrow conceptual ground in a technologically mediated world matches reflections about language that Van Rensselaer Potter[134][135] offers for health care. For instance, Potter uses Clouser's notion of "conceptual ghettos" to argue that in modern health care, a "free market ghetto" preoccupies professionals with lucrative technical proficiencies that obscure our wider ecological responsibilities from view.[136] Perhaps the "ecological slums"[137] of modern hospitals, inner cities, damaged wilderness, and Disney theme parks all harbour the same ethical effluent, our inability to trade a market share mentality for the more sustainable and inclusive public commons of environmental and human health. If this is the case, several disciplines may need to move beyond traditional groupings of health, management, or basic sciences to craft adequate ecological reforms of health care.

The central finding of the present research is that whether it is the land or ourselves that we hope to heal, our modern culture confronts us with common questions for open-ended civic dialogue. These are questions of relation[138] and regeneration,[139] and of how we mindfully learn about, ethically work with, and collectively re-form our present human ecology of thought, relations, and practices in a biotechnological world. These questions orient how we think, resist, and act on a local basis, but they also direct our attention to a global culture that is irretrievably technological and not yet substantially ecological. In nature and in health care, we face technology's ambivalent possibilities as an unavoidable moral journey. The possibilities of technology foster an ecological ethic when we

201

stay in a questioning, focal orientation towards the care of each other and the home places we share.

The technical legacy of scientific health care management may deserve our criticism, but our continued attempts to change seem unavoidable. We cannot and do not seem to want to stay where we are today. The parallel criticisms of technical restorations and health care re-engineering raise the question: How do we exit the ever shortening and dubious cycles of superficial yet destructive "change" that presently characterize modern health care to re-invent a better place? How do we "re-inhabit"[140] health care as a healing place in a technological world? If ethical relations and informed resistance are vital practices for each individual practitioner, it is arguable that a sufficient response to health care's current ecology asks no less of every citizen. If we hope to contribute rather than detract from the ecological integrity of health care and of our world, what is it that we need to learn?

The premise that health care needs to think more ecologically is not new, but as Whitehouse forcefully argues, ecological knowledge remains foreign territory for the halls of modern corporate hospitals and the professionals within.[141] The nurses' words reinforce the validity of Whitehouse's arguments, and they demonstrate the urgent need for efforts such as those of *Nature, Polis, Ethics*. However, the nurses' work also issues a critical caution that both health care and other healing projects need to recognize: *We need to renature our understanding of and relation with a technological world.*

202

One research project does not provide that definitive ecological account, but the nurses' words ask us to do more. The caution of a more ecological approach to our home places, including those in health care, is to proceed humbly but steadily; to question glamorous discoveries but encourage innovation; and to resist pop management mantras, yet be more willing to lead. With these commitments, we recover the value of local, detailed knowledge about little niches in our health care habitat, and we come to understand that a diversity of relations, metaphors, and responses are our greatest hope of ecological integrity, in health care and in our lives. Thus the sequel to a more ecological view of health care is not to gather everyone into "one camp", nor is it to critique every innovation in health care as technological terrorism. Instead, ecological citizenship thrives in health care as it does in the Chicago project, Jasper National Park, or elsewhere: by co-evolving with our local and global environments in more ethical relation, and with more awareness of home places.

Ecologists have largely left notions of rigid vertical hierarchies behind in their own science. Newer theories of ecosytem dynamics assume complex panarchies of cross sectional relations across several levels and scales, open-ended change, profound alterations over time from originally subtle shifts, and the creative, healing capacities of living systems.[142] For many experts, the inter-relationships between natural ecosystems and human systems enable us to imagine that instead of an inexorable climb to some fantasized technological plateau, real progress in natural or human ecosystems incorporates creative cycles of growth, destruction, and renewal. Our task in the face of technology is to

understand our co-evolution within and as part of nature,[143] and to see what that means for our health and healing work, for people *and* the land.

In discussing how to evaluate the health status of various ecosystems, Tom Andrews notes that different attributes carry differing weights for different ecologists: "Some scientists focus more on the flow of energy and nutrients within ecosystems and others on the interactions of species".[144] Regardless of the particular perspective taken, he points out that we seek knowledge of how ecosystems change and vary towards or away from overall health, and in the presence of what patterns. With similar intent, this aspect of the research analysis was presented to scrutinize the terrain of modern health care for signs of ecological integrity, disintegrity or degradation, and threats. Within their settings, traces of evidence were found that nurses are nursing and patients are healing, as well as tracks that indicate a lack of nursing care, or even patient harms. A variety of technological as well as focal responses and relations to the complex environment of technological health care were identified, and an argument for a renaturing ethic in health care has begun.

The findings of nurses' work suggest that like abandoned corporate wastelands,[145] the increasingly toxic environs of some acute care hospitals are places to which we have not recently belonged in the sense of community that Leopold,[146] Dobson,[147] and others intend. At its heart, the research demonstrates that our failure to confront and renature the degraded environs of high-tech care comes at increasing ecological cost to both our health systems and our world. We may find that if we fail to renature and more ethically reinhabit our human healing

204

places, we will not realize the human qualities we need to regenerate and heal our technological world. Will we take up a more ecologically integral world, including a more democratic design of technology, to belong to health care in a more moral and communal sense? Or, will we abdicate our ethical responsibilities for ecological citizenship to an under-examined biotechnological and corporate adventure, where the biggest temporary winners are stockholders, and the largest long-term losers are the health and wholeness of humanity and our world?

As home places that we either *reinhabit* in more ethical relation or continue to abandon to the mounting ecological harm of short-term "progress", the reform of our earth, our healing places, and ourselves are vitally linked. Presumably, the journey has only begun. Re-inhabiting our world, including modern health care, from an interdisciplinary ecological view, provides many scholars and all citizens with a life's work. With the added practical and theoretic knowledge that is offered in nurses' stories of their work and philosophic accounts of technology, it is urged that *Nature, Polis, Ethics* and like-spirited projects explore ways to regenerate the landscapes of modern health care in tandem with the landscapes of our world. We cannot heal in our lands what we will not try to heal in ourselves and in all of our human communities, including the communities of acute care. The restoration "that lies before us"[148] is a full-blooded renaturing of our character, relations, and habitation in an undeniably biological, technological, and co-evolutionary home world. In the nurses' wisdom of relations, resistance, and response, we find strong and sustainable roots from which we can grow. Let's get to work.

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207

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[131] Excerpt from research transcripts. See Appendix D for Information on Research Participants.

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[136] Potter, "Bioethics, Biology, and the Biosphere," p. 40.

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[138] Bergum, "Ethics as Question."

[139] Higgs, "What is Good Ecological Restoration?"

[140] Mills, *In Service of the Wild*, p. 9.

[141] Whitehouse, "The Ecomedical Disconnection Syndrome".

[142] Gunderson, Holling, and Light, *Barriers and Bridges*.

212

[143] Heltne, "Basic Concepts."

[144] Andrews, "What is Natural in Natural Areas?"

[145] Colleen Varcoe and Patricia Rodney, "Constrained Agency: The Social Structure of Nurses' Work", in *Health, Illness, and Health care in Canada*, 3rd ed., ed. B.S. Bolaria and H Dickinson (Toronto, ON: Harcourt Brace, in press).

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213

214

Chapter 6

regeneration *n.* About 1350 *regeneraciun* spiritual rebirth; later, act of forming or growing again...borrowed through Old French *regeneracion* and directly from Late Latin *regenerātiōnem* (nominative *regenerātiō)* a being born again, the act or fact of forming anew, from Latin *regenerāre* make over, generate again...

<div align="right">Robert K. Barnhart[1] (p. 903)</div>

form *n.* Probably before 1200 *furme*...later, *forme* (about 1300); borrowed from Old French *forme*, learned borrowing from Latin *fōrma* form, mold, shape, case, manner, sort, kind...

<div align="right">Robert K. Barnhart[1] (p. 401)</div>

kind *adj.* friendly, doing good rather than harm. About 1250 *kind, kinde* natural, native, related by kinship; later, benevolent, kind (about 1325, in *Cursor Mundi*); developed from Old English *gecynde* natural, native, innate (about 725, in *Beowulf*) originally, with the feelings that relatives have, from Proto-Germanic **zakundjaz*, from *gecynd, cynd* nature...*n.* class, sort, variety. Probably about 1200 *kinde* nature, character, type, class.

<div align="right">Robert K. Barnhart[1] (p. 565)</div>

216

RECOMMENDATIONS FOR RENATURING: AN ETHICAL COUNTER TO MODERN HEALTH CARE

> Healing is real, that much I know...At forty-five, I still notice gains and
> improvements in the strength and flexibility of that leg that got crushed
> in the car crash. And every time I notice that, I'm brought back to marvel
> at this natural phenomenon of health – the capacity of a living system,
> given favorable circumstances, for self-regeneration.
>
> Stephanie Mills[2] (p. 204)

George Webster argues that at the heart of our efforts on behalf of ethical integrity in health care organizations, the questions we need to ask are: "Who are you to me and who am I to you?" and "What kind of a world do we want to live in?".[3] The purpose of an ecological approach to health care is to develop a relational, questioning, and therefore more ethical *counter*[4] [5] [6] to the under-examined technological patterns of an over-industrialized world. As we question the transient fast "cures" or agonizingly slow deaths brought on for people and for the land with re-engineered health care, corporate greening, or other technical fixes, a healing metaphor of ecological restoration emerges. Ethically adequate ecological restoration in a biotechnological world calls for regeneration, where a host of ethical, scientific, cultural, and other factors reach our sight lines.[6] From this inclusive view of healing, we can form initial recommendations to renature health care.

If we adopt a renaturing approach to health care, we cease to discount the less visible healing properties that contribute to the ecological integrity of a health system, such as the nursing practices of consistent assessment, coordination, or

217

being with a dying person. Instead, we question endemic and erroneous tendencies to equate more procedures and fewer nurses with genuine efficiencies. We also question the contribution of each piece of technical data to our clinical wisdom, and the association of excessive treatments with healing.[4][7] In effect, the questioning that supports an ecology[8] of good nursing care takes up the moral concerns of *relation*, *resistance*, and *response* to form an ethical "counterpoise" to under-examined technology, in health care and throughout our lives.[6] (p. 348) In the remainder of this chapter, the ecological principles of each of these concerns are examined in turn. As we exercise more adequate moral concern for healing places, we regenerate a sense of what matters for all of the places we need to heal on this earth, including ourselves.

Focal Relations: Regenerating a Sense of What Matters

I had a fellow who was diagnosed with lung cancer...I remember just sitting there and saying to myself, "I'm going to do this"...he needed to talk with someone...I did close the curtain around me so nobody saw me sitting there, because someone would probably criticize the fact that I was "doing nothing".

Ellen[9]

David Rothenberg encourages us to imagine ecology as "an evolving human perception of being caught in an ever-wider web of natural relationships".[10] (p. 30) The nature of relations, between persons and with places, is significant for the present research. If we re-imagine our bodies and persons, families and neighbourhoods, hospitals and health care systems, wild lands and

218

urban regions as home places which we need to heal, a complex web of *relations* comes into focus for the renaturing of health care. For instance, one constant for the nurses in the research was that deficient relations translated into betrayals of trust. In turn, loss of trust fuelled a communal loss of faith in health care for patients, families, nurses, and other practitioners alike. Thus, situations where a terminally ill patient died alone, or preventable harm or death occurred, or unsafe conditions for care were not corrected, were all ethical violations of the trust that patients and families placed in nurses' hands.

When trust between nurses and others became strained, practitioners, patients, and families often lost trust in the system as a whole. For example, several nurses reported that a growing number of families expressed the need to stay constantly with a hospitalized relative to make sure that care was given, or to prevent things from going wrong. A full-blooded sense of relations[11] therefore includes concerns about the healing properties of ethical relations that enable trust between persons, within organizations, across the health system, and in all of their possible combinations. These are healing properties of being *faithful*, *democratic*, and *questioning*, attributes of being that constitute more ethical ways of dwelling within our health care world. As Lib describes a health team she admires, all of these properties are at work. Relationships between practitioners are thoughtfully developed rather than automatically executed, because the purpose of relation is to serve a common healing end:

219

There is a lot of mutual respect. It takes some time when a nurse first
arrives on the unit for the obstetricians to kind of gauge their comfort
level with her...it's a really cohesive picture which is in effect...It's
called trust.

Lib[9]

In recent research, Cameron argues that "the relation of nursing is
primarily a practice"[7] (p. 19) that creates openings to heal. This sense of the
nursing relation-as-practice is similar to Borgmann's notion of a *focal practice*,
which he describes as a habit, relation, or engagement that counters the
problematic and pervasive emphasis on production and consumption
characteristic of our contemporary technological society.[12] [13] [14] By resisting
cultural tendencies towards unreflective consumption for its own sake, Borgmann
argues that focal practices keep us faithful to what matters and "saves for them an
opening in our lives".[12] (p. 209) A *faithful* sense of individual and communal
relations thus refers to focal practices that are committed, trustworthy, and
oriented to what matters for a moral ecology of good nursing care.

In this sense of what matters, ethical relations as focal practices nurture
the common trust and commitment that enables us to more faithfully inhabit all of
our home places – our bodies, our hospitals, and our world. As such, *focal*
relations help to make for us openings or places where we can heal. Cameron's
description of nursing a dying patient illustrates the relation of nursing as a focal
practice that strives to keep faith with an ethical sense of how we should treat one
another. Her account also enables us to understand the deep moral anguish that

220

nurses feel when they could not remain with patients who are dying, because to stay is the most fundamental nursing promise of all:

> I want to talk to her and I do so and it seems to comfort her. Then at
> another time talking and noises within the room disturbs her. I stop
> talking, turn down alarms and techno-noise as much as I can when I see
> it increases her restlessness and pulling on tubes...Today the betweeness,
> the line between life and death is clearer. I stand in it.
>
> Brenda Cameron[7] (p. 158)

George Webster and Francoise Baylis argue that the "moral residue" which collects within us when we do not act with integrity invokes an anguish that "can sear the heart".[15] (p. 12) If focal relations assist nurses to keep faith with what matters to good nursing care, then practitioners, hospital organizations, and health systems all need to account for how the ecological composition of a place does or does not create openings to nurse with adequate integrity. Nurses require unfragmented, whole moments and places to nurse, because it is in the relation of nursing as focal healing practices that nurses come to know what matters for patients and their environment. For the nurses of this research, knowing patients and their environments did not necessarily entail spending a great deal of time with them or remembering them vividly, although it might. Nursing knowledge of patients and environments did require, however, that nursing means and ends remain one. Thus, nurses strove to know their patients and environments because healing occurred within ethical relations that created openings in which to nurse:

221

...when I'm with a patient for eight hours I know the support system that they have at home. I know whether the guy that's with her is the father or what their relationship is. I have an understanding of what's going on in their lives right now, where this baby is going home to.

Lib[9]

In the research narratives, openings to nurse were most frequently reported in association with practice settings where the relations of nursing were valued. This connection between opportunities to nurse and the way nursing is valued links to the second healing property of ethical relations that became apparent in the research, their *democratic* nature. In the democratic relations of a moral nursing ecology, a complex synergy of connections was recognized and respected by all of the parties within a setting. It was understood that the conditions of good nursing care encompassed attention to relations between patients, families, other practitioners, and administrators; with units, departments, and organizations; and across the health care system as a whole.

However, while all of the nurses could identify the value of this relational web to better nursing care, the importance of democratic relations was most often demonstrated by their absence. For instance, front-line practitioners were seldom consulted on cost-oriented revisions to charting systems, supplies, or other supports for nursing care that often turned out to be ecologically and practically unsound. With similar results, nurses discussed administrative decisions where large numbers of full-time positions were deleted to ensure that a monthly budget was met, but longer-term staffing requirements for sick relief or vacation were not adequately considered, and costly overtime ensued. Several nurses also reported

222

units that underwent multiple changes in a short time frame and suddenly foundered on the shoals of just one further "efficiency", like splitting surgeons between hospital sites, or floating nurses between too many units. As Ellen noted, even the smallest of ill-timed changes sometimes brought unpredictable problems for the intricate practice of good nursing care:

> *They restructured the CSR carts at the same time...you could stand in front of this bloody cart opening doors and not finding what you want, and then they have this small little print where you have a number and you are supposed to go to a catalogue, and you were supposed to be able to find it. Oh, it was just ridiculous...once you got familiar with the way things were set up, some float might come up and say "Can you tell me where the four by fours are?"...it just drove you crazy, because you just could never get on to your day.*
>
> Ellen[9]

For the nurses, a democratic course to relations was apparent when people across the system and within their own units used one another's knowledge to build communal wisdom about what makes up a healing place. Faithful and democratic relations served to foster this shared sense of place, and to restore settings and those within them to *that which already and always mattered to the practice of good nursing care.* In Cameron's research, this sense of a pre-existing need that orients one's actions is described as a relation where the "call of the person claims the nurse who is genuine".[7] (p. 258) This sense of ethical relations incorporates the notion that focal relations engage our bodies, our choices, and our comportment with particular persons, communities, and histories in deeply

223

moral and accountable ways.[12] [13] We rely on each other for what counts, and we know that we can:

> *...when somebody says to you "there is a stat section", or one of the staff*
> *members is say having a patient that's going bad...you never ever have*
> *to worry about somebody coming in to cover your back. You never ever*
> *have to ask most of the time. If somebody is aware that you are having*
> *problems, they're right in right behind you, saying "Is there something I*
> *can do?"*
>
> Lib[9]

Lib's comments bring us to a third attribute of healing relations that consistently appeared in the research, which was the notion of ethical relations as *questioning* ones.[4] That is, places that evidenced a deeper moral ecology of care were ones where nurses indicated that practitioners frequently asked one another things like, "How can I help?" "What's happening?" or "Could we do better next time?" Nurses reported that in units that exhibited this atmosphere, a sudden emergency or a stressful shift did not dissolve into conflict. Relations between people and within the organization carried the capacity to withstand crises, perhaps even learn from them. However, when a factory environment prevailed, nurses questioned the inconsiderate and disrespectful relations that they witnessed with patients, between practitioners, and across the organization as a whole. For instance, a toxic denial of basic health needs often manifested on units that operated like a "production line". On the line, the incessant pressure of putting patients through wore on, even when nurses "dropped like flies":

224

The staff were getting very taut looking and people were falling

asleep...sometimes we wouldn't get our first break until two in the

afternoon...I'd say I can't do this, I have to have a break...they were

starting to really burn out their staff...people were getting sick.

Michelle[9]

The nurses' questioning of a factory line pace demonstrates that even

where nurses, patients, and others seek faithful and democratic relations, the

hierarchical model of systems that typifies modern hospitals confronts us with

ethical concerns about power.[4 16 17] Nurses who took part in the research

understood the "power games" of health care well, and used their knowledge of

the system's cumbersome rules and regulations to negotiate the best possible

conditions for patient care. Despite nurses' knowledge, though, intractable

tensions between large-scale rules and the moral demands of their actual work

repeatedly cropped up. All too often, "cost-efficient services" meant there was no

bed, nurse, doctor, treatment device, or other resource when needed, and nurses

found themselves facing deteriorating conditions for care. When nurses perceived

intolerable threats to their patients or themselves as a result, they responded with

acts of *resistance*. In moments of resistance, to be there for one's patients was to

struggle for focal relations and practices in the face of denatured work. In essence,

resistance formed a questioning stance toward denatured nursing that became

critical to sustaining a safe ecology for nursing care.

225

Focal Resistance: Dissenting with Technology on Behalf of Healing Places

... I find now that I'll stand up for my patients more than I would have in the past. I will ask, "Why are you doing this with this patient?"... "we are going to dialyze your patient". "Well, why?"

Blaze[9]

Cameron says that "to deviate and truly nurse, is to go against the system ...the real event of nursing hides itself, protects itself".[7] (p. 85) The concept of resistance did not start out as an explicit part of the research agenda. However, when nurses were asked what they did to get things to go well, or what they tried when things went wrong, resistance emerged as a basic property of ecological integrity for the health system. This notion of necessary nursing resistance fits with Joan Engel's observations that "Acting on behalf of a moral concern for place almost inevitably involves dissent".[18] (p. S26) Democratic communities are not quiescent ones, and ecological citizenship requires a steadfast and thoughtful opposition to the status quo.

If Joan Engel is right, the nurses' accounts in this research were ones of ecological citizens who dissented in places where a moral nursing ecology was sometimes impossible to sustain. In essence, the nurses' resistance was a form of ethical relation that questioned and countered technology when the moral ecology of good nursing was at stake. In this spirit, nurses' acts of resistance constituted *acts of civic faith*[19] on behalf of healing places. That is, the nurses' actions were oriented toward maintaining both individual and system-wide capacity for good nursing care. Thus as nurses searched for ways to strengthen the highly vulnerable

226

ecology of their environments, they bartered for needed equipment, tests, or transfers of patients; went around rules to find staff or change unsafe assignments; or insisted on better policies for determining safe levels of nursing care. They tried to stay alert for faulty decisions from their fatigued fellow nurse and physician colleagues; and they sometimes took considerable risks to preserve a better quality of care. In fact, Michelle's description of a typical team meeting suggests that many of the nurses' efforts on behalf of healing work required enduring resistance:

> *...they were talking about the budget for next year and the capital equipment that they want to buy...they want to buy this new machine, they want to buy that one ...I said "Well, what we need is better monitoring equipment in the rooms for the nurses."...they looked at me like I had two heads...I said "I think that needs to be a priority. We have very poor blood pressure cuffs, two of the rooms don't have ECG monitoring equipment when we have bad bleeds".*

<div align="right">Michelle[9]</div>

In work on ecosystems management, Gunderson, Holling, and Light note that "loyal heretics" play a vital role in alerting organizations to significant problems and necessary reforms.[20] (p. xii). In effect, the nurses' accounts of resistance illuminated "barriers" to care within the system that were ethically untenable, and shed light on possible "bridges" to a more moral ecology of care.[20] Acts of resistance therefore shaped the relations of nurses to their units and wider health care settings in a fundamentally ethical way. When overall conditions within the system threatened good nursing care, nurses questioned, bent, or even deliberately broke "the rules" or technical codes[21] of their settings to maintain

<div align="center">227</div>

best practice. To resist was to take responsibility for what was not right, and to ask others to take up their responsibilities in kind. As Kara couched it, nurses "have to be able to say, 'We are short today and we cannot run these rooms, for the safety of the patients'".[9]

The actions that nurses take on behalf of what matters for the practice of good nursing care introduces the notion of *focal resistance*. Essentially, *focal resistance consists of the ways that we question and counter unjustifiable technical codes that threaten the moral ecology of our world*. This definition of resistance incorporates Borgmann's concern for how we counter unreflective technological patterns in our environment through committed engagement with that which morally matters.[12] However, resistance as the nurses practiced it also illustrates a struggle between knowledge and power that Andrew Feenberg ascribes to the undemocratic design and use of technology.[17][21] Indeed, while their political analyses of technology differ significantly, the tasking and deskilling of work that both Borgmann and Feenberg attribute to undemocratic design concerned all of the nurses in the research. Hence, nurses took stands against "efficiencies" like skeletal staffing because at bottom, such technical codes or practices were inefficient and severely jeopardized their capacity to knowledgeably act on behalf of patients and their care. As Smoky explained, her decision to report unsafe staffing on one shift did not come from overwork, but from an ethical anguish she could not live with:

228

I was given four patients of which one was basically terminally ill,
esophageal cancer...She was basically a palliative care patient that
hadn't been put on that list yet. I felt so sick that she was just in the
wrong place. I couldn't provide her with the kind of care that I felt was
critical for a dying woman...she just fell to the bottom of the pile.[9]

In ways that become important for reforms to health systems, the nurses'
examples of individual resistance parallel the phenomenon of resilience in
ecosystems that is evident with spontaneous fires in a forest's nested cycles of
growth, or natural fluctuations in predation.[20] [22] [23] Thus like the self-corrective
resilience of a healthy ecosystem, nurses' acts of resistance frequently shored up
the ecological integrity of the system in favour of better nursing care, at least for a
moment in time. Ellen spoke of nurses who spent their free moments with patients
instead of completing incident reports or other documents; Sarah talked about
refusing to accept over-sedated post-operative patients onto her minimally staffed
ward, and Kara described how she safeguarded the OR theatres from
overbooking. As Lara expressed her own growing militancy with reluctant
obstetrical staff, where she determined that a patient required medical attention
during labour, "I don't take no for an answer".[9] The question for health care
becomes: How do we create and sustain environments where the resilient self-
correction of ethical resistance is fostered, on behalf of better care?

One exemplar of focal resistance that captures the creativity and
desperation of nurses' struggles to protect their patients from the efficiency trap is
"the oxygen manoeuvre". Michelle, other participants, and an external critic all
reported the use of this tactic to circumvent crowded treatment schedules and

229

overbooked hospital beds. In brief, nurses knew that patients on oxygen would be assigned a unit bed with an oxygen outlet instead of a hallway bay, and they also knew that patients in beds often saw a nurse more often than patients in hallways. After a string of incidents on units where post-operative patients in the hall were not adequately monitored, the nurses formed their own "solution" for an ailing system. Unless a post-operative patient's condition contraindicated its use, nurses simply began to put low flow oxygen on every patient they transferred, whether it was ordered or not. To secure adequate monitoring for their patients after surgery, every patient "needed" oxygen, and therefore "needed" a room, and hence stood a better chance of receiving sufficient nursing care:

> ...we bring them back usually with oxygen. It's a little game. We bring
> them back with oxygen, saying "We've got to plug this in somewhere",
> so they have to have a spot where they can be plugged in...Rather than
> the hall, because there is nothing to plug them into in the hall, so they
> can't stay in the hall. They "need" oxygen...

<div align="right">Michelle[9]</div>

By their own accounts, each nurse parted company with the policies and practices of their settings for different and unique circumstances. Regardless of their reasons, however, several nurses' actions entailed other dissident, unsanctioned uses of technology similar to the oxygen manoeuvre. For instance, nurses reported filling out workload measurement tools contrary to instructions because the measures did not accurately reflect patients' requirements for care. Additionally, they often made deliberate clinical judgements to use specific technologies either less, more, or differently than policy directed, because the

<div align="center">230</div>

accepted use was not demonstrably compatible with good patient outcomes. As well, nurses subverted policies that hindered their ability to call back necessary staff, or violated scheduling agreements to ensure coverage. It was also evident that whether nurses questioned openly or took subtler or even covert approaches, their actions often carried significant degrees of professional risk. Yet, as Haley recounted the clinical decisions she made on behalf of labouring women, she asserted that some situations made resistance seem like the only choice for ethical nursing care. For instance, Haley closely monitored all of her patients, but in select cases, despite the potential consequences, she documented and reported those assessments much less regularly:

> *If you know a doctor always sticks on a vacuum the minute you say the patient's fully dilated, so you deliver the patient because he is in a rush, well then, you just "won't" check her. You know she is fully by the way she is acting and the monitor strip and the whole shebang. You just "don't check her"...Well 1½ hours later, she's coming into view. "Oh she's 'fully now', better call the doctor".*[9]

In discussing the moral challenges for nursing in a health care system that sees itself as an industry, Leah Curtin writes that every professional must be able to locate "*his/her ethical bottom line* – the line you will not cross, wouldn't even think of crossing – both personally and professionally. It must remain inviolate lest one's soul start to crumble."[24] (p. 8) In the research, each nurse reported that they usually considered a variety of values in their daily work, including principles of good care, fair working conditions, clinical leadership, or individual rights. However, each nurse also reported instances where they forfeited such

231

initial considerations for deeper values that preserved an inviolable ethical bottom line. For Haley, who actually checked her patients carefully and frequently, documenting incompletely to prevent hasty vacuum extractions was an ethical risk she felt compelled to take on behalf of her patients. With different but often equal levels of risk, all of the nurses provided examples of wrestling with a personal ethical bottom line, and inevitably the moral struggle that ensued was at odds with the bottom line of production at any cost.

Frequently, the nurses' ethical dilemmas were complicated by the experience that the production line was not necessarily amenable to rational solutions. Since working harder did not decrease the pace or volume, nurses, patients and families, and other practitioners all became depleted. Emptying a bed quicker only meant that another acutely ill patient arrived that much sooner, and then the syndrome of depletion deepened. Working harder became counter-intuitive to staying healthy, as the reward for extraordinary effort over protracted time periods was simply more of the same. Gunderson and colleagues, who argue that the deliberate over-production of one factor or set of factors in an ecosystem invariably leads to a brittle imbalance and eventual collapse, recognize this paradoxical phenomenon of "depletion by production" in ecosystems management.[20]

To compound matters, the "depletion by over-production" that characterized nurses' work environments literally followed them home, where nurses had to mount similar efforts to resist personal exhaustion. For instance, as demands for overtime and last minute shifts increased, one participant after

232

another discussed the strategies they used to try to safeguard the integrity of their own health and personal lives. Many of the nurses participated in professional and community groups to bring balance to their lives, and some chose part-time work to mitigate the stress of their hospital work environments. In addition, several nurses reported that they either stopped answering the phone, used call waiting or answering machines to screen out hospital calls, or instigated their own booking practices to avoid the hospitals' inevitable last moment calls.

One nurse noted that after several staff began using call display to avoid overtime calls, the hospital countered with call-blocking technology to conceal its identifying number. When this same hospital called to request overtime shifts every day of one nurse's vacation, her family learned to ignore any call without a number on the call display, and eventually did not answer the phone at all. As a form of ethical relation, then, acts of resistance became an inevitable and adaptive response to the "freak landscape" of an extensively altered and disturbed place,[23] (p. 31) the place of modern health care. Not to resist was to live in an ethical no-man's land where one forfeited a vital sense of nursing, and of oneself.

If nurses are regularly faced with the ethical need to "crack the code" of their practice settings in order to give adequate nursing care and preserve their own health, how do we marry their struggle to a more ethically adequate response? The historical and present efforts of nurses to sustain good nursing care in the face of increasing environmental obstacles[25] [26] [27] raises the question: In light of the rising damage to nursing and health care, what is the basis for continued faith in the current design of hospitals and health systems? To date,

233

nurses and patients find our collective response to that question sorely wanting. Further, while many acts of resistance preserve better care in particular moments, the ultimate price of ineffective resistance appears to be alarmingly steep, both for nurses and for the system. New research demonstrates that nurses have record rates of injury and illness that are disproportionate to comparable occupations,[28][29] and attrition of nursing personnel is on the rise.

Of equal concern, covert acts of resistance run the danger of temporarily enabling the system to "limp along",[27] much like the declining condition of an old growth forest where fire suppression is practiced.[20] In this maladaptive mode, the system deceptively appears to function, even as it slides into widespread ecological vulnerability. Eventually, a single bolt of lightning or a controlled burn that would have caused a much smaller fire at an earlier stage of deterioration unleashes an inferno. In nursing and health care, the recent firestorms of rising labour unrest, shortages, and disability claims invoke responses of more money, quicker graduates, or other hasty "solutions" that do not heal what ails us. Thus, nurses' overall resistance to an ailing system is vital, but its greatest value lies in the questions it raises. In other words, what barriers and bridges[20] to a healthier system do nurses' acts of resistance reveal? And, given the answers we find, how do we use this knowledge to strengthen the ecological integrity of the degraded habitats of acute care?

Focal Responses: Reconstructing Healing Systems

*...once we moved...there were so many different people. Everybody
doing their own thing, and not as much cohesiveness as a unit...you are
getting 15 surgeons coming to visit patients now and residents, you know
you've got three different services, surgical services with three different
senior residents in their entourage. Nobody could figure out what they
wanted. So it took a lot more time to get comfortable with each other and
just when you did, things would change...*

<div align="right">Ellen[9]</div>

The place itself is unrecognizable...The trail is gone. The rock at the
bend of the trail where one sat once watching a grouse is nowhere to be
seen...This place was once good and just how it was can no longer be
found.

<div align="right">David Strong[30] (p. 40)</div>

The relations and resistance of a moral nursing ecology highlight our need
to reconsider the present direction of health care, and to question just where our
accustomed habits of a technological approach have led. Particularly, the nurses'
accounts indicate that the healing practices of nursing cannot be indefinitely
sustained within the factory sites of industrialized health care. In thinking about
damaged environments, Higgs observes that "to restore something means to
consider at first glance *what that thing is and what it means.*"[31] (p. 19) What is a
healing place – what does it mean to us? What do we hope to find when we seek
health care, and what total costs – to our finances, our health, the environment,
and our lives - are we willing to bear for our search? Many innovative approaches
to health care policy attempt to broach these questions, but this research and other

<div align="center">235</div>

recent work[32] [33] [34] suggest that we need to reframe our inquiry in a more inclusive and ecological home.

If we choose an ecological tack for future health care policy and management, we might ask: How do we cultivate the healing properties of ecosystems and health systems – how do we rebuild healing places in a biotechnological world? Like other properties of living systems, ethical relations and resistance flourish within a wider set of environmental conditions that make up an adequate *response* to the ecological ailments that threaten modern health care. These conditions sustain a balance between technology and ecology that provides both people and the health system with reliable and sufficient openings to heal. In a different and reformed balance between our technological and ecological commitments, we recover a more ethical relation between humans, health care, and the wider world.

However, Higgs notes: "To restore an ecosystem or an ecological process or many ecosystems within a larger landscape requires at the outset a clarity about goals: What are we after?"[31] (p. 19) What are the goals of a renaturing response to health care, what do we seek? In the research, the definition of *response* that developed was that of *a focal commitment to the ecological integrity of the everyday*. This definition proposes that we seek out and use knowledge of nurses' everyday work to reconstruct processes and structures that support the relations, resistance/resilience, and other attributes of ecological integrity in health care as a living system. In other words, the question we pursue is: What forms of

236

management restore the inevitable tensions between the technology and the ecology of our health systems to a better balance?

Gro Harlem Brundtland, Director-General of the World Health Organization, states that in the matter of health, "there are vital goods, services and values that the market will not deliver. In no other area is the need for a modern, vigilant and effective public sector response stronger."[35] (p. 1) The etymological roots of *response* include the word *liturgy*, which refers to matters of public service, worship, and ceremony, and originates from the Greek words of *laos* for people and *ergon* for work.[1] (pp. 918; 603) As Mills notes, restoration for advocates like William Jordan III needs to be conceived "in terms of not just private ritual but public liturgy...(it) must become a community event".[2] (p. 127) If we hold onto these communal, service-oriented notions of an ecologically and ethically adequate response to the wounds of modern health care, the prevalent consumer view of health care as a marketplace becomes sorely wanting. For health systems to retain a commitment to public service, nurses' work, patients, and healing cannot be treated as so many disposable commodities of an efficiency-driven market.[36][37] Ecologically thriving health systems will evolve to the extent that we identify, value, and construct those relations, practices, and structures that serve the integrity of sustainable economic development and healing equally well.

A complete outline of the relations, processes, and structures that form a healing ecology (and perhaps healthier economy) for a reformed health system is beyond the scope of one research project. Nonetheless, the nature of ethical

relations and resistance for nurses points to at least three essential areas for immediate response. They concern the *regeneration of ritual*, the *re-creation of healing metaphors*, and a *democratic redesign* – of technology, of health care, and of our world. As we work with these exemplars of healing wisdom, we begin to weave an ethically deeper and ecologically stronger integrity to the work and workings of health care.

Healing Rituals for Ailing Health Systems

...if you are orientating, you are trying to say, "This is what's important"...and they'll say "Yeah, but let's get to the desk", well, no. The desk isn't the major focus here. It's looking at this one...I am a very good hands on nurse. I know how to move that person so they don't hurt...when these new nurses come, you really like to take them by the hand and say, "Come".

<div align="right">Sarah[9]</div>

To see that this is my mother is to have a certain kind of information. To know that I am now at home is to have another kind...this approach can be illuminating, but it disregards the way we speak, and it veils the way we live or perhaps used to live. If someone were to ask me if I had any information about the Rattlesnake Valley in western Montana, I would hesitate to say yes and would reply instead that, well, I *know* the valley, this is where I live. I would give a similar response if queried for information about Grete Borgmann.

<div align="right">Albert Borgmann[38] (p. 14)</div>

To take part in healing is privileged work in an intimate world of pain, hope, and other human vulnerabilities. Just as experienced guides know what is

<div align="center">238</div>

important for the preservation of fragile wild lands, nurses know what is important for healing care. However, Beth Perry notes that in a health care world where "bigger is often taken for better and grandeur, opulence, speed, technology and efficiency seem to be revered above all, we sometimes lose sight of the immense power of tiny gestures rendered with sincerity and grace."[39] (p. 6) Stephanie Mills' work alludes to the complexities of this healing challenge, as she writes that restoration "lies before us, but the restoration must be of the whole system, and that whole ecosystem includes the human self, the personal heart."[2] (p. 207). Sarah's comments remind us that in an ecologically degraded environment, the nursing practices that sustain connections to healing knowledge are under continual siege.

In part, Albert Borgmann argues that to heal the wounds of our technological society, we need to reconnect the heart of what we truly *know* – about people, places, and things that matter in our lives – with who we are and how we live. Yet, he also notes that some of life's most important passages - birth, healing, dying – have largely moved into hospitals where "all colour and festivity have been drained from those focal events. How to restore celebration to a secular institution is a hard question".[40] The nurses' accounts of denatured work confirm the need to reconsider the interwoven relations between the local, everyday work of healing and the wider, communal practices of a healing system. Particularly, the ecological wounds in nursing suggest that in a technological health care culture, *we need to regenerate and respect those rituals in health care that heal.*

Healing rituals begin with respect for elders and the rich knowledge of patients and their environments that they carry.[38][41][42] As a young nurse, I came to know the complex world that patients and practitioners inhabit together through the steady mentoring of more senior nurses and physicians who shared my healing goals. By wise example, my elders coached me to respect and develop practices that located the essential clues to healing residing in patients, practitioners, and our shared environment. Just as Borgmann relates how Smoke Elser assumed his calling as a young outfitter for Montana's backcountry,[38] my growing ability to "read the signs" of my clinical setting made me a guide in another land, the wilderness of suffering, vulnerability, and healing. I learned to discern the differences between a tired, subdued person and someone with a brewing sepsis; between a quietly running unit and one that was silently dissembling into chaos; between enough staff with sufficient knowledge and plentiful numbers of poorly qualified personnel. I became more able to dress a young man's burns without unnecessary pain; or to calm a child and myself alike through a frightening asthma attack; or to be with someone who had lost a loved one.

In a few years' time, it became my turn to pass my nursing wisdom on, and I knew that it made the same difference for others that it did for me. Elder to younger, the rituals of mentoring ensured that an evolving ecology of good nursing care was sustained. However, the work redesigns of the '90s brought large-scale layoffs, relocations, and casualization in nursing that profoundly disrupted the mentoring rituals of clinical settings.[43][44][45] As nurses left or went to

unfamiliar areas in record numbers, collective nursing knowledge of particular

units and patients was misplaced, and the wisdom of elders was often lost:

> *The turnover now...there was 12 of us, but I mean now you just get a*
> *group kind of trained and they are gone. Then you get another group*
> *kind of trained and they are gone.*
>
> Blaze[9]

A deficit of dollars and healing knowledge now accumulates in most first

world health systems, as the costs of overtime, recruitment, and disability erode

the anticipated savings of re-engineering. Hospitals compete internationally to

entice dwindling supplies of expert nurses to their folds, and the loosening ties of

nurses or other practitioners to modern hospitals have garnered significant

concern.[46][47][48] Yet for several nurses in the present research, their treatment at the

hands of the health care industry meant that former affiliations with any given

hospital were profoundly curtailed. As one participant proposed, perhaps nursing

positions went unfilled at her hospital because "when a full-time nurse has a day

off, they are getting called two or three times in the day to come in and

work...they really pressure them hard to come in and work". For this nurse, both

her health and her practice fared better after she restricted her exposure to these

"staffing solutions" of re-engineered health care, stating, "I don't want any part of

it again".[9]

If nurses' commitments to the deteriorating conditions of modern hospitals

have weakened, we need to recreate places that draw back and retain nurses to a

more healing environment for patients and nurses alike.[49][50][51] The question

241

becomes, what practices entice and keep us to a place, and which ones erode our commitment over time? In the case of ecological restoration, Meekison and Higgs caution against rituals that only codify and maintain current norms (including destructive or highly questionable ones), and urge us to develop *transformative rituals* that "tie us to the restoration work and to the land".[52] (p. 79) For instance, these scholars argue, actions such as planting urban tenement sites, holding daily workday circles, and making art on the land carry the potential to re-shape and transform a troubled "relationship between nature and culture" into a more ethical and healing relation with our environment. In the present research, the nurses' accounts suggest that transformative rituals and focal practices are equally required to transform the ailing relation between the nature of healing and the culture of technological health care.

However, to re-form the present problematic relation between a technological culture and threatened healing places, some provisos about rituals in ecological restoration become significant. First, Meekison and Higgs argue that for rituals to carry a message that is healing, the inclusive and creative participation of all parties is key.[52] Second, at an even more stringent level of expectation, they contend that for rituals to transform our relations with our environment, their practice must "eventually change how we think and act" in a fundamentally ethical and ecological way.[52] (p. 9) They propose that focal practices as Borgmann outlines them carry this capacity to engage and hold us to what ethically and ecologically matters, and encourage restorationists to thoughtfully discern and nurture those rituals, including focal practices, which

242

carry this transformative potential. If we think about the rituals of good nursing care, the rituals of ecological restoration, and a common need to heal ecologically damaged home places, we arrive at the notion of *healing rituals that renature health care.*

Within these broad criteria for rituals, there are many possible transformative practices in the small and almost unnoticed "daily devotions" that the nursing community values, such as rigorous hand washing or regular turning of patients to prevent pressure injuries. Other practices may be more visible or public instances of honouring what counts, such as meticulous reporting from off-going staff, gatherings to note clinical achievements, or bringing food to celebrate special events. This ecological sense of rituals may explain why, as one management consultant notes, nursing leaders, staff, and units who have been radically restructured need to find "rituals for grieving" that allow them to mourn what is lost, remember what matters, and make together a new home.[53] As focal practices, then, nursing rituals small and large make up the ecology of good nursing care, and good nurses refuse to let them become extinct:

> *...often the wards were really busy and that's your clue when you are a*
> *nurse to know okay, if we are busy, that means that some things weren't*
> *checked or that maybe equipment needs to be put back in place...you*
> *need to follow-up on some things on your shift. Then they also report on*
> *any important factors per theater per list of patients, particularly to keep*
> *things in order. It's important for all of the rooms to know, because we*
> *have to coordinate equipment...*
>
> Kara[9]

243

Kara's "nursing checklist" seems quite modest and non-descript next to the sophisticated techniques and treatments of technological health care.[39][54] Yet, the almost imperceptible details of Kara's actions embody a principle of resistance or thoughtful counter to technology that reflects Ronald Engel's principle of *civic faith*.[19] That is, in the service of a common good, the focus of Kara's activities and attention converge on the elements of necessary nursing care, and intimate knowledge of the system is used to help it function optimally. The qualifier *optimal* is key, because nurses in Kara's setting do not just use their knowledge to "make things work" irrespective of overall conditions. To the contrary, Kara's ritual at report enables her to alter the pace or other aspects of work if she determines that conditions for safe care are breaking down. In this way, the rhythm of work fluctuates to an overall sustainable rate of production,[20] [22] and good care is maintained.

Perhaps not coincidentally, all of the disciplines meet regularly in Kara's area to determine jointly if the necessary systems for doing the work are still intact. This practice ensures that the rituals of each discipline are interwoven to develop common wisdom for clinical care. In this way, co-workers learn about such concerns as nurses' information needs for safe booking practices and adequate reports, surgeons' preferences for surgical techniques, or the unit's minimum requirements for time between cases for a thorough clean. Shared notions of best practice are therefore generated through democratic decisions on such crucial matters as the criteria for accepting or refusing extra cases and the process for triaging the urgency of cases. Mechanisms to ensure the accurate

ordering of supplies are identified, as are the steps to take when there are disagreements about care. One recent outcome of this workday meeting ritual is that a nursing charge role has been established for every shift to ensure continual coordination between surgical teams as the work progresses.

When Kara, Lib, or other participants discussed the value of these kinds of rituals, they noted that team meetings did not ensure that everything ran smoothly. For instance, supplies still ran out on occasion, and cases were still overbooked at times. Continuous vigilance was required to ensure that adequate cleaning was preserved between cases, or that sufficient staff were scheduled for patient care. However, regular discussions served to acknowledge these challenges, and encouraged practitioners to synthesize their respective knowledge of their work and work environment into better practice. As employers seek to retain qualified staff in a time of nursing shortages, the retention benefits of these subtle ecological practices may become evident. For example, Kara notes that her hospital is adequately staffed with a rare resource in 2000, highly skilled nurses in her area of specialty care. She also observed that her hospital maintained a commitment to stable full and part-time positions throughout earlier cutbacks and redesigns, and these same nurses remain with the hospital to this day.

The democratic ecological rituals that Kara describes for her area translate to a variety of other concerns in health care where increased attention to the common good also needs to prevail. For instance, when asked how mistakes were managed in her unit, Michelle noted, "I can't remember the last time any unusual occurrence was discussed".[9] Thus, other rituals that nurses wanted to see

245

established or increased on their units included making clinical rounds as a team; debriefing after unusual incidents; or developing more systematic procedures for checking staffing needs, patient assignments, or the flow of information, equipment, or supplies. The nurses' requests support the argument in the previous chapter that ecologically sound error management can be a healing ritual for patients, families, practitioners, and organizations.[55] [56]

Perhaps an ecological approach to errors attracts many nurses because its systemic perspective considers both the ethical and ecological integrity of our relations with one another, and with the organization. However, the present research indicates that original scope of a ritual does not automatically equate with its ecological significance over time. For instance, several nurses talked about fighting against the speed up of work to maintain the "smallest" of nursing rituals - to clean up a patient up after a procedure, to provide patients and families with opportunities to ask questions, or to orientate a new co-worker. Not surprisingly, nurses reported that units and organizations which regularly violated their ability to perform such nursing rituals for patients just as frequently ignored fundamental practices of respect for practitioners. As a result, nurses resisted the "rules of production" to regain rituals as basic as introducing themselves to patients or other team members, obtaining adequate rest and nourishment to carry on, or attending meetings where decisions were made about patient care. The significance of these "smaller" rituals to the system's overall integrity quickly accumulate, and may be as central to the overall function of the health system over time as how we respond to more infrequent, unusual events. Indeed, our

capacity to support "little" rituals may be a reliable predictor of how often large-scale mistakes and problems occur. For instance, thorough hand washing remains one of our best defences against the spread of antibiotic-resistant microbes, and yet its reliable practice eludes us in many modern hospitals.

In addition to these and other rituals of sound nursing practice, healing rituals in research, education, and policy are of equal importance to the renaturing of health care. For instance, rituals of interdisciplinary dialogue are fostered with such projects as *Nature, Polis, Ethics*,[8] the *Relational Ethics Project*,[11] and the WHO's work on global ecological integrity.[32] Other research projects that combine the strengths of several disciplines, settings, or reimbursement strategies also demonstrate the ecological rituals of *citizen science*,[57] including respect for the knowledge of elders[42] and close attention to the thoughtful questions of "loyal heretics".[20] (p. xii) We may also find that we increase our ecological literacy[58] through interdisciplinary courses in clinical practice,[59] health care ethics,[60] scientific integrity,[61] health technology assessment,[62] international health,[63] and other areas of health care policy and management. These topics provide opportunities to "think ecologically"[64] and develop our understanding of the principles of health and healthy systems that both ecosystems and health care systems (as parts of larger ecosystems) share. Concepts of *integrity*,[3] [15] [32] [65] *diversity*,[22] [66] *sustainability*,[8] [32] [35] *extinction*,[22] [41] [67] *root cause analysis*,[55] [56] [68] *integration*,[66] [69] and *fittingness*[15] [70] that appear in current literature may even suggest that the need for ecological insights into health care is already recognized, if not yet named.

247

At the same time, the phenomenon of denatured work reminds us that many barriers to civic science, practice, education, or policy remain in the industrialized settings of modern health care. Several of these economic, political, or regulatory obstacles amount to contaminated or "empty rituals"[71] (p. 485) that call for different reforms. For instance, Lib noted a marked decrease in medically induced labours for the duration of a job action by obstetricians. Because physicians were only available for necessary obstetrical care throughout their protest, the decreased rate of inductions may point to perverse incentives and problematic practices in modern health systems.[72][73][74] Of course, the duration of the protest may have been too short to draw any such conclusions. However, for better or worse, the "performance" of the job action reminds us that any ritual, tainted or not, illuminates what is important to those involved:

> ...that job action was almost a blessing. Because it was almost impossible to get in and see an obstetrician, you couldn't do an oxytocin induction unless there was an obstetrician covering...And of course the GPs, because they were so busy trying to pick up the obstetrical patients, weren't doing any inductions they didn't have to do, because of course again, there was no coverage...[9]

If we extended the democratic principles that Meekison and Higgs propose for healing rituals in ecological restoration[52] to the present lot of birthing women in modern hospitals, what might happen? Surely, transformative rituals in women's health care would need to resist and dissolve some of the most problematic practices that persist within the current model of care. At minimum, our present "payment rituals" would change to accommodate stable public

funding for midwifery along with medical and nursing obstetrical care. Financial incentives would be rebalanced to more equitable proportions of multidisciplinary practice and solo obstetrical care, and payments would be geared to continual coverage rather than procedure-by-procedure care. Nurses, midwives, and physicians would also need to work closely with citizens and the media to alter our present myths about risk and safety in childbirth, so that stories of pregnancy, childbirth, and parenting that rebalance our understandings of technology and healing could be more widely told. Notably, some rituals to heal reproductive care are in sight. One example of a rebalancing performance or ritual for women's health care is illustrated by the interactive drama, *A Child on Her Mind*, which uses a play about research on pregnancy, birth, and mothering to discuss women's experience and health care ethics with public and health professional audiences.[75] Writing such personal narratives counters assumptions that transplants, experimental drugs, or other high-risk treatments are the only reasoned options for parents who love their children.[76][77] Other recent projects to support collaborative midwifery and physician care that have been funded in Alberta[57] expand birthing options for women.

Other questionable rituals in the market of health care also present significant barriers to renaturing health care. For instance, it is highly debatable whether our present patent laws truly serve the complexities of genetic engineering, environmental cleanups, pharmaceutical developments, or other 21st century tasks of health care.[78][79] Further, the profit margins in health care or any industry need to open the contracted targets of corporate shares to wider concerns

of ecological wealth and health for all.[32][35][80] Recent attempts to address

environmental concerns in fields like car manufacture,[81] ranching,[82] and the urban

renewal of the Chicago Region[8] dissolve the myth that unfettered markets are

sacrosanct in health care or elsewhere, and a better balance between private and

public goods can be found.[83]

A renatured health care system also requires a civic spirit of respect for

elders' ecological wisdom to ensure that nurses and other front line practitioners

are meaningfully consulted in the initial research and development of technology

and biotechnology. Thus, in more ecologically sound rituals of research, nurses

who resist an endless cascade of "innovations" are not automatically exhorted to

let go of "senseless rituals", and research is not conducted to "debunk the myths"

of nursing practice. Instead, researchers and policy makers work faithfully with

practitioners to identify the values in present practice that carry significant

meaning, and find ways to retain these values in subsequent research designs.

Research projects or reviews of research that reflect this respect for context often

seek a range of methods and disciplines to study phenomena. Recent examples of

ecologically oriented health care research include ethnographic inquiry into

adverse events on hospital units[84] and multi-factorial research on the

characteristics of hospitals with good nursing care.[85][86][87]

If we embrace these civic forms of research, practice, teaching, and policy

as healing rituals for health care, a central ecological principle becomes clear. *In*

all of our health care endeavours, we must be more democratic in our design.[21]

This emancipatory principle of design applies for specific patient populations, for

250

health policy questions, in health technology assessment, with environmental concerns, for ethical issues, and so on. However, to reach more collaborative design, we must first reconsider how we think and talk about the practice, research, education, and policies of modern health care. In short, we turn to the matter of language, and to how we re-create metaphors that heal.

Healing Metaphors: Creating Ecological Literacy in Health Care

I've got 20 drugs in the lady. She's like lit up like a Christmas tree and oh we've got her on dialysis too. So we are dialyzing her and you know...this person even if they survive they are in a permanent vegetative state. They're not going to know they are here...We call it the swirl around the drain, around and around.

Blaze[9]

I am urging a hermeneutic understanding of human life, not just an empirical scientific one, in order to respond to the daily ethical decisions that must be made in health care.

Vangie Bergum[4] (p. 169)

Akemi Hiraki writes that in the act of language, "we understand or misunderstand the possibilities for our actions."[88] (p. 12) To open possibilities for action, Bergum urges us to recognize the relational ethic that is formed in the discourse of the everyday.[4] For Higgs, ethical relations are central to how we enact restoration, particularly the ethics of our relation with the land. Specifically, he notes that "ecosystem integrity will not be secure anywhere until cultural beliefs and practices everywhere are more respectful. It makes little sense to

251

spend time and money on restoring ecological patterns and processes without changing corrosive practices."[23] (p. 34)

It follows that as practices that can wound or heal, the ways in which we speak about our world with one another serve to continually strengthen or diminish the relations, and thus the ecological and ethical integrity, of where we live.[89][90][91] However, Bergum and others point out that a more thoughtful hermeneutic in our lives calls for different language, stories, and ways to think about what is at stake.[4][71][92] To reinhabit hospitals more ethically therefore requires that we question the daily conversations within our damaged health care environments, in order to re-imagine the nature of healing places. For example, Peter Whitehouse recommends new metaphors that "enable us to conceive of diseases and health in more complex and productive ways than our current expensive wars permit".[33] (p. 43) Bjornsdottir agrees, and argues that the costly medical battles of modern health care have infiltrated nursing practice with "an instrumental discourse" that does not "foster and enhance nursing practice that is morally valued".[89] (p. 359)

To consider an example of how the healing metaphor of ecological restoration helps us to constructively critique our present language, we can question the thin, cost-efficient conception of the health care industry that is reflected in the nurses' accounts of speed-up. What does a more ecological account of the word *industry* include? For instance, Heltne and others describe the industry or workings of ecosystems as a complex co-evolution, not a simple financial bottom line, with continuous interplay between biodiversity; nested

252

cycles of life and death; a rich web of relations and processes, and the

fragmenting complications of human activity.[2][20][22][23] Surely, a health care system

where the predators of super-organisms, pollution, and market shares intermingle

with the popular sells of generic health care workers, information highways, and

biotechnology requires an equally robust ecological account. Such an explanation

takes shape when we consider other definitions that appear in the original

etymological roots of industry, such as *cleverness*, *skill*, *diligence*, and *useful*

work.[1] (p. 523) These terms remind us that over the long-term, in health care or

elsewhere, a viable human industry should be a labour of civic faith where we

purposefully work on behalf of communal projects with a variety of scientific,

ethical, social, economic, and other bottom lines.

The fuller conception of industry that serves an ecosystem transforms the

narrow cost-efficiency mindset of a corporate health care model into what Steven

Peck and Robert Gibson call the "eco-efficiency initiatives" (p. 22) of "industry

redesigned".[81] (p. 24) In this latter concept of an "industrial ecosystem", Peck and

Gibson urge us to use knowledge of natural ecological processes and technologies

to redesign our "systems of production and consumption".[81] (p. 23) In the

language of nurses, it seems that this more relational and ecological commitment

to the industry of health care may be long overdue:

They haven't addressed the relationship between the nurses and the doctors, the nurses and the administrators...The flow of information is not good. They keep losing nurses...they can put them all in a shiny new building but I don't think it's going to work any better than it did before, because there is still issues with just communication in the area and how we run things, and how we are.

Michelle[9]

If we use an ecological hermeneutic to extend our critique of nurses' work, the present health care industry, and healing, more questions about our present health care language arise. However well intended and biologically accurate their technical ministrations, do modern hospitals that primarily focus on discharging patients "quicker and sicker"[93] (p. 75) still offer vulnerable patients and practitioners healing environments, or have they *mutated* into factories? If notions of "cost-efficient production", health "services" and "outcomes" become the dominant currency in health care decision-making, do we have the necessary *capacity to sustain* any health discipline, or for that matter, a vigorous industry of health care?[4] [80] [90] If we compare the terms of "evidence-based practice" and *best practice*, which language orients us to a larger and more comprehensive whole, a mindfulness where we critically consider and integrate best evidence, essential ethics, sound judgement, and more? When nurses, other practitioners, and even potential patients abandon our present health system in mounting numbers, do they *migrate* to other healing places we need to support and develop, or does their exodus simply foreshadow a time when nurses and other healers become *extinct?*[41] [94]

These kinds of questions are not raised as fanciful plays on words, but to generate alternate explanations and resolutions for our current plight. For instance, the concept of *migration* suggests that we may renature health care within the walls of modern hospitals, but it is also feasible that we will not. Perhaps citizens, nurses, and others will take a more ecologically sound industry of healing to other places, and health care will reconstitute in hospices, homes, clinics, lodges, birthing centres, schools, and malls. This does not mean that a corporate, hierarchical model of health care would not persist for some years to come, but it could portend that over time, healers become extinct in hospital environs, and only technicians, entrepreneurs, and their business managers remain in place.

Perhaps with more thoughtful language, we can construct a more eco-efficient[95] health system before this scenario for acute care becomes commonplace. As we re-examine our habitual thinking in health care, however, the ecological principles that generate a healthier tension with technology caution against over-dependence on trendy jargon or outside experts to steer the design of significant change.[6 8 20] Ecological language must not become the next management argot that constrains our thinking, and there is no imported consultant whose acumen outstrips local wisdom. Instead, eco-efficient health systems need to make better use of consulting affected citizens, practitioners, and communities,[6 8 20] and distant experts should be saved for sparing and selective use. A restrained reliance on external experts varies from many re-engineering projects of the last decade where external management consultants prescribed

255

health care restructuring. To the contrary, legitimate concerns about technical management jargon in health care arise with ecological thinking, and we need to create metaphors, words, and concepts that concretely and clearly describe the nature of health, healing work, and systems that heal.

Whatever the potential merits of ecological language, however, there are also inevitable limits to every metaphor, and significant differences persist between varying schools of ecological thought. For instance, concepts of preservation and wise use are important to notions of ecological citizenship, but terms like "nature's capital", "corporate greening", or other resource-oriented models of ecology may not serve to shift health care from problematic cycles of production, consumption, and scarcity. In contrast, the terms that Michael proposes for more thoughtful and creative ecosystems management are ones like "reciprocal, resilient, circular, emergent, development, ebb and flow, cultivate, seed, harvest, potential, and fittingness".[71] (p. 477) This "full-blooded"[11] language embodies several essential biological and ecological facts of our existence in a technological era, and encourages our scientific thinking to focus on the attributes, properties, relations, and cycles of healthy ecosystems and human systems.[8 20 71] Financial or other forms of "capital" can be squandered or hoarded for equally short-term gains, but the ecological characteristics of ethical health care systems are less divisible phenomena that require different questions, methods, and approaches to health science. With a declared leaning for this more ecological hermeneutic of science, we meet up with the third direction for reform that this research requires. Specifically, we draw from the relations, resistance,

rituals, and language of civic science to rewrite technology in a more democratic, ecological, and thus ethical design.

Redesigning Technology: Bringing Ecological Citizenship to Health Care

> *...they'll add on two more cases. "Here we can squeeze some in. Yeah*
> *we can do this."...they've been told numerous times that when you are*
> *on consult leave some room, don't book a full elective slate. Nine times*
> *out of ten they book a full elective slate. They've got ten consults and*
> *they are trying to squeeze it into an eight hour day.*
>
> Michelle[9]

> Is there a design that cuts across the workings of nature and the workings
> of humans? Can we grasp its outlines through the careful observation of
> detail? Can we learn the wisdom from the patterns of change and
> stability that we observe over time in the intertwining of ecological and
> social systems?
>
> Frances Westley[96] (p. 392)

Our present approach to technology has constructed a formidable maze in our health systems and in our lives. Matters of design for modern health care intersect a burgeoning range of data and documentation, performance indicators and other measurement criteria, along with care maps, practice guidelines, and other decision tools. The practice of health care design also strives to anticipate and allow for the inventions and market shares of biotechnology, pharmacology, "nanomedicine", and other magic bullets of today and tomorrow.[66][97][98] In turn, an expanding medical arsenal breeds the technologies of regulations, legislation, e-commerce, and other means by which the economy and ecology of our world are

257

endlessly interwoven. Decisions to fast track or ignore an exponential range of technological developments profoundly shape the work of nurses and others in health care as well as the healing or harm of vulnerable patients, families, and communities. [99] [100] As the relationships between the ecosystem and human health become more evident, [22] [32] [35] however, the focus, design, and introduction of technologies for health and health care largely proceeds without the democratic input of those who are most affected. Of central concern, the present economic, political, and social structures of a predominantly technological global marketplace overwhelmingly favour more of the same. [79] [80] [101]

Meanwhile, other technologies straggle forward with little thanks to health care or its industries - technologies to clean up our waters, air, and earth, or to reduce waste; transport that causes less pollution; or labour-saving devices that decrease injuries and illness in work environments. The majority of citizens still do not have affordable access to internet health education, and the majority of health care practitioners cannot access current, well-integrated reviews of research online in their practice settings to this day. It is infinitely easier to obtain the company of an ultrasound or a foetal monitor than that of a midwife or registered nurse. Another lab test is far more likely than a thorough clinical exam, and a consent form all too often replaces actual conversation between practitioners and patients. Perhaps most troubling, a rising deluge of information seems to fuel rather than slow an escalating inversion between rising patient acuity, new technologies, and lower proportions of registered nurses.

258

In contrast to this disturbing scenario, *a more democratic design for technology means that its conception, funding, research and development, dissemination, and evaluation are transparently managed and critiqued*. This critical redesign of technology proceeds through the reconstruction of relations, processes, and structures that balance financial profits with other common goods of the communities it serves.[20][21][96] To redesign technology with this democratic intent requires that we identify (language) and plan for sustaining the attributes of ecological integrity in modern health systems. The ecologically literate[58] design of health systems therefore incorporates the processes and structures that are required for adaptive co-evolution[22] with a bio-technological world.

Amongst other criteria, democratic redesign of our health care systems entails that we re-institute adequate supports for the synergistic web of relations and the resilient acts of resistance that characterize good nursing care. Examples of these attributes include necessary ancillary services such as sufficient housekeeping, clerical, and lab services; the processes and structures for ethical system error management; and adequate front line staff, managers, and clinical educators to critically question everyday practice as well as infrequent but potentially devastating mistakes in judgement. In addition, other attributes that correct the current imbalance between technical efficiency and ecological deficiencies include such capacities as self-organization, diversity, learning and adaptation, and sustainability.[20][22][32][102] The significance of these qualities is starkly evident when we consider our present recruitment and retention issues in nursing. These issues include massive and successive reductions and bumping of

259

the nursing workforce (decreases to self-organization, learning and adaptation, and sustainability); sharply reduced production and hiring of new graduates (decreases to diversity and sustainability); a diluted nursing skill mix; and less funds for continued education (decreased learning, adaptation, and sustainability).[45][103][104] The lessons of nurses' work environments and of ecosystems thus jointly demonstrate that a better understanding of the intricate interplay between a variety of ecological properties is essential to enduring and equitable health systems design.

To consider these concerns of democratic design in relation to a problem identified in the research, consider the oxygen manoeuvre that nurses used to obtain monitoring for their post-operative patients. How would an *eco-efficient*[81] rather than cost-efficient model of health care ensure that the system did not churn out more procedures than its ecological integrity could safely withstand? To cite an example from eco-ranching in Montana's Little Snowy Mountains,[82] when Tom Elliott saw how stressed workers toiled to put expensive herbicide on the leafy spurge that his cattle would not eat, he didn't opt for even larger amounts of plant poison and overtime. Instead, he decided to "reassess his relationship with the weed".[82] (p. 7) While this meant replacing herbicides with sheep and several other weed-eating species for the N-Bar Ranch and it obviously means something quite different for modern health care, the principles of sustainable ecological integrity are constant for both enterprises. For example, Elliott turned from a narrow model of straight economic growth to a "complex ecological 'cyclic' model" of planning, and a hierarchical management approach was abandoned for

260

a process of collaborative leadership. The patterns and impact of grazing were carefully tracked to maintain a richer biodiversity of grasses, and various staff assumed the lead for their areas of expertise.

If we apply similar strategies to the design of modern health systems, we quickly see that meeting rigid targets of more procedures with fewer qualified staff is not necessarily an indicator of either human or system health. To the contrary, Holling views such exploitative manipulation in an ecosystem to be a recipe for "reduced options, limited potential, and perpetual surprise" of a disastrous variety.[105] (p. 33) It follows that in health systems, a viable margin for error includes a reasonable diversity of capable practitioners to track and head off conditions that contribute to unsafe care, and a minimum number of vacant beds for at least parts of a daily or weekly cycle. [15][106] Practitioners with the most detailed knowledge of patient conditions and clinical environments need to organize the care, and feedback loops are required to slow or accelerate activity as the margins allow. Ongoing learning about patients' clinical conditions, resources for care, qualifications of staff, and other factors directs periodic recalculations of the margins, and where needed, these estimations are used to refine the way the work is organized.

Other steps to shore up the overall integrity of the system also ensure more realistic room for effective response. For example, early warning capabilities[69][107] include feedback processes and structures for the detection of subtle alterations in conditions that often precede larger problems. On a practical daily basis, this can mean such provisions as a clinical leader on every unit who oversees the overall

261

quality of care; staffing to ensure adequate ratios of professional caregivers to patients; or pharmacy stop checks for outdated drugs. Several nurses also cited the importance of debriefing after unusual incidents to detect environmental threats to care and of timely, constructive feedback when errors are found, but only two participants confirmed the consistent presence of these mechanisms in their own settings.

Nurses also agreed that close attention to details increased their chances of detecting subtle changes and averting disasters, but only three participants felt that their own units valued these practices. In fact, the majority of nurses in the research saw the early warning capabilities of their own environments to be significantly compromised. Nurses cited one or more reasons for defective early warning systems, including that managers were spread over two or even as many as four units, or that there were large turnovers of staff with few nurses left who knew "how things really worked". Nurses also reported tendencies to neglect documentation or reporting of minor occurrences when work was so sped up, and several nurses said that a punitive, blaming atmosphere discouraged practitioners from admitting errors that came to light. The cumulative effect of these changes seemed to violate some form of minimal ecological threshold for the democratic design of nurses' work, and many nurses recited these sorts of conditions when they discussed "things that went wrong".

Effective early warning capability on emerging health technologies is another way to heighten ecological literacy in health care, and the merits of various detection systems are under study or already in evidence.[108] [109] [110]

However, the profit stakes of biotech markets militate against the economic, cultural, and regulatory reforms that are needed for more ecologically sound research, development, and practice to unfold.[73 78] For instance, risky medical treatments sell newspapers; the cost of research invites more commercial partners into cash-strapped universities; and the rapid, uncritical adoption of new technologies perpetuates despite better evidence. To alter the dynamics that impede necessary reforms, we can start with attention to the media technologies that shape our myths and conceptions of health care in critical, everyday ways.[17] [111 112] For example, the Alberta Heritage Foundation for Medical Research (AHFMR) now funds internships to "foster better communication between the science and media communities",[113] (p. 11) and other steps to increase accurate dialogue between researchers, professionals, policy makers, and the public are equally warranted. This may mean that the technocratic dissemination practices of traditionally structured committees, task forces, and mailings need to be replaced with active clinical partnerships, fellowships, and other innovative knowledge transfer programs.[114 115 116] For instance, the AHFMR's Health Technology Assessment Internet Guide illustrates ecological literacy by providing users with annotated sources for linked online HTA information.[117]

The ecological goals of knowledge transfer also lead us to question whether practice settings consistently use technologies to maximize clinicians' access to research for best practice, or to prescribe inflexible "efficiencies".[10] If the former is our aim, then we need to re-evaluate how we presently apportion funds between research and development versus the tracking, synthesis, and

263

accessibility of new knowledge.[70][115][118] For instance, Sarah recognized the need

to learn and troubleshoot her facility's new computer system, but practitioners in

this study and elsewhere cite a lack of access to online databases and summaries

of research as limiting their capacity for best practice.[115][118] If we are serious

about designing more ecologically sound health care systems, the production and

integration of knowledge must become more balanced endeavours, and radical

investment in clinical education and access to research will appear in every health

region's operating budget.

While many eco-efficient measures do not reduce the need for human or

other resources within our health care system, they redistribute available dollars

across a different and more equitable pattern of research, knowledge synthesis and

dissemination, reflective practice, and regular re-evaluation. For example, several

research-based clinical programs support people and their families to manage

chronic health conditions with minimal use of expensive acute care in ways that

demonstrate the eco-efficient principles of a renatured health system. This

includes initiatives that support families to cope with asthma and reduce their

need for emergency care, [119] or to leave hospital after birth on the basis of several

readiness factors instead of inflexible protocol.[120] These and other community-

oriented, multi-disciplinary health services promote people's capacities to sustain

effective relations, necessary resilience, adaptive learning, and self-organization.

In this light, proposals to tie funding to specific home care and pharmaceutical

care programs may turn out to be very eco-efficient, particularly if the cross-

incentives between health care, research, and wider global markets are more

closely aligned with human and environmental health.[14] [21] [37] However, rising

concerns for conflicts of interest in health care research and delivery[121] [122] also

mean that the transparent disclosure of all affiliations and funding sources in

published work is critical to democratic design. Such disclosures do not prevent

researchers and investors from acting on appropriate opportunities to capitalize

health care research or the production of technologies, but it does mean that the

economic "rules of engagement" for health research are re-written with more eco-

efficient and communal principles of distribution in mind.[21] [79] [123]

Engaging Ecology: Getting On With Healing Work

This is being a part of something and doing something a little bit
different and stretching...if you don't always do something, how can you
keep current or keep alive or keep an interest in things?

Sarah[9]

...somehow, in the midst of all this madness, there were still many
nurses who remained remarkably strong and supportive of one another,
even thought they weren't immune to the problems surrounding them.

Theresa Smith[124] (p. 55)

Somehow, ten nurses who often struggled just to get through their shifts

found the time and commitment to take part in this research. Each nurse indicated

in her own words that at bottom, participation in the research was a commitment

to safe, ethical nursing care. They explained how what they did was important for

patients' and families' well being, and they believed that too often, they could not

practice what they knew. As expert health system ecologists, nurses have a lot of

265

wisdom to share, and the recommendations of this research only highlight a few ways to renature the threatened healing places they know so well.

In this chapter, key recommendations are formed to address concerns from the nurses' work and work environments in the areas of *relations*, *resistance*, and *response*. These areas are examined for their contribution to a more ecologically sound health care system for a biotechnological world. The central features of healing rituals, ecologically literate language, and democratic redesign of technology are outlined, and examples in practice, research, education, and policy are provided. Even though these recommendations are incomplete, we can still immediately engage a more ecological and ethical path in health care with one vital step. We can choose one ecological goal for our own lives and in our workplaces, and begin. Like the nurses of this study, when we take an ecological perspective we start to question what actions take priority, at whose bidding, with what tools, on behalf of what moral concerns, *and for which ends*. Leaders in technology recognize the need for these questions and head up a movement to reinsert broad humanities education into science and technology curricula.[125] If we do rejoin our ethical concerns with the ecology and biotechnology of life after 2000, perhaps we will be able to renew our civic faith in healing in the renatured places of 21st century health care.

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Chapter 7

resistance *n.* Probably about 1350, act of resisting; borrowed from Old French *resistence*, from Late Latin *resistencia*, from Latin *resistentem* (nominative *resistēns*), present participle of *resistere* **resist** *v.* About 1380 *resisten* stop or hinder, stand against, in Chaucer's translation of Boethius' *De Consolatione Philosophiae*; borrowed from Old French *resister*, learned borrowing from Latin, and borrowed directly from Latin *resistere* stand back or still, withstand, resist (*re-* opposite, against + *sistere* cause to stand, stand firm, related to *stāre* to STAND[1] (p. 916).

stand *v.*....Latin *stāre* to stand, Greek *histánai* cause to stand, set, place, *stênai* come to a stand...Before 1325, place, position, in *Cursor Mundi*; from the verb. The noun is recorded in Old English (about 950) in the sense of a pause or delay...[1] (p. 1059).

pause *n.* About 1426, a short stop or rest; borrowed from Middle French *pause*, learned borrowing from Latin, and borrowed directly from Latin *pausa* a halt, stop, cessation, from Greek *paûsis*, from *paúein* to stop or cease, of unknown origin. The phrase *to give pause*, meaning to cause to stop or hesitate, is first recorded in Shakespeare's *Hamlet* (1602)...[1] (p. 766).

278

RESEARCH AND RENATURING: LIMITATIONS AND DIRECTIONS

> *...the cutbacks have dealt such poor cards to everybody that the morale*
> *is really low. But I think what it really takes...is just a few motivated*
> *individuals to draw people in...And they are out there you know...as long*
> *as I'm challenged I'm in there like a dirty shirt. I have so much to learn*
> *that my motivation just comes from the necessity to learn.*
>
> Ellen[2]

> Ecological management is concerned with the future...The future is
> inherently uncertain; essentially everything is subject to unpredictable
> change, especially because we understand so little about the
> present...Taking advantage of the opportunities to learn from
> uncertainties requires constructing procedures that embrace error.
>
> Donald M. Michael[3] (p. 478-479)

In this research, two narratives were initially set into dialogue. In concert,

we listened to the accounts of nurses who stand in the midst of life, suffering, and

death every day, and to the accounts of philosophers who strive to interpret what

technology means to our present and future world. The dialectic of the research

integrates the claims of technology and nursing into a third and larger story, an

ecological reading of the nurses' work, work relations, and work environments in

a technological world. The ecological reading that is generated is argued to be a

sentinel one that warrants further reflection, research, and action. Specifically, this

initial study uncovers a prevalence of problematic technological tendencies within

acute care hospital environments that speed up and fragment nurses' practices into

work that does not heal.

The technological predilections that consistently reappear in the nurses' work and work environments include an automatic predisposition for narrow concepts of efficiency and a growing separation of technical means from original healing ends. These "technical errors" of modern human endeavours are outlined and critiqued in the fields of philosophy[4][5][6] and ecological restoration,[7][8] and the thesis is formed that an unquestioning acceptance of technological practices denatures the work of nurses, and possibly that of other practitioners, by detaching them from practices of a healing nature. Using the metaphor of ecological restoration to further the research dialogue between the nurses' accounts and technology theory, three areas of concern are identified as central tenets of fundamental reform, those of *relation, resistance,* and *response.* These concerns are considered at length in Chapters 5 and 6, and recommendations are offered to reform or renature nursing and health care. The interaction between these concerns continually and synergistically shapes who we are and how we "take up with the world".[9] The concerns of relation, resistance, and response are therefore places of ethical questioning[10] that we probe in order to learn.

The conditions within health care and within our society that drove this research and shaped its findings persist and even deepen at the present time. Registered nurses in staff, management, and teaching positions continue to report high levels of ethical distress, workplace strain, and disrupted relationships in Alberta[11] and across Canada,[12][13] and shortages of nursing personnel have captured the attention of all levels of government.[14] More research and immediate actions are both called for, and within the limitations of the present study, the

280

initial recommendations to renature health care should be reinforced or commenced. In this final chapter, the study's limitations are considered, so that others can debate the recommended directions for research, practice, education, and policy. In effect, the ecological integrity of sound research, like the integrity of best practice, relies in part on our capacity to withstand the tempting sedatives of simple numbers, single studies, instant fixes, or other easy certainties. Instead, the nurses' resistance requires that we remain open to and stand within some of the most troubled places in our world, the disrupted home places of modern health care. Within these ecologically threatened environments, nurses labour to sustain a moral ecology[15] of good nursing care in the face of a system that is more technically preoccupied than technologically wise. The nurses' struggle should give researchers, practitioners, educators, and policy makers pause, as their ecological citizenship urges us to jointly "live the question"[10] of how to renature health care. As we stay in a questioning stance, we rebuild places that enable us to learn and heal in an uncertain world.

To learn from the research and the attendant concerns of "how we do things and how we are"[2] requires that we engage in two assignments. First, the potential errors of the research are embraced, so that we consider its findings from a legitimately critical view. Then, along with the nurses of this research, we ask who and what we are collectively responsible to, and therefore "what we must do".[2] As we struggle towards our responsibilities, we rethink and more ethically live out where we presently stand. These closing exercises are carried out so that

we can build research, practice, education, ethics, and policy to sustain healing

practices and healing places in a technological world.

Research, Ecology, and Healing Work: Coming to Terms with Error

...the greatest value of restoration as an ecological research technique is
the power it has to draw attention to what is important in a system – in
other words, to force an ecologist to an increasingly clear conception of
the critical parameters governing the system with which he or she is
dealing...Of course, different kinds or degrees of disruption elicit and
bring into the foreground different aspects of the system.

William R. Jordan III[16] (p. 377)

The intent of this research was to develop new knowledge about

technology and nurses' work. Several measures were taken throughout the design

and conduct of this project to achieve ethically and scientifically sound inquiry,

and steps to ensure rigor throughout the research are discussed in Chapter 1.

However, the purpose of the critique that follows is to ask about the research from

"the other side", at the conclusion of the study. Given the research questions,

objectives, methods, and findings, what can be learned that might benefit future

projects? What was fruitful, what was difficult? What steps assisted to minimize

error, and what unanticipated limitations came into play?

To address these questions, we reconsider how the findings do or do not

address the questions and objectives set, and what is intended by the concept of

"error" in the critical multiplist design of the present project. Given the ecological

perspective that the research method and findings proposes, it may be useful to

282

heed the words of William Jordan III and recognize that in any single ecological reading of a system, the focus of the research largely determines the disruptions that come to the fore. It would therefore be erroneous to presume that a full picture or ecologically adequate sense of either nurses' work or modern health care is captured by one study. However, it would be equally mistaken to assume that because the study adopts a particular focus on technology and nurses' work, and with a small number of nurses and work environments at that, the ecological wisdom obtained is not significant. Rather, it is feasible that within its limits, the present research offers important insights about technology, ecology, and healing work for several disciplines.

However, to sufficiently consider the validity of the research findings requires the examination of multiple and often contradictory findings. In the narrative accounts that the nurses provide, many common attributes of their work, work relations, and work environments emerge. At the same time, there is also a steady ambivalence within the data that holds the research in some degree of open-ended paradox. The challenge of the research analysis is to draw the contradictions that reside in nurses' work into conversation with technology theory, to deepen our understanding of the paradoxical nature of nurses' work in modern health care, and to identify outstanding questions that are not sufficiently explained. As we review the questions, methods, and findings of the research, we see if these tasks have been accomplished, and to what degree.

The Research Questions: Were They Answered?

> Warrants are more than procedures used to ensure rigor in scientific
> work. They are qualities of the evidence presented for a knowledge
> claim.
>
> Dorothy A. Forbes et al.[17] (p. 374)

Forbes and colleagues argue that common warrants can be found for different research perspectives. The warrants they propose to judge the merits of any research are the scientific community's scrutiny of the methodology and findings; corroboration of findings with other evidence, and the capacity of the research to contribute to scientific knowledge[17] (p. 373-379). To apply these criteria to the present study, we start our methodological scan with the research questions in order to make two queries. First, did the research answer the research questions? Second, regardless of how well the research answered its original or subsequent questions, what do the answers contribute? The research questions that launched the present project were:

1. What do registered nurses describe as their work in acute care?

2. How do registered nurses characterize their care environments?

3. How do registered nurses characterize their work relationships, including their relationships with co-workers, patients, and families?

4. What can a dialogue between registered nurses' descriptions of their work and contemporary philosophy of technology tell us about the nature of nursing, health care, and technology in contemporary society?

284

To pursue the research questions, three objectives were developed:

1. to obtain narratives of registered nurses' work in acute care;

2. to use the nurses' narratives and contemporary technology theory to dialectically critique the forms and features of technology that characterize the nurses' work, work relations, and work environments; and

3. to develop critical propositions about the nature of registered nurses' work and about contemporary technology.

With these guiding questions and objectives in mind, the paradoxes that emerged in the key findings of the research are recapped as follows. Each nurse offered detailed examples of good nursing or nursing that heals, and of denatured nursing. In the former examples, the practices described by the nurses incorporated a focal nature[4]that oriented them to the relations, actions, and environmental conditions that form an ecology of good nursing care. In the latter instances of denatured nursing, they described technological practices of a distracting and fragmenting character that displaced nurses' healing practices with sped up tasks and piecemeal work. Accounts of denatured work consistently surfaced when nurses talked about a factory-like environment, but many nurses also shared experiences of units, work teams, or leaders for whom, despite continual pressures to produce, the nursing of patients was still a highly cherished good. Further, every nurse relayed that within a single shift, or even in an isolated incident, instances of healing and denatured work could both be in play. Accordingly, healing practices and denatured work could not be construed as

285

absolute opposites that never co-inhabited the fabric of nurses' care. Rather, both healing practices and denatured technological practices were different possibilities that became more or less concrete in the way that nurses gave care in any given moment. Thus, all of the nurses provided vivid accounts of nursing practice (healing) and of their daily work, but the two accounts were frequently unaligned, and the divergence was ethically significant.

A variety of ethical tensions characterized the struggle to nurse patients in a technologically patterned environment, and to sufficiently nurse one's patients frequently entailed resistance to at least part of one's work. Resistance was aimed at preserving right relations with one's patients, co-workers, and the larger system, but ethically impoverished relations were frequently cited as a predominant concern. The conflicts that arose between an ecology of good nursing care and technological practices in the environment meant that every nurse devoted considerable effort to resisting or subverting what they perceived as barriers to good nursing care. In the nurses' judgement, good care was often lacking, and even safe care was sometimes at stake.

Barriers to acceptable care resulted in ethical dilemmas for nurses, dilemmas that became defined by how the structures and processes of one's environment enabled or disabled adequate responses to individuals who awaited care. The nurses indicated that even conscientious practitioners could find themselves caught up in and distressed by unacceptable care, and yet opportunities to learn were often forfeited. Getting to the next task repeatedly prevailed over reflecting on what one had done or why, with the result that errors

often tended to resurface, and environments deteriorated over time. Acts of resistance could become inevitable even when they were seen as futile, and at other times, resistance strategies that staved off short-term harm likely contributed to the perpetuation and deepening of system-wide vulnerabilities.

These findings indicate that the first three research questions are addressed to some extent, but it is equally important to revisit the fourth guiding question of the study. Specifically, what did this research dialogue between registered nurses' descriptions of their work and contemporary philosophy of technology tell us about the nature of nursing, health care, and technology in contemporary society? The findings suggest that exploration of this question is only begun. For instance, the nurses' accounts support the proposal that both the ethical *and* ecological integrity of nursing (as healing work), health systems (as healing places), and technology (as the ways we do things and the way we are, including the way we heal), are inextricably linked. The sustenance or depletion of the ethical and ecological integrity of nursing, technology, and the health system all seem to depend on the balance that is or is not achieved between the technological tendencies of a complex modern world and the equally complex ecology of healing care. Further, ecological integrity does not appear to thrive without the presence of ethical integrity (relations and resistance), and ethical integrity is mortally threatened in the absence of the structures, processes, and relations (response) that sustain the ecological integrity of healing habitats. All of these claims require further substantiation or refutation through subsequent research.

With these claims about the nature of nursing, health care, and technology in view, the constant backdrop that emerges out of the paradoxical aspects of nurses' work is one of ongoing strain. The overall health system, its local environments, and their inhabitants all sustain damage as recurring technological tendencies within the acute care environment confound the relations, resisting attributes, and responsive practices that heal. In the expanded research conversation with ecological restoration that ensues, it becomes apparent that the healing properties of focal relations, resistance, and response comprise a counterpoise to technological tendencies, and we see that the ecological integrity of an environment varies with the nature of the counterpoise that evolves. It is further argued that a healthy counterpoise to technology requires a deep respect for and ecologically literate and relational sense of *place*,[7 18 19] and the dilution or absence of these ecological sensibilities diminishes the system's, practitioners', and patients' capacities to heal.

The tensions that surface between technology and the moral ecology of nursing care lead to the matter of whether the research fulfills the dual aims of critiquing nurses' work in light of technology theory, and critiquing technology theory in light of nurses' work. Certainly, significant aspects of two technology theories are demonstrated in the study findings. Within the research, the suppressed *background* of production and the seductively glamorous *foreground* that Borgmann describes for our technological culture[9] are consistently evident in the nurses' work, relations, and environs. The coercive *technical code* of the market that Feenberg critiques[5] also becomes visible, and several nurses refer to

288

their work environments as factories. But, does the ecological reading of nurses' work equally push contemporary technology theory to refine its concepts? If we consider the ethical tensions that the nurses describe in their accounts of work, this study raises initial questions for further study. For instance, the alternately healing/denaturing phenomena that often cohabit the nurses' work correspond with various parts of Borgmann's and Feenberg's divergent explanations for the ambivalent potential of technology. The research confirms that too often, technology attracts us (the screen, the image, life-extending technologies) without retaining us to what matters (someone's airway, progress in labour, being with a dying person). We see that almost invariably, technology is profusely available (forms, images, guidelines and "communications") and yet with equal incidence, its pervasive presence offers insubstantial wisdom for practice. The argument is also supported that technology is capable of great benefit, and yet often harnessed to covert codes and practices that bode no widespread good. Further, the environmental degradation that both Borgmann and Feenberg associate with under-examined technology becomes starkly evident in the health care landscape that the nurses describe.

However, the research conversation does not fully justify either theory, nor does it adequately explain why the nurses' narratives support both Borgmann's and Feenberg's work to a greater extent than each has supported the theses of the other.[20] [21] Instead, the present research presses these thinkers to search for more common ground. For instance, we can ask: Does the speedup and fragmentation of nurses' work lend primary credence to Borgmann's critique of

consumption, to Feenberg's criticisms of capitalism, or to something else? Does Borgmann's device paradigm offer a wide-angle lens on technology that Feenberg's social criticisms flesh out, or does Feenberg's account of the design and use of technology in corporate markets provide a better home for Borgmann's incisive account of the device's allure?

More research is required to determine whether Borgmann's device paradigm, Feenberg's critique of capitalist economies, or an evolving hybrid best explains the complexities of modern bio-technological health care. The theoretical framework for technology that was developed at the outset of the research (Appendix B) does not declare for one theory over the other, and the findings at this end of the project do not settle the question. In fact, the critique of theory (technology) and practice (nurses' work) that ensues during the research introduces the possibility that both theories are essential to astutely interpret the ecological damage of modern health care. Perhaps Borgmann's eloquent account of our unreflective adoption of technology throughout every facet of our lives explains the success of biomedical marketing in a technological world as much or more as Feenberg's critique of power relations in capitalist societies. And, perhaps Feenberg's analysis of the non-democratic design of technology correctly predicts the prevalence of technological practices. But, Borgmann's concerns with the unquestioned production and consumption of commodities in a technological society predict the escalating forfeit of democratic life. If we consider what Cypher and Higgs propose about the colonized imagination of our technological culture,[22] we arrive at a circular debate. Which comes first, our social

acquiescence to the power structures that profit from the commodities of a technological era, or our persistent allegiance to the brilliant products of technology in their own right?

In health care, where our deepest vulnerabilities and hopes for life itself collide with the high stakes of biotechnology research and development, the answer to our circular question may be "both". That is, a cultural desire for the promise of "Disney" medical cures[22] fuels our tolerance for overheated markets, and the market itself is simply one more technology designed on behalf of a collective quest to live outside of and unaccountable to the ecological realities of our industrialized world. If we combine the counsel of Cypher and Higgs,[22] with that of Feenberg,[5] Borgmann,[9] and Van Rensselaer Potter,[23] a common theme seems to emerge: Designs which are situated in consumptive desire, rather than deeper human moral and biological aspirations, are by definition non-democratic. Our common ecological citizenship is required for that state of affairs to change. As Potter and others note, our ecological and human health will prosper to the extent that we use our ecological and social knowledge for mutually responsible and communal ends.[15 24 25 26] This concept of prosperity is one where ecologically sound and reasonably profitable markets thrive, but the "free market ghetto" of maximum growth and profits[23] (p. 40) becomes a historical economic artefact of an insufficiently ethical time.[27]

As an inaugural critique of philosophy of technology from nursing, the present research therefore suggests that nursing and restoration share equal concerns for both particular (focal) and general (power) relations. The findings

291

support Feenberg's call to reform hierarchical power relations, but the significance of a panarchy of relations to the moral ecology of nursing care reflects Borgmann's account of foreground and background. If the present findings are validated in future research, the ecological reform of health care should consider models of restoration that incorporate arguments from both philosophers.[7][8][28] In the resulting pluralistic model of reform, the foundational goal of future research, practice, education, and policy is to transform the present technical codes, in health care and in our lives, into a design for human living that is both more focal[4] and more socially critical.[5] As discussed in Chapter 5, this entails more democratic design and ownership of such central influences on our cultural imagination as the media, and continued public ownership and increased civic design of our education system, health care system, and other sources of common public good. In this sense, the democratic design of a renatured technical code consistently refines an economy of signs that refer to a moral ecology of things.[5][10][29] These things are the focal structures, processes, and relations that sustain ecological integrity and health in a biotechnological world.[6][30][31]

On balance, then, all of the research questions were answered to some but not sufficient extent. The dialogue between the nurses' narratives and philosophy of technology weaves experience and theory into some common ecological instructions, and both Borgmann and Feenberg should continue to earn the attention of nurses and others in health care. As Cameron points out, the healing practices of nursing remind us that while theories may remain intact within their own rules of engagement, "things get messy in practice"[32] (p. 77). If the work of

292

Borgmann and Feenberg both maintain relevance to the healing efforts of nursing and restoration, then perhaps all of philosophy, nursing, and ecological restoration have more theoretical and practical work to do, alone and together. To consider what directions such future work might take, we turn to matters of method.

Methods for Healing Wisdom

> ...the development of ecological knowledge and techniques must be accompanied by an ethical framework for governing its implementation. The present view of science as 'objective and value-free', as discussed by Sagoff,[33] should be discarded to incorporate 'a vocabulary or conceptual framework in these sciences that helps us to *evaluate*, not simply to *control*, to *appreciate*, not simply to manipulate, to *protect*, not just to *manage.*"
>
> C. Mark Cowell[34] (p. 31)

In addition to re-examining the research questions in light of the findings, a further set of criticisms is needed to address the overall warrants of the research. These criticisms are methodological questions of ethics, sampling, methods, and procedures that minimize the potential for error. The concept of error refers to the potential for harm to people, to the truthful nature of the findings, or to the appropriate dissemination and application of what we learn. Given these demands, research methods cannot achieve sufficient integrity through ethical review alone, even though such processes bring about much needed deliberation in modern inquiry. Cowell's remarks remind us that our knowledge development needs to be founded on a comprehensive ethical framework that enlarges our scientific goals from ones of prediction and control to ones of understanding and respectful co-

293

existence. Cowell's broader goals for scientific inquiry are compatible with the

relational ethics framework that founded the present study[35] and with the

ecological framework that emerged at the other end. This does not mean that the

research is preserved from all ethical and scientific error. Nonetheless, declaring

one's ethical framework enables others to judge the merits of the research with

knowledge of the researcher's fundamental beliefs and concerns.

On the claim that methods flow from one's ethical framework, several

questions can be raised for the present research. For instance, does the study

provide useful insights about ten nurses, seven hospitals, 18 units, all of the

above, or something else? Does the analysis that unfolds adequately critique the

stated target of technology and nurses' work, or does it wander too far afield by

introducing the metaphor of ecological restoration? Would the nurses' accounts

have taken on a different flavour if the definition of technology had not been

shared at the outset of the research conversations, and did the definition unduly

sway the nurses' narratives in any particular direction? Does the nurses'

considerable practice expertise tend to mask how technology actually figures into

their work, or does it allow them to notice what less experienced nurses would

not?

The answers provided for these questions are open to debate, and the

reader is encouraged to challenge the following explanations with divergent

views. First, the research design does not primarily explain the characteristics of

these nurses, their units, or their hospitals. The intent of a purposeful sampling

strategy of phenomenal variation or criterion sampling[36] was to ensure adequate

294

data collection from two primary sources or samples, registered nurses' narratives of their work and contemporary philosophic theory of technology. This sampling technique did not favour either technology theory *or* nurses' accounts, but rather the dialectical notion of technology in nurses' work: nurses' work in a technological world. Ultimately, the effectiveness of the sampling strategy is judged against how truthfully the research represents the nurses' work, work relations, and work environments, and the credibility of the research findings in the eyes of others. The conduct of future inquiry is well served if both less and more convinced readers ask several questions. These questions should include how additional conversations, larger numbers of nurses, smaller numbers of nurses, fewer clinical specialties, more clinical specialties, less theoretical data, or more technology theory might have served the analysis differently, or led to different findings overall. These are questions that demonstrate some of the most important limitations of this study, and further research must try to address them.

As a hybrid method that does not rest entirely in either an inductive or deductive home, readers should also critique the research design for both qualitative and philosophical rigor. The ethics review process, expert supervision, external critics, the researcher's journal, and presentation of the work to interdisciplinary audiences and peer review journals were all designed to provide checks and balances for the chosen methods, but would other additional procedures strengthen similar research in the future? For instance, a theoretical framework for technology was staked out under expert supervision at the outset of the research, and revised as the analysis progressed. It is quite possible that

295

mapping the links between technology theory, the nurses' accounts, and the model of ecological restoration that emerged would have organized the findings in ways that the journal notes and successive written analyses did not. A partial attempt at this exercise yielded the parallels between health care and ecological restoration that are depicted in Appendix F. Future research would need to begin with a comprehensive attempt to map the proposed links between technology, nursing, health care, and ecological restoration.

Other issues arose from the range and number of fields that became germane to the research analysis as the metaphor of ecological restoration emerged. What began as an already ambitious plan to put nursing and technology theory into conversation was complicated by the emergence of ecological concerns that could not be ignored. Meaningful use of the metaphor required further study of ecosystems, ecological integrity, and ecological restoration, and possible explanations for the findings multiplied. Research that considers the thought of several disciplines can generate findings that are either too superficial or error-ridden to be of consequence, or too dense to use. The decision to include the model of restoration necessitated feedback from several scholars, from expert practitioners, and from the peer review process of submitting for publication. The task of the research doubled in a sense, as the claims of technology theory were questioned in light of two healing disciplines (nursing and ecological restoration), and then as possible parallels between nursing and restoration were questioned in light of technology theory. However, efforts to improve the reflection and writing of this work never came to a close, and research that chooses to combine theory

296

and practice should expect to remain open to future interpretations that are both more precise and more profound.

Finally, this research bears the limitation of a particular experiential and theoretical bias from its outset. As Bergum notes, no researcher "stands outside" of the phenomenon under study, and all forms of knowledge come to figure in our research and practice, whether these sources of knowledge are confronted or held implicit.[10][37] The researcher's own experiences in nursing practice, administration, health policy, and health care ethics led to study in philosophy of technology. Alongside a foundational base of relational ethics, the biases of technology theory and practical experience also shaped the questions, methods, and findings of this work. Critics could fairly assert that a fundamental belief in the ethical significance of relations assured a finding that relations were central to the nurses' concerns. However, the initial bias could not predetermine the parallels that emerged between nursing and ecological restoration as two healing endeavours with deep concern for relations and similar issues with technology.

The initial corroboration that emerges between nursing and ecological restoration in this study introduces warrant further investigation, and it is too early to delimit the scope of ecological thinking for either nursing or health care. Every piece of research must stake its claims and allows others to decide if, given the biases of the work, the findings stand up to the light of informed criticism from differing perspectives.[38][39][40] With all of these limits of the research in view, we can reconsider the recommendations for renaturing that were outlined in Chapter 6 in some closing comments about our local and national health care scene.

297

Relations, Resistance, and Response: A Call to Action

> The thing about a big injury – physical or psychic or ecological – is that organisms are not the same afterward. Hurt, loss, suffering all work irrevocable changes. The question is whether or not one admits the fact of things being different now, and how one wears the difference.
>
> Stephanie Mills[18] (p. 204)

> *There's a lot of building to be done...Right now I'm just working on good things.*
>
> Ellen[2]

In his critique of health and medicare, Thomas Noseworthy urges us to "understand and reconcile the past if we are to thoughtfully shape the future".[41] How do we use the ecological reading of nurses' work to re-understand the mistakes of modern health care, and redirect our future? In the research analysis, the fundamental error of unchecked technological practices marked all of the acute care environments to significant and continually varying extents. The ways in which these technological tendencies shaped nurses' work could fluctuate considerably within a shift, within a setting, and across settings. Some of the most confounding aspects of this fundamental technical error were its pervasiveness and persistency; the technical error was often a misstep of the multiplying kind.

Despite its perpetual presence and endlessly varying forms, however, the effect of the technical error consistently manifested for nurses in one or more of three fundamental concerns, those of *relation, resistance,* and *response.*[42] As we have discussed in Chapters 5 and 6, these concerns are matters of how we are with one another and collectively; how we question a technologically patterned

298

environment; and what structures and processes are needed to sustain healing practices and places in health care. While these initial principles of ecological reform may seem to demand a great deal of us, we can heed Stephanie Mills and resist the urge to under-estimate our capacity to heal.[18] Instead of dwelling on the enormity of the work ahead, we need to join Ellen's lead and set about rebuilding what is good.

We have already noted that the relations which characterize a setting, the forms of resistance that arise, and the structures and responses that come about within an organization or system all synergistically mold one another towards changeable, complex outcomes. In health care as in ecological restoration, the interplay between vital parts of a larger whole constitutes a delicate balancing act. As a result, the recommendations outlined in Chapters 5 and 6 constitute various forms of ecological management that are intended to restore the inevitable tensions between technology and ecology in our health systems to a better balance. With this wisdom in mind, highlights from the renaturing recommendations in Chapter 5 and 6 are briefly recapped in the following section.

A Recap of Recommendations: Exemplars of Ecological Management

I said this is a preemie, 10 weeks early. Yes it could be a urinary tract

infection, she could be contracting or she might not be, but maybe you

should sit with her for 15 minutes. Let her tell you when she feels the

pain and palpate for yourself. Do you feel a contraction...How strong is

it?...I would go back there, I would sit with the patient and show what I

was talking about. This poor patient is in active labor. People don't have

to scream or holler. They are all unique. It's not even recognized.

Lara[2]

Throwing more money at a system that has no new accountability

expectations or opportunities for internal markets to be exercised will

have little chance of success. Is there evidence of new thinking on the

horizon?

Don Juzwishin[43]

In an analysis of five health authorities, the 1998/99 Auditor General

Report to the Government of Alberta notes that "measurements for 69% of the

targets identified in health authority business plans were not included in annual

reports for 1998"[44] (p. 186). In part, the report continues, this finding indicates "a

risk that too many measures create confusion and there is a need to sort out what

is most relevant to report"[44] (p. 186). It seems that whether you work with

ecosystems or health systems, judicious ecological management is a complicated

and humbling task. Over-control of isolated variables can destroy resiliency and

precipitate the worst crises,[26][31] and every niche within an ecosystem carries out

activities with significance for the larger whole. Subtle interactions across several

layers and cycles contain vital knowledge for sound decisions, and at present, few

300

people are watching the entire field instead of a few interim scores. Perhaps in all healing systems, the ultimate assignment is to balance the energies we expend to observe, predict, and explain our surroundings with equal efforts to think about how this knowledge matters to us in relation to our larger living whole. From such efforts, we might learn what we should do on behalf of our moral concerns for people, for healing places, and for our world.

The ecological principles of relations, resistance, and response underscore the need to reapportion our financial, intellectual, environmental, and other human investments in health and health care. Essentially, such realignments of our risk-taking require that we build and cross several bridges of civic faith. This means that regardless of either the total amounts or the sources of dollars, which will be endlessly debated (and in a democratic society, should be), it is proposed that funds for health care be redistributed equally across five critical areas. Each of these areas requires different but complementary forms of knowledge, and each area thrives to the extent that all are well tended. These areas are:

1. knowledge development,

2. the critique and synthesis of new knowledge,

3. the dissemination and practice of what we learn,

4. feedback on our applications, and

5. systems redesign.

301

The first category of investment, knowledge development, addresses the funds and other resources (personnel, equipment, infrastructure) that allow us to research health and health care. To examine asthma as one example, this would include all areas of basic and applied research from genetic mapping to the latest pharmaceutical, and from the outcomes of various models of care delivery to the epidemiology of asthma incidence and severity. As more and more innovative research programs are funded for this and other health conditions,[45] this first category of research considerably overlaps with another category, that of dissemination and practice, and this overlap is a desirable ecological goal.[46] Regardless of the overlap, however, each category requires dedicated funding in order to strengthen the capacities of the health system, practitioners, and citizens to continually adapt and change.

The second category of funding, the critique and synthesis of new knowledge, is an emerging niche within the health care habitat that urgently needs to expand. To continue with our asthma example, this would include the continual collection, review, and integration of new evidence in asthma care to provide appropriate early warnings about new technologies or growing environmental concerns. There would be also be interdisciplinary development of practice guidelines and policy recommendations for the delivery and evaluation of asthma care. These activities need to be carried out by increased support for highly qualified knowledge workers in practice settings, health technology assessment agencies, other research and policy institutes, research fellowships, and other

302

organizations. Virtual networks increasingly exist between these groups, and will continue to grow.

From knowledge synthesis comes the need to disseminate, or to translate good research into best practice for specific local contexts of care. This means that guidelines for optimum asthma regimens are adapted to different individuals, communities, and situations. For instance, nurses may visit some homes to help families identify and decrease environmental triggers, but find other families want take-home instructions or online information to accomplish the same end. Practitioners, researchers, and citizens may band together to take civic action on larger environmental issues such as automobile emissions or other asthma triggers. In addition, as alternate delivery models of interdisciplinary monitoring, teaching, and early intervention reduce the need for emergency care, financial and other incentives to spread these innovations should be introduced.

Out of best practice comes feedback, and this is where clinical improvement activities take place to build the system's integrity and decrease avoidable threats. Ecological clinical improvement practices focus on 1) embracing errors and debriefing for adverse events, and 2) examining and "briefing" after difficult events are managed well. The principles of ecological error management are used with individual situations and across programs, on the assumption that proactive and non-punitive error management builds system wisdom about the barriers and bridges to safe patient care. Learning that is gleaned from error management drives further research, better knowledge synthesis, altered dissemination practices, and systems redesign as indicated. For

303

asthma care, this may mean decisions to fund more school nurses or community health care clinics to obtain less emergency visits, or to support citizen coalitions to bring about necessary environmental reforms. Publicly funded pharmacare and drug profiles will be recognized as less costly than lost workdays, and peak flow meters will become standard items on our health care insurance plan. At the same time, clinics and communities with persistently high rates of emergency admissions for asthma attacks will trigger peer reviews of their asthma management practices, local pollutants, or other contributing factors. In addition, regional health care budgets will allocate education dollars around asthma care that are proportionate to their staff and population base.

Turning to other issues for system design, there will be more questions than ever about what information is collected, by what means, on behalf of which purposes, at what cost, and for whom.[29 47] An ecological understanding of health care will severely test our faith in many current types and piles of information, as we come to terms with these neglected ethical and scientific questions from a less technical and more evolutionary point of view. Continuing with our present exemplar, we may decide to adapt Carole Estabrook's proposed map of the research utilization field in nursing[48] to chart research utilization in the field of asthma care. With considerable ecological intent, this alternate "map" would not follow traditional silos of research, practice, education, and policy; nor would its design reinforce persistent islands of acute care, home care, public health, and continuing care. Additionally, our "asthma map" would not confine itself to the known practices of one discipline or even all health disciplines, but instead

304

consider the interwoven ecological pattern of structures, processes, and relations that drive all of the human and financial costs of asthma care.

An ecological approach to mapping asthma research utilization assumes that as "the forces for change in the way we deliver healthcare grow stronger with each passing day",[49] the confluence of these clinical streams is inevitable, and already underway. Children with well-managed asthma are increasingly found in communities, schools, and clinics rather than our emergency rooms, and future technological supports to enhance their outcomes should keep it that way. These supports include but are not limited to more accessible internet health education,[49] [50] disease and pharmaceutical databases,[49] [51] and online clinical monitoring.[49] [51] As such ecological maps require us to redistribute our intellectual investments and activities, they will also demand different financial and other investments as well. For instance, an ecological map does not separate our use of automobiles, our tolerance for other industrial pollutants, or our plans for public transit from our health system approach to asthma or other health conditions, and the "territory" of adequate asthma care will change.

In our current deepening shortages of human resources, the ecological design of delivery models also requires planning for adequate supports for the future recruitment, retention, and roles of qualified practitioners and other ancillary workers. Essential steps for a healthier workforce will include better health human resource data bases, more accessible basic and advanced education, computerized scheduling and other technical supports to improve work life. It will be equally vital to demonstrate a commitment to staff as knowledge workers by

designating more funds for ongoing clinical learning. All practitioners, including nurses, voice increasing loss of governance over their own practice,[11][12][13] and the critical topic of professional health will stay in view for many years to come.

The present research offers a potentially different lens to investigate professional health issues in nursing and other fields, but that work like other future projects is outstanding. However, we can safely bet that if our systems make their workers sick,[12] patients and families cannot reasonably expect to optimally heal. We cannot wait for further research to institute whatever immediate relief is feasible to achieve. Local knowledge breeds system integrity, and it is therefore vital to "repatriate" clinical leadership and educational supports to the unit and bedside level across health care settings, and to place such recruitments at the top of our list. Nursing education and practice can also be reciprocally strengthened by dissolving our own professional ghettos and hierarchies, and by pairing *diverse* educational backgrounds (versus "levels" of education) for clinical programs, research, and clinical education. Along with increased use of clinical chairs and other cross appointments, such measures will encourage what nursing and other health disciplines all need: more cross-pollination and synergy between research, education, and practice, from undergraduate through to post-doctoral education.

Finally, the findings of this study only lay a template for a host of future projects. To stay with ecological metaphors, if denatured nursing fits with further studies across a variety of settings, is it a phenomena that restricts to one health practitioner, or do other groups show signs of denatured work as well? If nurses

or other practitioners know when their work is denatured and yet they cannot mount sufficient defences to its threats, which system attributes can be augmented to the most optimal effect, and what criteria should we use to decide? Are magnet hospitals ecological blueprints for better nursing care, and if they are, is it because of the properties that have been identified to date, because of others, or due to both? If we want to ecologically map a sentinel event, a health program, or a disease condition, what relations and time scales do we need to include? If clinical and organizational ethics also suffer their own conceptual ghettos, can ecological thinking transform their practices and roles? If ethics committees used an ecological approach to their work, for example, what composition would they aim for, and why? How would ethical toxins and "anti-toxins" be defined, and what would be the goals of consultation? We need to get to work.

A Closing Plea

I tried as often as I could just to be quiet and to listen to him tell me what he wanted. I always heard him saying "Thank you for looking out for me. Thank you for protecting me, because my journey is to move through this life whole".

Lesley Paulette[52] (p. 16)

The stakes for continued neglect of our troubled relation with technology, in health care and throughout our lives, are so very high. For Lesley Paulette, a liver transplant was not part of a life for her infant son that was *whole*.[52] As she describes her struggle with practitioners, hospitals, social services, and court to choose for and be there for her dying son, we witness a relation of resistance that

307

forms a deeply honest and thoughtful counterpoise[7] to technology. Paulette's

relations with her son, her family, the health system and the larger world are

grounded in the spiritual beliefs of her native culture, not the "relative risk"

calculations of a clinical trial. She seeks wisdom for life choices in the natural

order of a Creator, a code for living that encompasses but also surpasses the

scientific order of biomedicine. She carefully studies all the latest research on the

proposed treatment, she closely listens to and stays with her son as he suffers, and

she comes to the clear knowledge that a transplant is not the right way to *treat* her

child. Whether any of us would choose the same course or different options for

ourselves, our child, or someone else, do not patients, families, and practitioners

all need to be treated in ways that make and leave us whole?[10]

In Barnhart,[1] (p. 535) the etymology of the word *integrity* includes notions

of soundness and an unimpaired or uncorrupted condition. The metaphor of

ecological integrity that emerges from a research dialogue between technology

and nurses' work constructs a reading where ethical relations, resistance, and

response are proposed to be essential elements that mitigate against the corruption

of a sound moral ecology of good nursing care. In this work, the overriding

question for nursing practice is how we best understand nurses' work, and

therefore the country of nursing, in a technological world. Like damaged wild

lands that we do not see from the main road, much of nurses' country is over-

exploited and yet still fundamentally under-explored. As for most of the

endangered species in our threatened ecosystems, we have scarce local knowledge

of a healing species called nursing that could disappear.

Margarete Sandelowski discusses the "vein and other dubious portals of entry" in her historical work on the incorporation of intravenous therapy into American nursing practice after World War II[53] (p. 59). Sandelowski's analysis is that the *medical delegation* of IV therapy as a technical skill reinforced a problematic ideology of scientific management that devalued the composition of, and consequently *decomposed*, nursing skill. Stressing that the scientific management of nurses' skill and not the science of IV therapy was at issue, Sandelowski observes that this technical "inversion" of nursing skill meant that nurses' efficient performance of technical tasks was persistently prized over the delivery of skilled nursing care. Sandelowski argues that this impoverished notion of nursing skill persists in present day hospitals, as nurses increasingly function as "Hamburger Helpers" to deliver devalued medical tasks that dislodge skilled nursing care in favour of narrowly prescribed technical roles[53] (p. 60). She cites the rising demand for acute care nurse practitioners to respond to medical specialty shortages as a current instance of another suspect opportunity for the growth of skilled nursing practice, noting that "technology, in combination with ideology, can both create and destroy nursing jurisdictions."[53] (p. 61)

Other work in nursing supports Sandelowski's concerns with the problematic combination of technology, scientific management, and nursing skill. In Nagle's critique of nurses' work in acute care, she notes that "many nurse practitioners have found their workday consumed by assembly-line history and physicals".[54] Along with Sandelowski and several other nurse scholars,[55 56 57 58] Nagle cautions that within modern health systems, the current technical hierarchy

309

of bio-medical specialties does not secure a place for nursing practice. To the contrary, these works and the present research suggest that when nurses or others mistake technology *for* reality,[29] the consequent valuing, design, and division of health care work fuels a continued erosion of nursing care.

The research metaphor of ecological restoration takes us beyond these urgent concerns of nursing, and invites us to ask: Is the erosion or denaturing of nurses' work (and possibly other practitioners' work as well) a terminal problem for nursing, for health care, or for neither? The current imbalance between ecology and technology can be corrected, and so the answer remains open. Together, I hope that we will take up the work of renaturing nursing, healing health care, and regenerating our world.

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311

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314

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315

316

Appendix A

318

Databases for Review of Literature

Online Searches

- Academic Search Full TEXT Elite (EBSCOhost)

- Applied Science & Technology Abstracts

- Bioethics Line

- CancerLit (HKN)

- CINAHL (HKN)

- Dissertation Abstracts

- Econlit

- EMBASE

- ERIC

- HealthSTAR (HKN)

- Humanities Abstracts

- Images in the Humanities and Social Sciences

- MEDLINE (HKN)

- Project Muse

- PsycINFO

- SAM: Scientific American Medicine

- Social Sciences Abstracts

- GATE Electronic Journals for Health Sciences, Humanities & Social Sciences, and Science & Technology

319

Online and Hand Searches

- AARN and CNA libraries

- John Scott library

- H.T. Coutts library

- John Dossetor Health Ethics Centre library

- Rutherford Humanities library

- NEOS library

Appendix B

Theoretical Framework for Technology

Key theoretical streams of contemporary philosophic thought on technology for research:

Borgmann's paradigmatic theory – the device paradigm

Feenberg's critical theory – power & politics

Organization of theoretical propositions:

1. The *Nature* of Our Technological World (What is the problem?)

   - *Hyperreality* vs. *focal reality* (Borgmann)

   - *Environmental degradation* vs. *healthy environments* (Borgmann; Feenberg; Higgs)

   - A *glut of information* & a *poverty of wisdom* (Borgmann); a *technical code* that directs the conduct of workers (Feenberg)

   - *Background & foreground* (*machinery* and *device*) of technology are increasingly split (Borgmann)

   - *Unreflective consumption* of endlessly available, easily disposable *commodities* (Borgmann; Feenberg)

   - "Distance ethics" where *ends (foreground)* are dissociated meaningfully from *means (background)* and *production for consumption* predominates (Borgmann); *production for profit* overrides attention to ethical difficulties with means, commitments, relationships (Feenberg))

323

2. The Proposed Theoretical Explanation (Why this problem?)

- *Ascendance of a technical code* (Feenberg), *technical information* taken as reality (Borgmann), *technically mediated experiences* taken for experience of nature (Higgs)

- The *brilliance, richness, and pliability* of hyperreality (Borgmann); the *control, power, and domination* of the technical code in the hands of the elite (Feenberg)

- Discounting the steady erosion of *focal things & practices* (Borgmann); discounting the value of work (Borgmann, Feenberg)

- *Commodification* of everything (Borgmann; Higgs; Feenberg)

- *Ascendance of devices* over things (Borgmann)

- *Ascendance of production* over creation/generation (Feenberg; Borgmann; Higgs)

- *Decontextualizing practice* (Borgmann; Feenberg); *decontextualizing nature* (Borgmann; Higgs)

- "Life by Byte": eg. instant media culture vs. participative citizenry & democracy (Borgmann); power of media and corporate marketing versus democratic potential of technology (Feenberg); disengagement from nature for substitute experiences eg. Yellowstone theatre, Disneyworld (Higgs)

- The *limits of modern ethics* in the face of material culture: principles and formulae do not suffice (Borgmann); principles and formulae perpetuate

324

present power relations (Feenberg); the need for *dialectical* understanding

of ethical actions in a technological society (Borgmann, Feenberg, Higgs)

3. Proposals for Reform (Getting to a different relation with technology):

   • *Recovering* focal things & practices (Borgmann)

   • Engaging the *dialectic of technology*: using *subversive rationalization* to

   counter decontextualization with *concretization* (Feenberg)

   • Fostering dialogue and projects with communities to *regenerate*

   environments within their sociopolitical contexts (Higgs)

   • Discerning the difference between *information* and *reality/nature*;

   between measures & controls vs. meaning & wisdom (Borgmann);

   overthrowing technical codes as prescriptions for reality and replacing

   them with democratic design of technology

   • Reconfiguring economic practices to foster local as well as global

   economies and markets (Borgmann); fostering more socially democratic

   workplaces (Feenberg)

   • Reconstituting *ethics* for "*reality after modernity*" (principles & formulae

   brought into fuller *context* and more democratic *relation*) (Borgmann;

   Feenberg; Higgs)

4. Related Work in Nursing and Ethics:

   • *Relational ethics* and *dialectical development of inherent knowledge* for

   ethical care (Bergum)

   • *Clinical ecology* and the *dialectical development of ethical knowledge* for

   clinical care (Gadow)

325

- *Spectacular nursing vs. the reconnaissance of the skilled, knowledgeable nurse* in a technological health care system (Sandelowski)

326

Appendix C

328

Dear President Lorraine Way & Provincial Council, AARN;/
    President Heather Smith & Board Members, United Nurses of Alberta;/
    Deans & Directors, Schools of Nursing;

Re: Research Project on Technology and Registered Nurses' Work in Acute Care

I am a student in the doctoral program in nursing at the University of Alberta. The purpose of this letter is to provide information about my research project. I ask that you share this information with registered nurses as you see fit.

I am conducting a research project on technology and registered nurses' work in acute care. My academic supervisor is Dr. Vangie Bergum, a professor for the Faculty of Nursing. The purpose of the project is to examine how technology shapes the daily work of registered nurses in acute care. I hope this research will contribute to better knowledge of technology as a pervasive presence in nurses' work and in health care.

I have attached an Information Sheet on my research. An e-mail copy of the information sheet for web sites or e-mail distribution lists is also provided. Several hard copies of the research information are enclosed for mailing or other distribution at meetings. I would be pleased to supply additional sheets and cover any mailing or fax charges as needed.

I will contact you within the next two weeks to answer any questions you may have about the research. Thank you for considering this request.

Sincerely,

Patricia Marck, RN, PhD candidate
Faculty of Nursing & John Dossetor Health Ethics Centre, University of Alberta
222 ANR, 8220 – 114 St., Edmonton T6G 2J3
Phone: (403) 486-5368 or (403) 492-6676   e-mail: pmarck@v-wave.com
Supervisor: Dr. Vangie Bergum   Phone: (403) 492-6676

330

Research Information Sheet

Are You a Registered Nurse in Acute Care?

My name is Patricia Marck, and I am a doctoral nursing student at the University of Alberta. I am conducting a research project on technology and registered nurses' work in acute care. The purpose of the project is to examine how technology shapes the daily work of registered nurses in Alberta's acute care settings. I hope this research will contribute to better knowledge of technology in nurses' work and in health care.

I am seeking registered nurses with at least three years of current experience in acute care to participate in my project. If you take part in the project, we will have one or two taped conversations about your work for a total of three to four hours of your time. The conversations can be in person or over the telephone. The taped conversations will be typed and used as part of the analysis in this research. You might be asked to review the typed record for accuracy. You may also provide written comments for the project if you wish.

Your participation in this project is completely confidential. Our taped conversations and the typed records will be coded and kept in a locked safe. Anything that identifies you or your practice setting will be removed from the records to protect your privacy. If you decide to take part and then change your mind, you can withdraw from the research with no reason. The final research may be presented or used in articles to teach others about nurses' work and technology. If you wish a copy of the final research results, it will be provided.

If you would like to learn more about this research, please contact me at one of the contact numbers below. We will discuss the research and any questions you have. Please call collect if your call is long distance, and the charges will be accepted or reimbursed. If you know of colleagues who might want to take part in the research, I hope you will show them this information. Thank you for considering this request.

Patricia Marck, RN, PhD candidate   **Phone:** (403) 486-5368 or (403) 492-6676 (messages)
Faculty of Nursing & John Dossetor Health Ethics Centre, University of Alberta
222 ANR, 8220 – 114 St., Edmonton T6G 2J3
Fax: (403) 492-0673   **e-mail:** pmarck@v-wave.com

331

Information and Consent Letter: Potential Research Participants

Part 1:

Project Title: Critical Text on Technology: A Dialectical Critique of Technology and Registered Nurses' Work in Acute Care

Researcher: Patricia Marck, RN, PhD student   e-mail: pmarck@v-wave.com
Phone: (403) 486-5368 or (403) 492-6676 (messages)
Fax: (403) 492-6073

Supervisor: Dr. Vangie Bergum   Phone: (403) 492-6676
Affiliation: Faculty of Nursing & John Dossetor Health Ethics Centre, University of Alberta, 222 ANR, 8220 – 114 St., Edmonton T6G 2J3

Part 2: To be read by each participant

I am a student in the doctoral program at the Faculty of Nursing, University of Alberta, Edmonton. I am seeking registered nurses with at least three years of current experience in acute care to participate in my research project. The purpose of the research is to study technology and registered nurses' work in acute care. I hope that this research will contribute to better knowledge of technology as a broad force within nurses' work and within health care.

If you decide to take part in this study, we would have one or two taped conversations for a total of three to four hours of your time. The conversations could be in person or over the telephone. I will ask you about your work as a registered nurse in acute care. The taped conversations will be typed and used as part of the analysis in this research. You may be asked to review the typed record for accuracy, which could require one to two hours of your time. You may also provide written statements about your work if you want, which could require two to four hours of your time to prepare.

Initials of Participant

332

Project Title: Critical Text on Technology
Researcher: Patricia Marck, RN, PhD student

Our conversations, your participation, and all research records will be kept completely confidential. Anything that identifies you or your practice setting will be removed from the records in order to protect your privacy. Typed records, tapes, and written submissions will be coded and kept in a locked, fireproof cabinet in the researcher's home, and tapes will be destroyed at the end of the research. The typed record will be used as one source of information for this study on technology in nurses' work. No names or other identifying features will appear in the written research findings.

Typed records and written submissions are kept for seven years. The typed record might be used for future research, after separate ethical approval is obtained. The final research may be presented or used in articles to teach others about nurses' work and technology. If you wish a copy of the final research results, it will be provided.

It is not expected that there will be any risks to you by taking part in this study. In talking about your work, you or the researcher might identify possible concerns about patient safety or other issues. If that happens, you will be given information on resources that you can contact to protect patient care. You may not receive any benefit from being in the study. By taking part in the research, you may provide valuable information that helps others to understand nursing and technology. You may ask any questions that you have about the study and you may choose not to take part.

If you have further questions about the research as you take part, you can contact the researcher, Patricia Marck, at any time by the phone numbers at the beginning of this form. If you have any concerns about how the research is conducted, you can contact Dr. Janice Lander, Associate Dean of Research, Faculty of Nursing, by the phone number at the end of this form. If you decide to take part and then change your mind, you can withdraw from the research with no reason.

If you think that you might take part in this research, please read the rest of this form and answer the questions. You should then contact the researcher, Patricia Marck, at one of the contact numbers at the top of this form. Please call collect if your call is long distance. The charges will be accepted or reimbursed. We can discuss the research and any questions you have. If you decide to take part in the study after speaking with the researcher, please sign this form and give it to the researcher. You will then be contacted for an interview. If you know of colleagues who might take part in the research, I hope you will show them this information. Thank you for considering this request.

Initials of Participant

333

Project Title: Critical Text on Technology
Researcher: Patricia Marck, RN, PhD student

Part 3: Questions to be completed by participants

Do you understand that you have been asked to take part in a research study?	Yes	No
Have you read the information about the study?	Yes	No
Do you understand the risks and benefits involved in taking part in the study?	Yes	No
Have you had the opportunity to ask questions about the study?	Yes	No
Do you understand that you can refuse to participate or withdraw from the study at any time?	Yes	No
Do you understand how your participation will be kept confidential?	Yes	No
Do you understand you may contact the Faculty of Nursing if you have any problems with how the research is conducted?	Yes	No

The study was explained to me by: _____

I agree to take part in this study

_____   _____   _____
Signature of Research Participant   Date   Witness

_____   _____
Printed Name   Printed Name

_____
RN Registration Number

_____   _____
Current Nursing Position   Years of Practice

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____   _____
Signature of Researcher   Date

Contact for concerns:
Dr. Janice Lander, Professor & Associate Dean of Research
Faculty of Nursing   Phone: (403) 492-6763

Appendix D

336

Information on Participants

General Overview

Years of nursing practice: 10 – 34 years
Areas of clinical experience: labor & delivery, operating room, recovery room, adult intensive care, coronary care, cardiothoracic surgery, neurosurgery, ambulatory care, general surgery, orthopedics, burns, trauma
Other nursing experience: nursing education, nursing management
Educational Background: Diploma (5), Post-Basic BScN in progress (1) o completed (3), Master in Nursing (1)
Age range: 34 – 57
Facilities and Geographic Areas: seven hospitals in five large and mid-size cities across the province of Alberta
Other Involvements: AARN, UNA, clinical specialty groups, community, church

Individual Participants: Biographical Information at the Time of the Research

Nurse 1   **Education:** hospital program; diploma in nursing
Age: 39
Facility: 1 acute care hospital
Clinical Background: 10 years nursing experience in critical care
Interviews: March 30, 1999; June 29, 1999

Nurse 2   **Education:** hospital program; diploma in nursing; university program – working on Post-Basic BScN
Age: 46
Facility: 2 acute care hospitals
Clinical Background: 25 years nursing experience – neurosurgery & trauma
Interviews: May 31, 1999; June 24, 1999

Nurse 3   **Education:** hospital program; diploma in nursing
Age: 42
Facility: 1 acute care hospital
Clinical Background: 21 years nursing experience – rural nursing, intensive care, post-anaesthetic recovery room
Interviews: March 17, 1999; March 31, 1999

Nurse 4   **Education:** hospital program; diploma in nursing
           Age: 34
           Facility: 1 acute care hospital
           Clinical Background: 12 years nursing experience – labour and delivery
           Interviews: April 21, 1999; June 9, 1999

Nurse 5   **Education:** hospital program; diploma in nursing; university program, Post-
           Basic BScN
           Age: 57
           Facility: 1 acute care hospital
           Clinical Background: 34 years nursing experience – surgery, operating
           room **Interviews:** March 31, 1999; June 8, 1999

Nurse 6   **Education:** hospital program, diploma in nursing; university program, Post-
           Basic BScN
           Age: 40
           Clinical Background: 18 years nursing experience in labor & delivery and
           community maternal child nursing
           Interviews: June 3, 1999; August 4, 1999

Nurse 7   **Education:** college program; diploma in nursing
           Age: 39
           Clinical Background: 12 years' nursing experience in labor & delivery,
           outpost nursing
           Interviews: February 11, 1999; February 24, 1999

Nurse 8   **Education:** hospital program; diploma in nursing; university programs; Post-
           Basic BScN & MN
           Age: 36
           Clinical Background: 14 years nursing experience – medicine, diagnostic
           ambulatory care
           Interviews: March 16, 1999; June 16, 1999

338

Nurse 9   **Education:** hospital program; diploma in nursing
           Age: 44
           Clinical Background: 25 years nursing experience – orthopedics
           Interviews: February 26, 1999; April 19, 1999

Nurse 10   **Education:** hospital program; diploma in nursing; university program, Post-
           Basic BScN
           Age: 46
           Clinical Background: 30 years' nursing experience in cardiac acute and
           community care, independent practice, and critical care
           Interviews: March 29, 1999; June 3, 1999

340

Appendix E

342

Sample Questions & Statements for Conversations with Nurses

- Perhaps you could tell me a bit about yourself – how you came to the research, what you wanted to tell me about you and your practice.

- Can we talk about your work? Perhaps we could start by talking about your last day at work – or any particular day that comes to mind for you.

- Can you tell me about your patients? How many patients do you usually look after? How is the nurse:patient ratio decided? What are their needs for nursing care in your view?

- Please tell me about your unit. How many patients are cared for on your unit? Can you tell me about the other staff? What is the staffing for a typical day? What has to be accomplished for good patient care? How do you get the work done?

- How do you get report on your patients at the beginning of a shift? Who can you go to with questions about your patients? How do you organize your day?

- How would you describe your relationships with patients? Families? Other visitors to the unit? Do you find that you can usually maintain good relationships with patients? What makes a relationship good in your view?

- Can you tell me about your relationships at work with other nurses? Physicians? Students? Other health care providers? Supervisors? What makes these relationships good in your view?

- Can you tell me about a typical day, if there is such a thing? How do you get through a "typical day"? How do things usually go on a typical day? Are there things that go wrong? What are they?

- I would like to know about a "good day" – what is a good day in your work? What is it like, what makes it a good day? How do things go and how do you know they're going well?

- Can you tell me about a difficult day? What made it difficult? How did you get through it? What sticks with you after a "bad day" is over with?

- What would you like me to know about your work that we have not talked about?
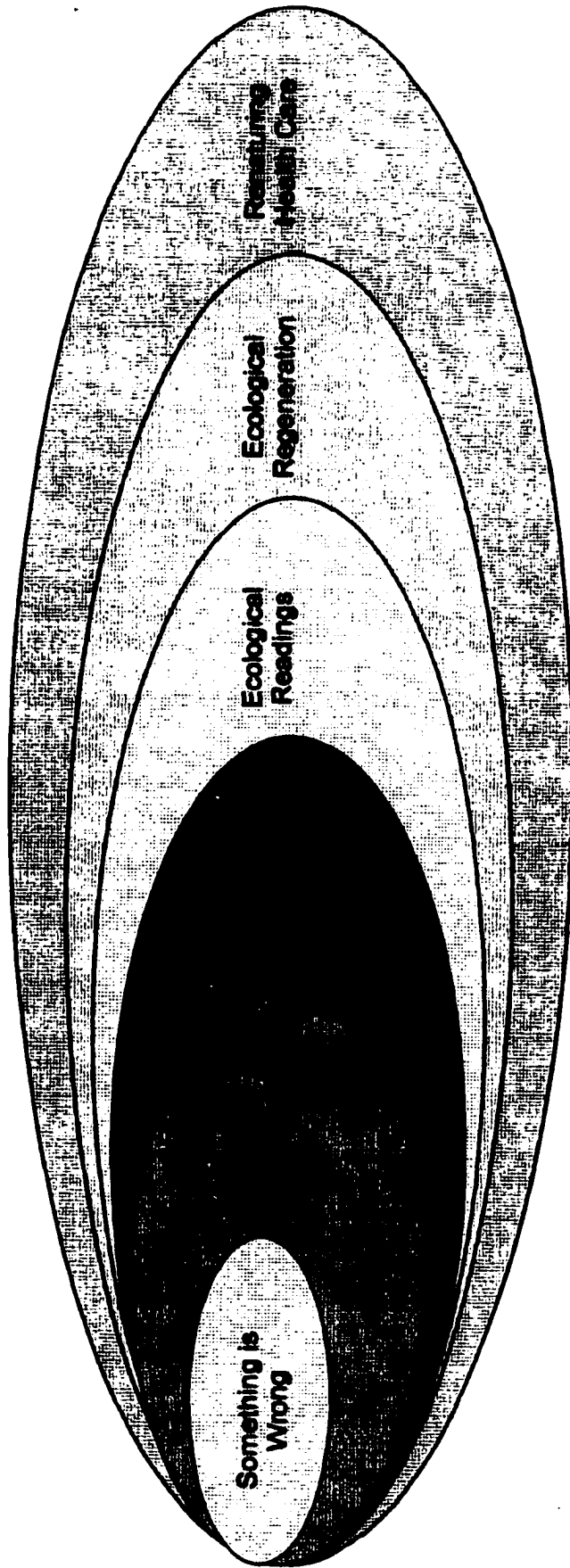
343

344

Appendix F

Technology and Registered Nurses Work
A Nested Analysis

346

A. Stages of the Research Interpretation: A Nested Analysis

1. **July 98 - December 98:** *Something is Wrong* (Higgs, Strong & Light): Missing Knowledge in Modern Health Care (Chapter 2: Recovering Ethics After Technics: Developing Critical Text on Technology) → Nurses' problems/Problems with modern health care: Contemporary philosophic views of technology → argument for method of critical hermeneutic dialectic between nurses' work and contemporary philosophy of technology

- Practical rationale for attention to proposed area of study: Nurses and other report record numbers and types of ethical "problems" with modern health care that are not "solved" by more science alone. We are missing essential knowledge for ethical care in a contemporary technological world
- *Inherent knowledge* is defined by Bergum as those insights that recover the unique meaning of each person's experience of health care, knowledge we need to understand our ethical commitments to persons in relationship and in context, from a place where illness is not a problem to be solved, but (Gadow) a "situation to be lived through"]
- Closer attention to the nature of the everyday commitments and relations that are found between nurses, patients, families, coworkers, and communities in modern health care allows us to develop some of this inherent knowledge
- Dialectical analysis of nurses' work and technology theory allows us to develop inherent knowledge of nursing in a technological world
- Inherent knowledge is needed to reconcile nurses' everyday lived experience of practice with the ethical, political, and cultural stake that technology represents for our times.
- Theoretic rationale for dialectical study stems from two primary sources of contemporary philosophic thought on technology: *Borgmann*: an adequate account of technology intersects "economy and culture, labor and leisure, science and technology, history and philosophy", and *Feenberg*: technology's dialectical properties yield "an ambivalent process of development suspended between different possibilities
- Nursing and technology from this perspective are explored as a "scene of struggle" (Feenberg) with several ambivalent tensions and possible outcomes (some better than others)
- Nursing and technology as a context for various potentials are successively explored through the notions of technology first as promise, then as problem, and finally as a complex phenomenon that characterizes our daily lives and work. The case is built for understanding technology as "the way that we take up with the world" in contemporary society (Borgmann).
- To understand nurses' work in a technological world (how nurses take up with the world of modern health care), a dialogue between nurses accounts of their work and philosophic accounts of technology is required.

347

2. January 99 - July 99: *Technology and Nurses' Work* (Interim Analysis)

Nurses' work: Technology theory → critique of nurses' descriptions of their work in technological health care

- nurses thrive/nurses burn out
- nursing relation/disrupted relations
- clinical judgment & mentoring/technical & bureaucratic thinking
- nursing rhythm/assembly line factory speed
- attention primarily to power, presence of technology & technical image/attention primarily to presence of patient & environment
- nursing the patient/doing endless tasks
- technology as healing aid/technology as torture;
- clinical leadership/absence of clinical leadership
- healthy place to work/unhealthy work environments
- "led around" by technology/subversive rationalization to resist technological practices
- superficial understanding of care & care environment (surface view)/deep understanding of complexity of care and care environment

348

3. June 99 - August 99: *Nursing in a Technological World: Paradoxical Tensions*
(Chapter 3)

Critique of nurses' work: Critique of Technology theory → critique of technology and registered nurses' work (paradoxes of nurses' work in technological health care)

- knowing patients/patients as strangers
- place to heal/factory for treatments
- nursing relation/technical relation
- resources to nurse/scarce resources to nurse (Note: resources may be plentiful overall, but maldistributed for actual care)
- respect between persons; lack of respect
- integrated clinical judgements/narrow technical problem-solving
- goals for patient care/tasks for completion
- preeminence of product/equal valuing of processes as practices that matter
- means and ends tied to the nursing of patients/separation of nursing ends from available means (reverse adaptation to a technological environment)
- reading a balance of natural, cultural, and technological signs in order to nurse (persons, surroundings, community, world)/focus primarily on technological signs and disjointed procedures & problems
- focal practices that enable nurses to nurse their patients and the environment(the work of nursing)/fragmented, predominant attention to technical signs & endless tasks of "nurses work"
- system-wide view of context for care/narrow task-of-the-moment lens
- able to nurse/not able to nurse
- ecological perspective that situates nurses and patients within an overall system that is a living, dynamic habitat/acontextual focus on nurse(s) and patients only
- technological health care as living, dynamic habitat is characterized by complex phenomena and relations that are always moving towards further health/further degradation
- need to explore notion of the habitat of nurses' work in acute care through ecological perspective that adequately accounts for contemporary technology theory -→ ecological restoration from a regenerative point of view (Higgs, Light & others who have considered Borgmann and Feenberg)

349

4. August 99 - October 99: *Ecological Readings of Nurses' Work: Re-reading the Signs of a Technological System* (Chapter 4)

Nurses' work and work environment: ecological restoration informed by technology theory → nursing and health care in a technological world

- nature of an ecosystem/nature of health care system (common presence of technological patterns in contemporary world); nature of health care as habitat and healing place/health care as factory & treatment site)
- nature and needs of living beings in ecosystem/nature and needs of patients, nurses & other health care practitioners within health care
- characteristics of healthy eco-health care system (ecological integrity, ecosystem health)
- threats to thriving system (ecological degradation/disintegrity, ecosystem decline)
- adaptive responses to threats (eg. nursing focal practices of a healing nature, subversive rationalization & other forms of resistance, migration to alternative practices and sites of nursing)
- maladaptive responses to threats (eg. strong *nurses* leave acute care & denatured technicians (mutation) stay, decreased reproduction - nursing shortage & recruitment problems, extinction)
- ecological regeneration & health care reform/technically efficient ecological restorations & health care re-engineering
- *health* care and its' inhabitants thrive in acute care settings/health care, patients, and health care practitioners vacate acute care as health system sickens further

350

5. October 99 - December 99: *Ecological Regeneration: An Ecological Ethic for a Technological World* (Chapter 5)

Ecological regeneration of health care: Adequate ethics for a technological world → ecological health care ethics for a technological world

- conversation between ecological lens on nursing, technology and health care and notions of "bridge bioethics (Potter) and ecological citizenship (Nature, Polis, Ethics)
- propose that an adequate ethic for health care must widen from ecological citizenship that tries to recover/restore nature to an ecological ethic that recognizes technology-in-nature (technology in our lives and as a way that we take up with our world)
- argue that this research on nurses' work in acute care is one exemplar that directs us away from the possibility of viable nature or viable health care if we do not consider the actual nature, experience, and moral significance of technology-in-nature, technology-in-us, technology in our world
- suggest that to adequately account for technology in our quest to improve health, health care, and health care ethics, we need to renature our understanding of technology, of health, and of health care
- renatured understanding of technology, health, and health care considers multiple sources of local and general knowledge about nature, health, and health care
- local knowledge is found in relational or inherent knowledge of nurses, other health care practitioners, patients, health care environs, health care system, the land, wilderness, working in ecological restoration, community building, participating in decisions, thriving local economies (the focal practices of nursing, medicine, other health care practitioners; the experience of sickness/vulnerability and healing; health care as a place/home world that we inhabit and navigate together; communities as places/home worlds that we inhabit and navigate together; the land as place/home we inhabit and learn/know together; illness and degraded as places that we take committed action towards; health care as a social good not a human market)
- general knowledge is found in scientific, philosophic, political, and economic knowledge of health, disease, health care systems, health policy & politics, health care interventions, global markets, ecosystems, technology, biotechnology, ecological restoration, culture (how ecosystems do or do not thrive; the difference between growth and sustainable development; ecological view of viable nature and of viable health care not as resources and services but as attributes and qualities; relationships that characterize viable nature and viable health care; adaptive versus maladaptive responses to threats in nature and in health care & health care ethics; ecological integrity for nature & for health care)
- a renatured ethic for health care is a dialectical, relational, ecological ethic for a technological world

351

6. **December 99 - January 99:** *Renaturing Health Care: Directions for a Healing Project in a Technological World* (Chapter 6 and 7)

- initial proposals for disciplinary and inter-disciplinary work in research, practice, education, and policy around three concepts for a technological world:

- *relation* – focal, ethical relations for healing, developing, thriving

- *informed resistance* –focal practice of critically questioning a technological world; the purpose of counter-tension in a viable nature, viable health care

- *response* – effective structures and adaptations in a technological world/health care system

352

B. Ecosystems and Health Systems: Parallel Themes

wilderness habitats   health care habitats (hospital, home, clinic)

   ecosystem   human-community-global environment

←   **technological practices**   →

loss of ecological integrity   loss of individual / system / societal integrity

   ecological degradation   deteriorating health care environments

←   **damaged human environs**   →

← disrupted & dysfunctional relations →

← inability to resist threats, maladaptive responses →

← migration, mutation, failure to reproduce, extinction →

←   **focal practices (relations, resistance, response)**   →

   ecological regeneration   health care

   ecological integrity   individual / system / societal integrity

ecosystem health   human / community/health system / environmental health

353

C. Technical Ecological Restoration: Health Care Re-engineering

← [Wilderness]/community/health care as markets/sites of consumption →
← Primary profit motive; public/private divisions →
← marginalized populations, lands, systems (eg. public health) vs.
resource intensive populations, lands, systems (eg. acute care) →
← Product over processes/practices →
← scientific management approaches →
← imbalance of technological vs. cultural & natural signs →
← profusion of information, poverty of wisdom →
← narrow "thin" definitions of technology, caring, restoration, health →
← reverse adaptation →
← excess growth, decreased development; overconsumption →
← short range risk management, resource allocation, overall policy →
← separation of actions from consequences →

←Ecosystem disintegrity/degradation →

← deterioration [fauna/flora/inert] – people/organsims/env't →
← technical thinking & relations→
← more scientific management, reengineering, deskilling →
← denatured nursing, ? medicine, other hcp? →
← (mutation) superbugs, clones, allergies, asthma, birth defects→
← Failure to reproduce (recruitment, retention, lack of mentoring and dev't) →
← (migration) practice at the margins, nurse in another role →
← Loss of diversity within habitat/acute care→
← Narrowing options for shallower and shallower cover-ups & "fixes" →
← technically efficient & effective restoration but acontextual relations →
← cosmetic versus actual restoration →
← (extinction) burnout, leave the field→

354

D. Ecological Regeneration: Health Systems Reform

← [Wilderness]/community/health care as home places, habitats, places we live in →
← Contextual and committed relations →
← Informed resistance & reflective "counterpoise" to technology →
← Focal responses (design of processes & structures) →
← proportionate profit motives in constellation of civic interests →
← an economy of signs for an ecology of things that matter→
← regeneration of pop'ns, lands, systems → acute/p. health agendas converge→
← Adaptive (focal) practices →
← Eco/Health system management as learning env't (civic health) →
← recognition & critique of technological patterns →
← fuller definitions ("full blooded") of technology, relations, restoration, health →
← democratic science & society for different technology →

← *Ecological integrity* →

← Thriving and developing relationships & responses →
← Integrated judgements and practical nursing actions →
← Viable eco/health system & capable of creative change and development →
← leadership through practice, learning, response & feedback/critique →
← Biodiversity within habitat →
← Ability to reproduce (recruit, retain, sustain) →
← optimal possibilties for ongoing ecological regeneration →
← Sustainable growth & ongoing development →
← [Wilderness] Health care good places for respective forms of healing →

355