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NURSING TECHNOLOGY AND STRESS

by

(C) ROBERT H. YAMASHITA

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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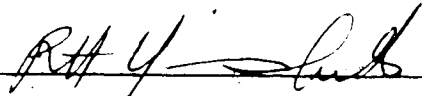
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recommend to the Faculty of Graduate Studies and Research,
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DEDICATION

To my wife Brenda, and my daughter Meghan.

ABSTRACT

The purpose of the study was to examine for interrelationships between concepts of Technology and Stress as they relate to the practice of nursing in hospitals. In addition, differences in Technology and Stress were examined according to the level of nursing education as well as nursing subunit specialties. Concepts of Technology and Stress were drawn from the study undertaken by R. Schneck and P. Overton which also provided the data for the study.[1] Data was extracted from their analysis of 24 hospitals in the province of Alberta, Canada which included 157 nursing subunits and 1265 individual nursing staff. Data was collected through questionnaires directed at measuring perceptions of nursing staff which included items relating to Technology and Stress. The unit of analysis was the individual response level.

Analysis of data appears to indicate that significant relationships exist between Technology and Stress such that stress may be related to the ability or rather inability of organizations to operate under conditions of Technical Rationality (Thompson, 1967). For the purposes of the study, Technology was viewed as the causal variable, and Stress the behavioral outcome or criterion variable. The analysis further suggests that significant differences do exist between pro-

---

fessional and auxiliary nursing staff in there perceptions of both Technology and Stress. Auxiliary nursing staff generally experienced less Stress and observed more routiness of activities. Examination of nursing subunits specialties with regard to Technology and Stress furthermore suggests that significantly different profiles exist which are generally in accord with the interrelationships indicated earlier.

Multivariate statistical procedures were employed throughout in the analysis of data. This included Factor Analysis, Analysis of Variance, and Multiple Discriminant Analysis.

Several limitations were noted in the study which included the difficulty in operationalizing concepts of Stress and the problem of employing perceptual measures. Limitations were also noted regarding the generalization of findings not only across organizations but within as well given differences in technology which may exist between occupational roles within an organization. The study concludes on the need to determine how stress may be altered through manipulation of other organizational variables given that technology represents the "current state of art" and therefore not easily manipulated or improved.

ACKNOWLEDGEMENTS

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CHAPTER I

INTRODUCTION

Organizational stress has been the subject of much discussion. For most, the demands of the job continue to be the single most prevailing source of stress to the extent that it has been linked to such problems as coronary heart attacks, ulcers, as well as the more subtle problems associated with self-esteem and identity. However, for all that has been acknowledged regarding the effects of stress, we know surprisingly little regarding its sources and causation within organizations.

Much of the current literature has tended to emphasize roles and interrelationships as being sources of stress to the exclusion of other organizational variables which may be equally prominent in explaining stress. Given the ubiquity of stress, it is reasonable to assume that other factors related to the design and operation of organizations may act independently to induce stress. In this regard, McGrath (1976) had identified three independent systems or environments within organizations, and the effects of their interaction to produce six sources of stressful situations from which to classify stress, namely:

1. Task-based stress (difficulty, ambiguity, load, etc.)

2. Role-based stress (conflict, ambiguity, load, etc.)

3. Stress intrinsic to the behavior setting (e.g. effect of overcrowding, of undermanning, etc.)

4. Stress arising from the physical environment itself (e.g., extreme cold, hostile forces, etc.)

5. Stress arising from the social environment in the sense of interpersonal relations (e.g., interpersonal disagreement,

privacy, and isolation, etc.)

6. Stress within the person system, which the focal person
    "brings with him" to the situation (e.g., anxiety, perceptual
    styles, etc.).

While the author readily concedes that the designations are some-
what arbitrary and subject to overlap, what is important, is to recog-
nize the diversity of situations covered by the classes provided. It
would seem that the possibilities are endless, the only commonality
being that they are capable of inducing stress among organizational
members.

In addition to organizational structure which is closely aligned to
Role-based Stress (i.e., roles and patterns of interrelationships), re-
cent studies investigating Technology would suggest this to be a likely
area for further research in determining causal factors relating to
stress. Since tasks are determined to a great extent by an organiz-
tion's technology, this would suggest that stress associated with tasks
may be a function of that technology. For the purpose of this study,
technology is defined in terms of the actions an individual performs
on an object, living or otherwise, with or without the aid of tools or
mechanical devices in order to bring about changes in raw materials.
Technology therefore includes the basic characterization of raw mater-
ials, the knowledge or body of ideas behind actions and the rationale
for methods employed (Perrow, 1967). Perrow suggested that it is the
frequency with which a worker's knowledge is inadequate which is im-
portant in determining the transformation process. Where knowledge is
inadequate, activity consists of unprogrammed search behavior, which
contrasts with the routinization undertaken when knowledge is adequate.

Under these circumstances, is possible for stress to occur because of the uncertainties associated with the outcome of such tasks.

Specifically, McGrath has suggested that tasks may induce stress because of task difficulty, ambiguity and overload which create uncertainty as to outcome. Defined in this manner, it is possible that technology not only serves to establish the degree of control which may be exerted over the transformation process, but conditions of stress as well, except in reverse fashion.

Based on such an approach, the purpose of the study will be to explore relationships between concepts of Technology and Stress, as they apply to nursing staff; and to identify any differences in stress which may be attributable to technology employed by nursing groups (professional/auxiliary) and nursing specialty (nursing subunit type).

Stress

Concepts

In reviewing the literature, it must be stated at the outset that conceptualization and measurement of stress is problematic. In recent years, the meaning of stress has varied widely with little attempt at reconciling differing views. While many authors have attempted to describe causes and consequences, very few have attempted to define it. Some authors such as Kahn et. al (1964) have avoided attempts at defining stress entirely, relying on the assumption that a common and experiential notion exists so as to pre-empt such discussion.

Others similarly have avoided this problem by defining stress, not in terms of what it is, but rather by the processes by which it occurs, and those few who did offer definitions have been purposely vague such as Selye (1956) who defined Stress as being the non-specific response of the body to a demand. One of the reasons for this, suggested by Selye, is because of its ubiquitous nature, which permits numerous different meanings reflecting different perspectives to co-exist with seemingly little conflict. Because of the inherent difficulties in defining stress, we will as well avoid proffering yet another definition. We will instead for the purposes of this research, assume the approach taken by McGrath (1976), which provided much of the basis for this analysis.

Much of the early work regarding stress was pioneered by Dr. Hans Selye (1956) who primarily viewed stress as a biological state, which was induced by the onset of a demand, physical and otherwise upon an organism. With the instigation of Stress, Selye found that there was

an instantaneous rallying of the body's defences, as if preparing the organism for physical attack; this reaction induced a variety of changes in the human biological system. Regardless of the source of stress, the physiological response was the same, which he then called the General Adaptation Syndrome. Later, Selye(1974) attempted to apply his framework for stress to a social psychological state, thereby expanding its application.

McGrath (1976) similarly viewed stress from a social psychological perspective, wherein the data sought reflected socio-psychological states and processes not physiological processes related to stress. McGrath provided a working definition of stress, which rather than identify what stress was, defined a set of prerequisite conditions which were required for stress to occur. Stress occurred in the interaction of a person with his environment: an event happens "out there" which presents a person with a demand, or a constraint, or an opportunity which may be acted upon. McGrath defined three conditions which he considered necessary for an event to be stressful. First, the event must be perceived by the "stressee." Second, it must be interpreted by him in relation to his ability to meet the demand,circumvent, remove, or live with the constraint, or effectively use the opportunity. Third, he must perceive the potential consequences of successfully coping with (i.e., altering) the demand (constraint, opportunity) as more desirable than the expected circumstances of leaving the situation unaltered (p. 1352). Specifically:

> . . . there is a potential for stress when an
> environmental situation is perceived as presenting
> a demand which threatens to exceed the person's
> capabilities and resources for meeting it, under
> conditions where he expects a substantial differential
> in the rewards and costs for meeting the

demand versus not meeting it . . . (p. 1352).

Recognizing that such a representation of stress relied heavily upon the perceptual processes of individuals, he went on to suggest that emotional, physiological and behavioural responses would be influenced by the person's interpretation of the "objective" or external stress situation. In this connection, such aspects as past experience, (including reinforcements such as past successes and failures) and training, could influence the level of stress associated with a given situation (p. 1353).

These concepts were incorporated into what McGrath referred to as a stress cycle, whereby a stressful situation could be broken down into a four stage, (sequential) closed-loop (p. 1356). Each of the stages are connected by "linking processes" which are essentially a restatement of the cognitive processes and behaviour of the individual in dealing with a stressful situation.

In applying the model to stressful situations, McGrath (1976) outlined six classes of stress as identified earlier in the chapter. They stem from the existence and interaction of three conceptually independent "systems" which determine organizational behavior, namely:

    (a) The physical and technological environment in which the behavior takes place;

    (b) The social medium, or patterns of interpersonal relations, within which the behavior occurs; and

    (c) The "person system" or "self-system" of the focal person whose behavior is to be considered (p. 1369).

McGrath suggested that stress associated with organizations could be conceived as arising from conditions specific to the three "systems"

individually and from their interaction (i.e., the intersect of two systems).

Task-based Stress

Task behavior was viewed as being the interaction of the "person" system and the technological environment. McGrath suggested that tasks by themselves could be stress-producing given any of at least three properties, namely difficulty, ambiguity and load. If a task is perceived as being difficult, this could pose performance requirements which have the potential to exceed the capabilities of the individual. Under these circumstances, stress is induced because of the uncertainty associated with the outcome. Similarly, ambiguity as to task requirements and/or standards of performance may induce stress because of the uncertainty associated with response selection (i.e., how best to perform the tasks) or how the performance will be evaluated. Regarding the latter, any ambiguity in the relationship between performance (i.e., my behavior in the task) and outcome (i.e., my success in reaching the intended goal) may lead to stress. Specifically, McGrath has suggested that: " . . . Other things being equal, the more uncertain the relation between effectiveness of performance on the task (quality, quantity or speed) and the outcome of that performance (desired change the situation), the more stressful the situation . . . " (p. 1376) Task load has been identified as a third source of stress. While a person may be fully capable of performing all the tasks assigned, stress will be incurred if sufficient time has not been alloted for their completion. Similarly stress will occur if the person is

unable to carry out the assigned task for the duration of time allotted. This concept is similar to task difficulty, in that temporal boundaries may introduce additional constraints, making the task more difficult.

Role-Based Stress

Role behavior was viewed as being the interaction of the "person system" and the social environment wherein patterns of interpersonal relations were established. Drawing heavily on the work of Kahn et. al. (1964), McGrath suggested that "role expectations" held by members of one's "role set" imposed demands which resulted in prescribed role behavior. McGrath further indicated that roles became stressful whenever a mismatch occurred between the focal person's perception and those of members of his role set in terms of role expectations and demands. These took the form of role conflict, role ambiguity and role overload, which are analogous to forms of stress described for tasks. Role conflict identified conditions where conflicting expectations existed for a focal person's role behavior. Examples of this included inter-role conflict, person-role conflict, intra-role conflict, etc. Role ambiguity relates to the indeterminancy of role expectations and can arise from uncertainties regarding scopes of responsibilities, limits of one's authority, rules, regulations, etc. Ambiguity may also result from uncertainty regarding the relationship of behavior to intended goals, leading to successful role performance. Role overload is essentially an excess of role demands, which is akin to task load. Stress occurs because of the sheer number of role demands imposed.

Behavior Setting Stress

McGrath defined a behavior setting to be a time-place-thing milieu with its attendant social "meaning," wherein animate and inanimate objects held symbolic value to the participants. The "meaning" of objects found within physical settings thus serves to prescribe behavior in a manner similar to role expectations. As such, behavior settings could give rise to stress if performance demands are too difficult; if "meanings" of the setting are ambiguous; or, if there is an overload situation relating to participation and performance demands within (i.e., within an allotted time period) (p.p.1380-1384).

Systems of Behavior as a Source of stress

To this point, the types of stress discussed were the result of various interactions between the three systems of behavior as identified earlier. McGrath suggested that they could also be a source of stress for organizational members. Stress, for example, could arise from the physical environment should a threat be posed to the physical well-being of individuals. The social environment could induce stress through altering the perceptual process of individuals, thereby affecting the "meanings" of objects, roles and events. Finally, the person system could affect the degree of stress experienced in that certain individuals may be more stress resistant than others. Because of certain personality characteristics, such individuals may perceive events to be less stressful than others.

In reviewing McGrath's work, it is apparent that stress is a complex event wherein no single factor may be easily identified as contributing to stress. In reality, there may actually be several factors

impinging upon a situation to make it stressful. If we can accept
McGrath's taxonomy, then task-bearing situations, for example, may be
stressful, not only because they are technically difficult (task-based
stress), but also because they may occur within a physically stressful
environment (e.g., extreme cold) and because of stresses imposed by
the behavior setting (e.g., dying patients). As a result, several
types or classes of stress may be brought on by circumstances relating
to a single event. This has implications for research in that stress-
bearing situations to varying degree may be expected to reflect moree
than one "stress class", which limits our ability to categorize by
ideal-type. Since we are unable to isolate the various types in our
study, we will concentrate on identifying potentially stressful events
and settings for nursing staff from which we will attempt to infer the
types or classes which may be applicable under the circumstances.

In reviewing the nursing literature, several studies have suggested
sources of stress which are particular to the nursing profession. In
terms of role-based stress, a number of authors including Kramer and
Schmalenberg (1976); Cassem and Hacket (1970); Watson (1976) have
described nurses' and headnurses' roles in terms of conflict. Some of
the major sources of conflict include general nursing administration,
scheduling and staffing, disagreements among nurses, handling patients'
families and interacting with physicians. With regard to physicians,
particular problems have been cited relating to difficulties in
communication and physicians who were critical or unaccepting of the
importance of nursing care for patients. Leatt and Schneck (1980)
identified five types of stress experienced by headnurses relating to
their administrative roles,types of patients, task ambiguity,

Staffing problems and physician contacts.   Other authors have

examined the stresses related to patients in Intensive Care Units

(West, 1975; Benner, 1975), while Kramer (1975) identified potentially

stressful factors associated with the hospitalization of children.

Gilles (1973) discussed the problems and attitudes of nurses toward

elderly patients. In addition, patients who were dying or close to

death were identified as potential sources of stress for nursing staff

(Denton and Wisenbaker, 1977; Keck and Walter, 1977).

Technology

McGrath has indicated that:

> ... there is often an ambiguous relationship between
> performance (my behavior on the task) and outcome (my
> success in reaching the intended goal). Other things
> being equal, the more uncertain the relation between
> effectiveness of performance on the task (quality,
> quantity, speed) and the outcome of that performance
> (desired change in the situation), the more stressful
> the situation... (1976, p. 1376)

This leads us into our discussion of Technology in that authors such

as Thompson (1967, p. 14) have indicated that organizations operate on

the basis of "technical rationality", which has a direct bearing upon the

uncertainty of relationship between task performance and outcome.

"technical rationality" was defined as the degree to which certainn

activities as dictated by man's beliefs could be judged to produce a

desired outcome. Thompson suggested that to the extent technologies

were instrumentally perfect (i.e., had high technical rationality), this

would inevitably result in attaining the desired outcomes. Thompson

however, qualified this by saying that it was also necessary to have the

power to control the "empirical resources" involved in producing the

desired outcome (p. 18). Referring to "technical rationality" as a
closed system of logic, Thompson indicated that a correspondingly closed
system of action (i.e., control over resources) would result in instru-
mental perfection in reality. Such a closed system of action would enable
an organization to buffer its technological processes from disturbing
influences and eliminate much of the uncertainty associated with the,
intended outcomes.

Thompson went on to describe three technological varieties which
could be extended to cover the various types of technology found in
complex organizations (p.p. 14-18). Each reflected different approaches
to the transformation process, suggestive of variations in human behaviour.
A "long-linked" technology was described as involving serial interdepen-
dance in that "act Z" could only be performed after successful comple-
tion of "act Y", which in turn depends on "act X" and so on. This is
exemplified by the mass production assembly line wherein only one
standard product is repetitively produced and at a constant rate. Under
these conditions, the criteria with regard to human behavior is clear-
cut regarding the construction of work-flow arrangements and selection
of human operators. Repetition, furthermore, enhances human skills in
performing the tasks assigned. A "mediating" technology referred to
organizations which were primarily concerned with linking customers to
clients who were or wished to be interdependant. Under these conditions,
technology required standardized operations on an extensive basis with
multiple clients distributed over time and space. Thus while there may
be.variation regarding the needs and circumstances of clients, human
behavior remains standardized and therefore predictable. An "intensive"
technology referred to situations where a variety of techniques are

employed in the transformation process. The selection, combination and order of application, however is determined by feedback from the object being transformed. Human behavior under these conditions would be standardized and predictable with regard to the individual technique. However, a searching behavior is implied in determining the precise order and application of echniques required for the transformation.

While Thompson did not refer specifically to stresses associated with systems of human behavior, the inferences are obvious given the controls implied by "technical rationality" over resources and activities in achieving desired outcomes. "Technical rationality" presumes that knowledge of cause and effect relationships exists such that tasks and appropriate role behavior may be known; and techniques are available which if undertaken properly will produce the desired outcome. Furthermore, "control of empirical resources" implies that suitable tools and equipment, materials and trained personnel may be repectively designed, controlled and arranged so as to produce the desired outcome. In relating this to the concepts of stress examined earlier, this would suggest that aspects of technology may well play an important role in determining the stress levels of organization members because of inherent uncertainties associated with different types of technology.

The concept of "technical rationality" is not unique to Thompson in that several authors, principally Woodward (1965) and Perrrow (1965, 1967, 1970) have included similar notions in their conceptualization of Technology. From her examination of industrial organizations, Woodward (1965, p. 42) was able to discern two dimensions of technology from which to identify modes of production.

These were namely, the tools, instruments, machines, and technical formulae basic to performance;.and the body of ideas which expresses the goals of the work and the rationale for the methods employed, the latter being similar to Thompson's "technical rationality". Woodward suggested that organizations could be categorized according to type, size and complexity, for which she constructed a continuum reflecting technological complexity. The continuum ranged from its simplest form, "production of units to customer's requirements", to the most complex, ."continuous flow production". It can be noted however, that this did not suggest varying degrees of technological improvement as opposed to historical development. It was indicated by Woodward that this continuum was also indicative of the degree to which control could be exercised over the production process. In a later work, Woodward (1970,p.p.13-18) included concepts of variety and change in production in her construction of technology. In addition, she introduced the notion of "production task" which was the type, quantity and quality of the goods to be produced and the effect of rates of production.

Perrow (1965, p.p. 910-971; 1967; p.p. 195-197; 1970 p.p. 50-91), in developing a technological framework for analyzing human service organizations has described technology as a continuum consisting of two dimensions, namely the nature of raw materials and the nature of the technique for transforming raw materials. Perrow suggested that depending on the properties of the raw materials and techniques employed in the transformation-process, organizations could be differentiated

according to the degree of routiness of work performed. Perrow defined

raw materials as being a living being, a symbol, or an inanimate object

on which an action was being performed. For an act to be classed as a

technique, it must be shown to have a cause and effect relationship with

the raw material from which feedback is possible in order to assess the

consequences of the act. In addition techniques should demonstrate

reliability and be communicable in order that others may successfully

learn and apply the technique. It can be noted that Perrow's concept of

technique closely resembles Thompson's concept of "technical rationality"

(1967, p. 14) in that they reflect beliefs regarding cause and effect

relationships which may be confirmed by changes in the condition of the

raw material. Perrow suggested that for work to be considered routine,

it must be comprised of well established and reliable techniques and

that they must be applied to raw materials that are similar in nature

(at least for the purposes of transformation). Under these conditions

work would be routine in that tasks and their outcome would be known and

there would be little variety in the tasks performed. Conversely, where

there were few well-established techniques and little similarity regarding

raw materials, the work could be expected to be non-routine in nature.

In this situation, there would be little certainty regarding tasks and

their outcome, and secondly, tasks would be expected to vary according to

the individual needs and properties of raw materials. Perrow indicated

that properties associated with the two dimensions operated in stimulus-

response fashion to set in motion the activities of workers in a routine

or non-routine manner. The stimuli was conceived to be the raw

materials and the response was conceived of as "search behavior". Perrow

indicated that where the raw materials were familiar, search behavior

could be quite routine and analysable; however, if raw materials were unfamiliar, search behavior would be non-routine and called for "unanalysable search procedures". Perrow went on to suggest that the degree to which search procedures were analysable in combination with a second dimension namely, the degree of variability of raw materials (which he termed "exception") could serve to identify ideal types of technology. These he labelled craft, non-routine, routine and engineering.

In applying this framework to people-changing organizations, Perrow emphasized the role of the nature of raw materials in differentiating technology. The characteristics of raw materials described were the degree to which raw materials were not understood (corresponds to search behavior) and the degree to which raw materials were uniform and stable (corresponds to variability or exceptions). Perrow suggested that where raw materials were understood, search behavior was analysable and techniques could be applied or at least developed to accomplish the desired outcome. Where raw materials were not understood, search behavior was unanalysable, and outcomes would be unpredictable in terms of the techniques applied if any. Where raw materials are uniform and stable, it is implied that exceptions are few and therefore similar standardized techniques and procedures could be applied. Where raw materials are variable and unstable, the exceptions are many and techniques and procedures will vary and be subject to continual readjustment. In terms of the degree of routiness then, activities could be expected to be non-routine where raw materials were not understood, non-uniform and unstable, and routine where raw materials were understood, uniform and stable.

In keeping with Perrow's concept of routine and non-routine technology,

Hasenfeld and English (1974, p. 279 - 282) have suggested that human

service organizations could be categorized as having indeterminant

technologies. Because of the distinct nature of the raw materials

worked upon, human service organizations are separate from all other

organizations. Not only is the choice and use of technologies limited

by the value orientations of the client (i.e. imbedded social values)

but by the highly variable and unstable nature of the client himself.

This was a contributing factor to the indeterminancy of technology

because of the problems it posed for the formulation of valid and

reliable practice principles. Finally, Hasenfeld and English indicated

that clients were self-activating and thus capable of neutralizing the

intended effect of techniques in changing attributes. Human service

organizations therefore had the additional problem of controlling

clients in order to succeed in their task. As a consequence, Hasenfeld

and English suggested that:

> ...organizations mandated to assess and change human behavior
> (e.g. mental hospitals, schools, correctional institutions)
> are characterized by indeterminant technologies which are
> incomplete, of limited reliability and validity, and occasionally
> even self-contradictory. The staff in these organizations must
> perform in a state of uncertainty, lacking adequate knowledge
> about what techniques to employ and when, and whether these
> techniques will in fact produce the desired outcome....(p.280)

With specific reference to hospitals as the organization of study,

Overton, Schneck and Hazlett (1977) attempted to develop measures of

technology which could be applied to nursing subunits. Drawing

principally from the work of Perrow (1967, p.p 195-196), Hickson et. al.

(1969, p.p. 380-381) and Thompson (1967, p. 15), their analysis indicated

that nursing subunit specialties could be differentiated according to

three technological dimensions or variables which correspond to those

suggested earlier by Perrow (1970, p.78). These were identified as Uncertainty, Instability, and Variability. Uncertainty related to the degree patients were not understood, since they presented complex problems involving unanalysable search behavior, job stress, discretionary skills and dependence upon patient feedback for treatment. Instability related to the degree of instability in patients as indicated by emergencies, use of technical skills and equipment, time pressures, and job stress. Variability referred to the degree patients presented different health problems that required individualized treatment; patients involved in planning their care , and decisions which were nonrepetitive (Overton et. al., p.p. 209-210). In discussing the findings, the authors suggested that raw materials and the types of techniques employed formed a stimulus-response set for individual nurses much in keeping with Perrow's concepts of Technology. The authors were also able to observe differences in nursing techniques in each factor corresponding to three aspects of nursing practice as described by Mauksch (1966). Care practices, for example, fell within the Uncertainty factor, since tasks were primarily concerned with independent nursing functions, and meeting patients' socio-psychological needs. Instability reflected cure practices, since technical assistance to physicians and treating physiological problems were emphasized. Coordinating responsibilities were identified within the Variability factor, although in a less clear-cut manner (Overton et. al., p. 214).

In applying their analytical framework to a sample of 71 subunits, the authors found that nursing unit specialties ordered differently according to all three factors. Furthermore, it was found that those which ordered highly could be considered to have relatively indeterminant

technologies, this being comparable to the description provided earlier by Hasenfeld and English (1974, p. 280).

Thus, nursing sub-units such as psychiatry and intensive care units which ordered high on Uncertainty, were considered to have indeterminant technologies since they exhibited unanalysable search behavior indicating the absence of known cause and effect and therefore predictability of outcome. Similarly, sub-units ordering high on Instability, such as intensive care and surgery were considered to have indeterminate technologies, in that instability in patients' physiological condition invokes constant monitoring and adjustment to treatment, thus reducing the reliability of predicting outcomes. Sub-units ordering high on Variability, such as Psychiatric units were also considered to have indeterminate technologies because of the variety of problems presented and the implications this has for individualized exception routines and the explicitness of intended courses of action (Overton, et. al. p. 215).

For the purposes of this study, we will essentially rely on the concepts developed by Overton et. al. in measuring Technology. This has been undertaken for two reasons. Firstly, the concepts primarily reflect contingencies which are a direct consequence of the level of knowledge brought to bear on technological processes. This is compatible with our approach in treating stress primarily as a socio-psychological phenomenon. Secondly, the concepts developed pertain to nursing subunits which is also the area of study for the current investigation. This then completes our discussion of technology. In the next portion our objective will be to link technology with the concepts of stress derived earlier.

Technology and Stress

In attempting to relate technology to stress, it must be stated at the outset that such efforts can only be viewed as exploratory in nature. Because of the relative absence of literature and research linking technology and stress (at least to the knowledge of the author) the following exercise should only be construed as an attempt at out-lining the various ways in which technology may influence stress. Throughout our discussion, technology will be viewed as the predictor or causal variable and stress the criterion or outcome variable.

It should be apparent from our examination of stress and technology respectively that common to both has been the notion of uncertainty, or rather indeterminancy. In general terms, uncertainty regarding cause and effect may be thought of as contributing not only to the manner in which the transformation process is undertaken (technology), but also, to the level of stress incurred by organization members. Both may therefore be viewed essentially as reactions or outcomes to the level of knowledge available regarding the transformation activities of the organization. This perhaps relates closest to Thompson's concept of "technical rationality" which was defined as the degree to which certain activities as dictated by man's beliefs and his ability to control the empirical resources could be judged to produce desired outcomes. Viewed in this manner, stress may be considered the behavioral outcome of an organization's ability or rather inability to assign technical rationality to the transformation process. In other words, the greater the degree of technical rationality, the less stress experienced by organization members. This will provide the basic premise from which we will examine for the effects of technology on stress incorporating the concepts

discussed earlier.

Uncertainty and Stress

Uncertainty, as used in this study refers to the degree to which there is insufficient knowledge regarding raw materials, and lack of predictability of techniques. Under conditions of Uncertainty, we can expect that individuals would experience stress as the result of task ambiguity regarding not only how the task is to be performed, but how successful performance on the task will be in relation to the intended outcome. Furthermore, since it can be expected that tasks will be undertaken within an organizational setting, uncertainty can be expected to introduce ambiguities to the role responsibilities of the organization's members, resulting in stress as well (i.e., who is to perform the task). The stress incurred may therefore be composed of both Task-based and Role-based stress: the essential criterion being ambiguity.

Instability and Stress

Instability refers to the degree to which there are fluctuations within raw materials and within the techniques in terms of their probable success. Under conditions of Instability, individuals can be expected to constantly alter task requirements to the varying needs of raw materials on an unplanned basis. Task requirements cannot be standardized or controlled and thus results in increased difficulty and overload. Standardization implies that tasks may be established within the general acceptable limits of human skills and abilities. This is undertaken to ensure that tasks may be replicated by more than one person on a consistent basis. To the extent that such tasks cannot be controlled through standardization because of exceptions, this may result in task

difficulty or the imposition of additional tasks. The stress incurred would therefore be the result of Task-based stress, the essential criterion being dfficulty and/or overload.

Variability and Stress

Variability refers to the degree to which there are variations between raw materials and diversities in techniques which can be success- fully applied. Under conditions of variability, individuals can be expected to undertake a greater range of tasks in responding to varying requirements of raw materials. Tasks cannot be standardized due the diversity in techniques which must be administered on an exception basis. Similar to conditions of Instability, this results in task difficulty and possibly overload in that depending on the variation, more techniques must be mastered and applied on a varying basis in accordance with individualized needs. The stress incurred would therefore be the result of Task-based stress, the essential criterion being difficulty and/or overload.

Nursing Subunits and Nursing Education

The organizational unit chosen for the purposes of this study was nursing subunit specialties within hospitals. This unit was suggested by the study undertaken by Overton et. al. (1977) wherein significant variation was observed across nursing subunits according to similar technology variables employed in the current research. By using nursing subunits, this enhanced our ability to examine for the effects of technology on stress, in the knowledge that they would be expected to exhibit significant differences according to similar measures.

In addition, it was decided to examine for the effects of nursing

education upon technology and stress, and any relationships observed between the two. Nursing education was employed to provide an independent measure from which to assess the construct validity of the technological variables, and to assist in the interpretation of findings. Nursing education has been suggested as a valid measure in differentiating between the work efforts of professional and auxiliary nursing staff. Members. in the latter category perform a supportive role to professional nurses, and as a result, their activities would be considerably mo   utine and less oriented to the practice of medicine. Under these ir stances, the technology would be considered to be more determinate, with procedures generally standardized, predictable and non-varying. Typically, activities have included providing personal care and attention, support services, etc.. Given the differences in tasks and objectives, it was expected that auxiliary staff would observe less Uncertainty, Instability, and Variability, and consequently experience a lower level of stress.

CHAPTER II

METHODOLOGY

Statement of the Problem

The purpose of the study was to determine if stress experienced by nursing staff could be attributed to various dimensions of Technology. In addition, the study sought to determine whether such relationships held constant across professional and auxiliary nursing staff. Finally, nursing subunits were examined for the effects of Technology on Stress across the various nursing specialties.

SAMPLE

The data and measurement tools utilized in this study are taken from a larger study by P. Overton and R. Schneck[1], which surveyed nursing staff, head nurses and nursing administrators in nine types of nursingg subunits found in hospitals. Hospitals surveyed in the study were from the Province of Alberta. Initially, thirty-five (35) hospitals were selected to participate on the basis of size. This included twelve (12) hospitals with one hundred (100) beds or less, thirteen (13) hospitals with one hundred and one (101) to four hundred (400) beds, and ten hospitals with more than four hundred (400) beds. Selection was based on the number of nursing subunits afforded by each and the hospital location with respect to travelling time available to the

researchers. Of the original thirty-five (35) hospitals selected, only twenty-nine (29) hospitals agreed to participate. This number however was further reduced to twenty-four (24) in response to the possibility of strike action by nursing personnel during the data collection period. The final tally yielded ten (10) hospitals with one hundred (100) or fewer beds, twelve (12) hospitals with one hundred and one (101) to four hundred (400) beds and two (2) with more than four hundred (400) beds.

While the original research supporting this study surveyed nursing personnel at various levels within each hospital, our efforts concentrated on nursing staff in the various nursing subunits. The other levels referred to head nurses, and nursing administrators. Responses from nursing staff numbered one thousand two hundred sixty-five (1,265) covering one hundred fifty-seven (157) nursing subunits. Questions posed to staff related to concepts of Technology, Structure, Process, Cohesion, Job Satisfaction and Stress. The full Nursing Staff Questionnaire is found in Appendix A. Respondents were also asked to provide data including age, sex, nursing education, and work experience in their nursing speciality. There were thirty-six (36) unclassified responses which prompted their removal from further analysis. The unit of analysis employed in the study was the individual nursing staff member.

Nursing Subunits

For the purposes of this study we have adopted the definition for nursing subunits as applied by the authors of the original study:

> "...A nursing unit is delineated as a geographic in-patient area of a hospital having an assigned number of beds, its own regular complement of nursing staff with a shared goal(s), a formal hierarchical structure, and arrangements for getting work done; that is it is considered a bounded administrative and social unit. Also, within each unit there is a relatively

stable pattern of activity and a continuity of action which
are independent of its particular members in a given time
period. A nursing unit is seen as comprising a varying mix
of levels of nursing staff which could include head nurses,
assistant head nurses, registered psychiatric nurses, certified
nursing aides, nursing orderlies, and nursing assistants...."
                    (Overton, Schneck, Hazlett, 1977)

The nursing subunits examined in the study reflected those employed

by hospitals in dispensing health care to the various segments of the

in-patient population. The types of nursing subunits chosen were

those which were considered to be relatively distinct technologically

and secondly were sufficiently large to support adequate sample sizes.

The following is a description of the types included in the study:

1) Pediatric units (Ped): comprised of children under the age

   of sixteen years with general medical-surgical disorders;

2) Obstetrics units (Obs): comprised of both anti- and post-

   partum patients but not including delivery room and nurseries;

3) Rehabilitation units (Rehab): comprised of adult patients

   with primarily physical disabilities requiring an active

   rehabilitation programme;

4) Intensive Care units (ICU): comprised of patients with a

   variety of diagnosis admitted for "general" intensive care,

   and/or comprised of patients with one specific disease

   requiring "specialized" care;

5) Auxiliary units (Aux): comprised of patients requiring long-

   care, including the chronically disabled and aged;

6) Psychiatry units (Psych): comprised of adult patients requiring

   active psychiatric treatment;

7) Surgical units (Surg): comprised of adult patients admitted

for general surgical procedures, but not for specialized surgery such as cardiac surgery, neurosurgery, orthopedic or ear, nose, throat and eye surgery.

8) __Medicine units (Med)__: comprised of adult patients requiring treatment for general medical/surgery disorders;

9) __Rural units (Rural)__: comprised of a variety of patients according to age group who are treated for a variety of disorders which do not require the specialty care provided by larger urban hospitals.

Level of Nursing Education

In addition, a further breakdown was undertaken, separating staff into professional and auxilairy nursing staff. Although this procedure created two control goupings, this did not alter the level of analysis.

Professional and auxiliary designations were assigned on the basis of the nursing education of staff. This was derived form demographic data provided by each respondent. (See Table 1.) It should be noted that only nursing staff responses were analyzed. Head nurses and other supervisory and administrative staff were excluded from the analysis. The breakdown yielded eight hundred and nine (809) professional staff and four hundred and thirty two (432) auxiliary staff.

Table 1

Nursing Education of Nursing Staff

Professional Designation

Master's degree	(01)	3
Bachelor's degree	(02)	53
R.N. diploma	(03)	682
R.P.N. diploma	(04)	32
Diploma: teaching & supervisory	(08)	1
Nursing unit administration	(09)	2
Other	(10)	36
Total professional staff		809

Auxiliary Designation

C.N.A. certificate	(05)	340
Nursing orderly certificate	(06)	69
On the job (ward aides)	(07)	23
Total auxiliary staff		432

Grand total — 1241*

*24 cases excluded due to missing or non valid values

Pretesting

The Nursing Staff Questionnaire was pretested along with other survey documents by at least twenty (20) nursing personnel, including administrators, head nurses, and subunit staff. Following the pretest, it was necessary to make minor modifications to the phraseology, and the style in which the questionnaire items were posed principally to improve comprehension (see Appendix A).

Questionnaire items were measured employing Likert scales except Stress questionnaire items which measured the combined effects of the level of intensity and the frequency of occurence of the stress encountered. Stress items composite scores were produced by multiplying intensity and frequency values. The value "zero" was assigned as "never" in order to nullify the effect of such occurences upon statistical solutions employed in the study. Composite scores therefore ranged from 0 to 20.

Selection of Respondents

Only a representative sample of nursing staff from the selected subunits was sought for the purposes of the study. Limited resources precluded canvassing of the entire nursing population open to the study. Questionnaires were completed by nurses on duty during the time of data collection. It was assumed that the staffing pattern was representative of those of other days, and did not reflect a bias to any particular group or segment of the nursing population. The types of nursing staff included were representative of the proportion of professional nursing staff to other categories of nursing staff including nursing aides, orderlies and attendants. In addition, an attempt was made to obtain at least 50% of the responses from permanently assigned subunit

nursing staff, ᵔfessional and otherwise to ensure proper reflection of the characteristics and nuances of the various subunits. It was thought staff assigned on a temporary or casual basis would not be sufficiently imbedded in the subunit organization to knowledgeably complete the questionnaire.

Data Collection

The data was collected during a six week span in May and June 1977 by research assistants. All questionnaires directed at the various levels of nursing personnel were completed during this time. Data collection procedures included interviews with nursing administrators to obtain general information regarding subunits selected for the study. Extensive explanatory sessions were provided to each group of respondents, including a short presentation describing the study and the concepts under investigation (45 to 60 minutes). Following this, nursing staff were asked to complete the questionnaire with the researcher in attendance to provide clarification as to the questions posed. The time span generally required to complete the quesitonnaire ranged from 20 to 30 minutes.

Operationalization and Measurement of Concepts of Technology

Operational definitions which provided the basis for this study were drawn from the work of Overton and Schneck (1976). Technology was defined in terms of the actions an individual performs on an object, living or otherwise, with or without the aid of tools or mechanical devices in order to bring about changes in raw materials. Technology, therefore, included the basic characteristics of raw materials, the

knowledge or body of ideas behind actions, and the rationale for methods employed (Perrow, 1967). For nursing subunits, raw materials were considered to be patients admitted to each nursing unit.

Uncertainty

Uncertainty was defined as the degree to which there was insufficient knowledge about the nature of raw materials and about the lack of probability of success of techniques (Overton et. al., 1977; Perrow, 1967). Operationally, this included the number of patients with many diagnoses, who presented complex nursing problems; the degree to which nursing techniques were complex, relied on nurses' intuition and feedback from patients' conditions and moods (Kovner, 1966; Overton et. al., 1977).

Instability

Instability is defined as the degree to which there are fluctuations within raw materials and within the techniques in terms of their probable success (Overton et. al., 1977; Perrow, 1967). Operationally this was measured by the number of patients whose physiological conditions fluctuated, requiring frequent nursing observation and attendance; the number of emergencies; and of the degree to which the nursing technique consisted of monitoring physiological instabilities (Kovner, 1966; Overton et. al., 1977).

Variability

Variability is defined as the degree to which there are variations between raw materials and diversities in techniques which can be successfully applied (Overton et. al., 1977; Perrow, 1967). Operationally this

included the number of patients who presented a wide variety of health problems and the degree to which nursing techniques were varied for each patient (Kovner, 1966; Overton et. al., 1977).

Measurement scales were developed by subjecting the respondents' scores on the technology items (see Appendix A questionnaire items #1 - #21) to factor analysis. This was undertaken to determine whether the questionnaire did indeed measure what it was designed to measure, and secondly to take advantage of the dimension-reducing facilities of factor analysis.

Each battery of item scores was subjected to a series of principal component factor analyses with an optimal solution being chosen on the basis of ease of interpretation and the amount of Variance Accounted For. An orthogonal solution was developed for each concept in order to provide independent factor variables. Although an effort was made to hold the minimum eigenvalue at 1.00 it was not possible for the fourth factor which was slightly less (.98070). Factor analysis of the twenty-one (21) questionnaire items relating to Technology produced a four (4) factor orthogonal solution using Varimax rotation. This accounted for 56.4% of the total variance. In arriving at this solution it was necessary to eliminate items #11, #18, #19, and #20 due to low communalities. It should be noted that these items were eliminated prior to undertaking the final solution. The solution is provided in Table 2. The four factors would appear to simulate the measurements as intended by the authors of the original study, except that the Uncertainty variable has been further delineated. Interpretation of the factors is provided below.

Factor Analysis - Technology Items

Table 2

Item	Label	Factor 1	Factor 2	Factor 3	Factor 4
# 1	Nursing Observation	.50966	.07871	-.04102	.40994
# 2	Similar Health Problems	-.21346	-.01495	.72680	-.13290
# 3	Health History	.12873	.08991	-.08969	.78506
# 4	Problems not understood	.15299	.19370	.09314	.68258
# 5	Technical Procedures	.65034	.07971	-.00034	.21857
# 6	Technical Equipment	.82464	.01251	-.06231	.12146
# 7	Intravenous Transfusion	.81832	-.04999	-.05342	-.04137
# 8	Time Pressure	.73623	.11516	-.06249	.25779
# 9	Skillful Work	.41312	.35765	-.04096	.36838
# 10	Analyse Complex Problems	.39043	.49948	.05696	.45613
# 12	Socio-Psychological Needs	-.21563	.72113	-.03847	.18255
# 13	Nurses' Intuition	.06992	.75001	-.07853	.12829
# 14	Similar Procedures	-.04421	-.02998	.86141	.02253
# 15	Repetitive Decisions	.07969	-.00343	.76776	.09595
# 16	Specialty Difficult to Learn	.46346	.45118	-.01961	-.01210
# 17	Patients Moods/Conditions	.26546	.66657	.06433	.06706
# 21	Many Emergencies	.59668	.17060	.06377	.09492
	VARIANCE ACCOUNTED FOR	21.67%	13.01%	11.23%	10.65%

Note: Underline indicates greatest loading

Factor 1: "Instability"

While there is apparently some variation from the original items intended to measure instability, the overall thrust remains relatively unchanged. As a dimension of Technology, it continues to measure raw materials on the basis of fluctuations in the patients' physiological conditions. Furthermore, technique continue to be related to the use of technical equipment and procedures in monitoring physiological conditions.

The search behavior implied by the items measured (i.e., technical tests and procedures) would suggest that while it may be logical and analysable, continual monitoring and adjustment to treatment constitutes an important part of the transformation process. Measurements supporting this include the need for skillful work and initiative by nursing staff, time pressure to provide treatment, the number of emergencies and the need to provide continual observation. This variable was labelled "Instability". Items with the greatest loadings are as follows:

#1 In your estimation, what percentage of patients on your unit needs nursing observation more often than once every hour?

#5 What percentage of the nurses' work involves performing technical procedures and special tests?

#6 What percentage of patients require the use of technical equipment (i.e., suctions, cardiac monitors, respirators, etc.)?

#7 What percentage of the patients on your unit on an average day require an intravenous transfusion?

#8 On some units there is greater pressure to give nursing care quickly because of patients' critical conditions. What percentage of the time is there a greater time pressure on your units?

#9 What percentage of the time does improvement in patients' conditions really have to depend upon the skillful work and initiative of the nursing personnel?

#10   What percentage of your work requires the analysis of complex problems?

#16   What percentage of new nurses starting work on your unit would find the nursing care specialty difficult to learn?

#21   On this unit, there are many emergencies when immediate nursing action must be taken in response to changes in patients' condition.

Factor 2:   "Uncertainty of Treatment"

The "Uncertainty" dimension as originally conceived was comprised of the degree to which raw materials were understood, and the degree to which probability for success of techniques could be measured. However, from the items measured, it would appear t. . those concepts have separated. The second factor distinguishes the lack of predictable techniques and procedures to the extent that nursing staff rely upon intuition and feedback as to the patients' conditions and moods to direct care. Moreover, activities appear directed at meeting patients' socio-psychological needs. This suggests that as uncertainty over nursing procedure increases, the more nursing care is directed towards the socio-psychological needs of patients. This factor was labelled "Uncertainty of Treatment". Items with the greatest loadings are as follows:

#9   What percentage of the time does improvement in patients' condition really have to depend upon the skillful work and initiative of nursing personnel?

#10   What percentage of your work requires the analysis of complex problems?

#12   What percentage of the nursing care on your unit is directed at meeting patients' socio-psychological needs? (as opposed to physical needs?)

#13   What percentage of the nursing care given relies upon nurses' intuition rather than a set procedure or routine?

#16   What percentage of new nurses on your unit would find the nursing care specialty difficult to learn?

#17 What percentage of your work changes in direct response to
changes in patients' conditions or moods?

Factor 3: "Variability"

In examining the items included in this factor, there is no

variance from the original items intended. Measurement relates to the

variability of patients' health problems, and treatment provided.

From this it can be further implied that the search behavior and the

corresponding procedures are individualized in response to the unique

problems of patients. This is supported by the non-repetitive nature of

decision-making by nursing staff. This factor was labelled "Variability".

Items with the greatest loadings are as follows:

#2 What percentage of the patients would you say have similar
health problems (or diagnosis)?

#14 What percentage of the nursing care procedures are similar
for most of the patients on your unit?

#15 What percentage of the decisions made by nurses during their
work are repetitive from one day to the next?

Factor 4: "Uncertainty of Patients' Problems"

As indicated earlier, the original "Uncertainty" variable separated

into two separate and independent factor variables. The fourth factor

appears to measure the degree to which patients' problems are well under-

stood. This is supported by the need to know the complete medical

history of patients in order to derive a medical explanation. Consis-

tent with this, the work of nursing staff involves the analysis of

complex problems, and skill and initiative in bringing about an improve-

ment in patients' conditions. In addition, reliance upon frequent obser-

vation by nurses would suggest that this is an integral part of the

search behavior in analysing health problems. This factor was labelled

Uncertainty of Patients' Problems. Items with the greatest loadings are

as follows:

> #3 For some patients more than others it is important to know
> complete details of their previous health history. For what
> percentage of the patients on your unit is it critical that
> the nurse know detailed history from birth to present time?
>
> #4 What percentage of the patients on your unit have complex
> problems that are not well understood?
>
> #9 What percentage of the time does improvement in patients'
> conditions really have to depend upon the skillful work and
> initiative of nursing personnel?
>
> #10 What percentage of your work requires the analysis of complex
> problems?

While the questionnaire was originally designed to measure the

technology variable of "Uncertainty", "Instability", and "Variability",

following factor analysis it would seem that some displacement has

occurred from what was originally intended. Although "Instabi ty

and "Variability" remain relatively intact, the "Uncertainty" variable

has been replaced by independent measurements of treatment uncertainty,

and uncertainty regarding patients' health problems. This change is

significant since it appears to introduce a characteristic unique to

human service organizations, particularly hospitals and other medical

agencies. Originally it was conceived that where raw materials were

well understood, this would result in better control and greater

efficiency in the technique applied. In other words, a one-to-one

correspondence existed between raw materials and techniques on the scale

of uncertainty. While this may be true of many organizations, it is

questionable whether this applies to organizations where functions and

activities reflect on ideological rather than technical rationale. Thus

while hospitals may be uncertain as to a patient's problem they are none-

theless compelled to provide treatment, or at least assume responsi-
bility for treatment. Conversely, knowledge of a patient's problem,
does not imply that corrective treatment exists, since this may be
beyond the current state of the art. Such organizations normally do
not exist in the private sector since successful transformation and
the existence of technology is a necessary prerequisite for survival.
Results of the analysis would seem to suggest that hospitals premise
as much of their activities upon an ideological base as they do
technically, as brought out by the independent nature of these two
variables.

Operationalization and Measurement of Concepts of Stress

Operationally, stress was defined as the degree to which a
situation or set of conditions is perceived as having stress in it
(McGrath, 1976), determined by the degree to which nurses perceived
work situations as str sfui in relation to external groups, patients
and nursing techniques (Spooner, 1977).

Respondents' scores to the stress items (see Appendix A) were
subjected to factor analysis in a manner identical to the analysis of
the technology items. Factor analysis of the twenty-one (21) quest-
ionnaire items relating to stress produced a five (5) factor orthogonal
solution with a minimum eigenvalue of 1.00, using varimax rotation.
This accounted for 57.2% of the total variance. In arriving at this
solution, it was necessary to eliminate items #69, #71, and #79 due to
low communalities which were eliminated prior to the final solution
(See Table 3). Interpretation of the factors is provided below, along
with a description of the related questionnaire items.

Factor Analysis - Stress Items

Table 3

Item	Label	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
#67	Insufficient Resources	.24645	.57543	.26454	-.06820	-.04254
#68	Conflicting Demands	.26291	.50697	.37067	-.08496	.05428
#70	Personality Conflicts	-.06718	.55968	.13796	.18321	.20545
#72	Impatient Physicians	.16883	.24758	.64266	.11839	-.18682
#73	Unavailable Physicians	.05799	.14139	.75729	.09652	.16315
#74	Physicians Communications	.14406	.12983	.78708	.05035	.16241
#75	Troublesome Patients' Behavior	.13668	.08528	.22290	.10593	.73440
#76	Very Ill Patients	.77549	.06138	.07364	-.00819	.23750
#77	Elderly Patients	.22264	.24828	-.05731	-.09163	.67197
#78	Painful Treatment	.77785	.06244	.11736	.09741	-.03229
#80	Upset Families	.61313	.16272	.27001	.02799	.13559
#81	Unpredicable Scheduling	.07763	.72659	.08572	.15116	.00813
#82	Heavy Workload	.26224	.71473	.03040	-.05880	.20261
#83	Death and Dying	.76530	.16722	.01034	-.06135	.19234
#84	Unfinished work	.18775	.49392	.15814	.29106	.20343
#85	Crisis Situations	.54951	.30279	.09562	.19480	-.03106
#86	Relief - Same Specialty	.04098	.09670	.02726	.80229	.17801
#87	Relief - Different Specialty	.06687	.08788	.14164	.78516	-.17622
	VARIANCE ACCOUNTED FOR	15.78%	14.00%	11.34%	8.90%	7.69%

Note: Underline indicates greatest loading

Factor 1: "Patient Stress"

From the items measured it is apparent that the patient is a potential source of stress for nursing staff. However, upon further analysis it would appear that measurement consists of two separate dimensions. These have been called the nursing component and the psycho-emotional component.

The nursing component consists of the degree to which a medical condition relating to a patient is perceived as being stressful. Stress results to the extent that a medical condition is perceived as establishing a constraint or barrier to the transformation process, in this case restoring health. The ability to respond to the condition imposed is therefore assessed in terms of the medical proficiency of nursing staff and the resources made available. Thus stress is generated due to very ill patients with poor prognosis, and crisis situations which are not considered part of the normal work.

The psycho-emotional component consists of the degree to which concern for the patients' psychological and emotional needs are perceived as a constraint or a barrier to the delivery of health care. The ability to respond to patients is therefore assessed in terms of the psychological makeup of nursing staff and their ability to cope with the needs of the patients and the nursing duties involved. Thus stress is encountered when painful but life giving treatment is administered or when staff are exposed to suffering, death and dying. Item #80, (anxious family members) may reflect aspects of both components in that the activities of family members must not only be controlled for and co-ordinated by nursing staff, but their emotional needs must be catered to as well.

This Factor was labelled "Patient Stress". Items with the greatest loadings are as follows:

#76 How stressful is it if a patient is very ill and his prognosis is poor?

#78 How stressful is it if nursing staff must perform painful but life-preserving treatment for patients?

#80 How stressful is it if a patient's family is upset or anxious about one of their members?

#83 How stressful is it if the nursing staff is exposed repetitively to suffering, death and dying?

#85 How stressful is it if the nursing staff are frequently faced with crisis situations which are not considered normal work?

Factor 2: "Environment Stress"

From the arrangement of stress items in the solution, it would appear that the internal working environment of the nursing subunit is described as a source of stress. Each of the items measured would appear to identify working conditions found within each station. Conflicting demands, heavy workload, insufficient resources, personality conflicts, irregular scheduling impose stress to the extent that they may be considered barriers to performing nursing functions, or impose demands outside the formal role responsibilities of staff, (i.e., interpersonal conflicts, personal and leisure activities etc.). This factor was labelled "Environment Stress". Items with the greatest loadings are as follows:

#67 How stressful is it if nursing staff have insufficient resources to do all the things that should be done?

#68 How stressful is it if nursing staff are unable to satisfy the conflicting demands of various people (i.e., patients, physicians, other para-medical staff, etc.)?

#70 How stressful is it if there are personality conflict among nursing staff members?

#81   How stressful is it if scheduling and staffing are unpredictable
      or there are irregularities in the way time-off is scheduled?

#82   How stressful is it if the workload is so consistently heavy
      that the nursing staff lack energy for leisure activities?

#84   How stressful is it if the previous shift leaves unfinished
      work that should have been handled during their shift?

Factor 3: "Physician Stress"

From the items measured it is apparent that the physician is identi-
fied as a source of stress. Because of the central role played by

physicians in directing treatment and establishing performance standards,

stress occurs to the extent that demands are excessive, or direction is

vague or not forthcoming, such as when a physician is unavailable. This

factor was labelled "Physician Stress". Items with the greatest loadings

are as follows:

#68   How stressful is it if nursing staff are unable to satisfy the
      conflicting demands of various people (i.e., patients, physicians,
      other para-medical staff, etc.)?

#72   How stressful is it if physicians appear impatient with or
      hypercritical of nursing staff?

#73   How stressful is it if physicians are not available when they
      are wanted?

#74   How stressful is it if physicians do not communicate well with
      nursing staff?

Factor 4: "Relief Duty Stress"

From the items measured it would appear that performing relief duty

on other units is identified as a separate source of stress. Stress may

result from lack of familiarity with other staff as well as different

operating rules and procedures. In addition, stress may also result from

the irregular and often double-duty nature of relief assignments (i.e.,

in addition to regular shift). This factor was therefore labelled

"Relief-Duty Stress ".

#86 How stressful is it if nursing staff are asked to relieve on other units of the same specialty?

#87 How stressful is it if nursing staff are asked to relieve on other units of a different specialty?

Factor 5: "Patient Behavior Stress

From the items measured it would appear that the patient's behavior on the nursing floor is identified as the source of stress. While the types of the behavior included may be numerous, ranging from nuisance types of behavior to active resistance to treatment, they all serve to impede if not treatment, then at least the performance of nursing duties. It is possible that elderly patients were included in this category, due to problems inherent with senility, such as loss of basic life skills and difficulty in communicating. These may as well impose additional demand on nursing staff outside the normal rigors of nursing activities. The common denominator however, is that the patient's behavior and not his condition impedes the delivery of nursing care. This factor was labelled "Patient Behavior Stress". Items with the greatest loadings are as follows:

#75 How stressful is it if a patient's behavior or personality is troublesome?

#77 How stressful is it if nursing staff are caring for mostly elderly patients?

All statistical calculations undertaken for the purposes of this study were through the facilities provided by the Department of Computing Services, University of Alberta, Edmonton. The Statistical Package of Social Sciences (SPSS, Version H, Release 7.2) supported all the computerized statistical procedures, data manipulation and conversions.

CHAPTER III

Presentation and Analysis of Data

In this chapter the results of the analyses undertaken will be presented and possible explanations explored. Initially, interrelationships between Technology and Stress will be examined. This will be followed by an examination of differences between professional and auxiliary nursing staff according to Technology and Stress. Finally, the nursing subunit types will be examined individually according to Technology and Stress.

Correlation Analysis

The respondents' factor scores were subjected to the Pearson Product Moment Correlation procedure to examine for relationships between Technology and Stress. The results are provided in table 4. On analysis, it would appear that the strongest correlation occurred between Instability and Patient Stress (.4680). This is followed by the positive correlation between Variability and again Patient Stress (.2064). A negative relationship was also found to occur between Instability and Patient Behavior Stress (-.1836). While it is apparent that other significant correlations (at the .05 level of significance) were observed, these were eliminated from discussion due to the extremely weak nature of the correlations. Each of the relationships is discussed in the following,

Instability and Patient Stress

It has been suggested that stress is the outcome of a demand or constraint being imposed which has the potential for exceeding the abilities of an individual in coping with the situation. Therefore,

PEARSON PRODUCT MOMENT CORRELATION ANALYSIS - TECHNOLOGY AND STRESS   Table 4

VARIABLES	PATIENT STRESS	ENVIRONMENT STRESS	PHYSICIAN STRESS	RELIEF DUTY STRESS	PATIENT BEHAVIOR STRESS
PROFESSIONALS					
INSTABILITY	.5311	.0857	-.0153	-.0814	-.1946
UNCERTAINTY OF TREATMENT	.0423	-.1087	.0381	-.0338	.1187
VARIABILITY	.1944	.0643	.0104	.0479	.0552
UNCERTAINTY OF PATIENT'S PROBLEMS	.0923	.1167	-.0036	.0652	-.0875
COMBINED					
INSTABILITY	.4680	.0754	.0246	-.0469	-.1836
UNCERTAINTY OF TREATMENT	.0565	-.0513	.0597	-.0510	.0767
VARIABILITY	.2064	-.0518	.0080	.0492	.0016
UNCERTAINTY OF PATIENT'S PROBLEMS	.0845	.0697	.0354	.0328	-.0191
AUXILIARY					
INSTABILITY	.2642	.0571	.0347	.1191	-.1106
UNCERTAINTY OF TREATMENT	.0509	.0258	.0414	-.0138	.0907
VARIABILITY	.2628	-.0499	-.0263	.0994	-.0809
UNCERTAINTY OF PATIENT'S PROBLEM	.0764	-.0220	.1572	-.0039	.0909

Note: Underline indicates significant at .05 level.

to explain any relationships between Technology and Stress, a necessary requirement would be that any demand or constraint attributable to Technology be measurable in terms of the particular skills and abilities needed to cope with the demand or constraint. In examining Patient Stress, it would appear that the skills and abilities in question relate to the medical competence of nurses in dispensing care, as well as, . emotional resources needed to cope with the psychological and emotional needs of patients. The high correlation observed between Patient Stress and Instability suggests that certain attributes of Instability may predispose nursing staff to stress. Furthermore, it suggests that such attributes are perceived as demands because they draw on the medical competence of nursing staff.

As an operational variable, Instability attempts to measure raw materials on the basis of fluctuations in the patients' physiological condition. This includes not only measurement of technical equipment and procedures employed, but also, the types of nursing activities needed to control patient instability (e.g. patient observation, performing special tests, crisis handling, etc.). From examination of the item variables, it is possible that much of the stress experienced may be related to the degree to which nursing activities are routinized. In other words, the characteristics of Instability which would establish conditions of non-routiness, may also induce stress. The ability to routinize activities implies that sufficient uniformity exists between needs of patients, or at least that they can be regulated such that standardized procedures may be applied successfully on a universal basis.. As a result, nursing activities would occur within a controlled environ-

ment wherein the demands imposed may be controlled to within the normal limits of the skills and resources necessary to carry out standardized activity. Nursing activities would therefore be established externally by rationalized rules and procedures which take into account the limitations of nursing staff. Control is exercised by limiting treatment to patients with similar problems which may be dealt with in a standardized manner. This has the effect of minimizing stress among nursing staff since demands are repetitious, predictable and certainly within the capabilities of nursing staff to respond in a successful coping manner.

By contrast, patient instability disrupts nursing routines due to the need to provide individualized and varying types of care in accordance with fluctuations in patients' conditions. Because of the uncontrolled nature of demands imposed by patient instability this would induce stress given the potential for such demands to exceed the normal limits of medical competence of nursing staff. In the absence of standardized procedures that regulate activities, nursing staff are required to respond to the individual needs of patients and so doing, assess their ability to provide the treatment necessary. Stress would be incurred whenever it is questionable whether such talents will be sufficient to cope with the needs of patients. For example, as Instability increases, nursing staff are required to perform more technical procedures and tests, engage more technical equipment, provide more intravenous infusions, and provide more nursing observations in order to stabilize a patient's condition. Nursing staff furthermore, are required to perform such activities under crisis conditions where recovery is dependent upon immediate and skillful care, all of which may serve to tax the competency of nursing staff.

Variability and Patient Stress

The relationship between Variability and Patient Stress may be explained in a manner similar to the relationship between Instability and the same stress variable. Variability among patients reduced the routiness of nursing activities in that sufficient uniformity does not exist from which to apply standardized nursing procedures. Because of the differences in needs of patients, nursing activities would be expected to vary accordingly. Nursing staff would be required to undertake more nursing procedures in response to the varying needs of patients. This may require additional nursing expertise to the extent that stress is incurred. While this relationship is relatively weak (.2064) it does at least suggest that non-routiness of activities may contribute to stress.

Instability and Patient Behavior Stress

The negative relationship between Instability and Patient Behavior Stress may reflect the critical condition of patients and perhaps their insensibility to human communication. As Instability increases, patient behavior in general would be minimized thus reducing the potential for stressful situations to arise.

The weak and non-existent correlations observed between the remaining variables included in the study deserve discussion particularly with regard to the Uncertainty variables. Both variables exhibited extremely low correlations with the Stress variables, particularly Patient Stress which suggests that Uncertainty is not a determining factor in the stress experienced by nurses. This is unusual, since one would expect that Uncertainty would affect routiness of nursing activities and, furthermore,

that stress would be incurred in searching for appropriate treatment modes.

One possible explanation would be that nursing routines have been developed to cope with uncertainty, and thus do not alter the flow of activities. In circumstances where uncertainty exists, nursing care may be directed more at providing patient comfort rather than actively searching for a solution to the problem. In the absence of known treatment or certainty as to the patients' problems, nursing staff may direct their efforts at non-treatment activities such as providing for safety and comfort of patients. These activities are matters of nursing routine and would not be expected to induce stress. The essential point is that nursing staff may be excluded from the search process to the extent that routine activities need not be disrupted in dealing with conditions of Uncertainty.

The low correlations observed between the Technology variables and the Stress Variables of Environment Stress, Physician Stress and Relief-Duty Stress would suggest that non-routiness of nursing activities only a minimal effect upon the stress generated from these sources. This is understandable, given the sources of stress. For example, routiness of nursing activities would not be expected to be a primary contributor to Environment Stress since the source of stress consists of such items as workload, scheduling, and inter-personal conflicts. Similarly with Physician Stress and Relief Stress, where such items as unavailable or impatient physicians and performing relief duty are largely unrelated to the routiness of nursing activities. The best that could be achieved under these circumstances would be an indirect relationship which would

partially explain the weak correlations.

Level of Nursing Education

The respondents' factor scores were subjected to the One-way Analysis of Variance procedure to permit examination for differences between professional and auxiliary nursing staff. The results are provided in Table 5. Significant differences were found in six out of the nine variables examined. No significant differences were found for the variables of Variability, Uncertainty of Patients' Problems, and Environment Stress. Professional Nursing staff measured higher on Instability, Uncertainty of Treatment, Patient Stress, and Physician Stress. Auxiliary nursing staff measured higher on Relief-Duty Stress and Patient Behavior Stress.

Technology Variables

It can be noted that the intent was to denote any differences and similarities between the two groups in terms of how they viewed the operating environment of nursing sub-units according to measures of Technology. Since the control variable was the level of professional nursing education, this would indicate that any differences observed would be largely attributable to those features which distinguish professional from auxiliary nursing staff. Essentially these include the level of professional training, nursing goals and the nature and level of nursing care provided. The following seeks to identify the nature of the differences and how this may be explained by attributes of nursing education.

Professional nursing staff as a whole observed higher Instability and Uncertainty of Treatment regarding the patient population possibly

ANALYSIS OF VARIANCE OF NURSING EDUCATION   Table 5

FACTOR VARIABLES	F-RATIO	F-PROB	(Standardized Means)	
			PROFESSIONAL	AUXILIARY
INSTABILITY	21.316	.0000	.1108	-.2350
UNCERTAINTY OF TREATMENT	20.803	.0000	.0921	-.1912
VARIABILITY	0.162	.6869	.0077	-.0175
UNCERTAINTY OF PAT. PROB.	0.004	.9474	-.0042	-.0083
PATIENT STRESS	13.078	.0003	.0807	-.1520
ENVIRONMENT STRESS	0.165	.6846	.0060	-.0201
PHYSICIAN STRESS	23.714	.0000	.1171	-.1919
RELIEF-DUTY STRESS	15.551	.0001	-.0885	.1647
PATIENT BEHAVIOR STRESS	20.463	.0000	-.1083	.1795

ITEM VARIABLES FOR VARIABILITY FACTOR			(Non-standardized Means)	
#15 Repetitive Decisions	5.524	.0189	2.5366	2.3909
#2 Similar Health Prob.	4.891	.0272	2.5688	2.7129
#14 Similar Procedures	.665	.4149	2.4156	2.4646

Note: Underline indicates significant difference at .05 level

as a result of differences in the level of formal training, and in the nature and goal-orientation of nursing activities. Both factors serve to create separate modes of technology as reflected in the assessments. The higher instability as observed by professional staff may be the result of their involvement in administering to the physiological needs of patients. This includes the utilization of technical tests, equipment and procedures which can only be undertaken by professionally trained nurses. Furthermore, professional nursing staff are more likely to be involved in assessing treatment and the timeliness of treatment whereas auxiliary staff by comparison would be exempted from participation in such activities due to the level of formal training. Reduced exposure to situations of Instability would then explain the lower incidence observed by auxiliary staff. This is further reinforced by the lack of formal medical training which would suggest that their ability to recognize instability would be reduced in comparison to professional nursing staff. Thus while conditions of instability may exist, they may nonetheless go unrecognized.

The higher incidence of Uncertainty of Treatment among professional nursing staff may also be explained by differences in nursing activities. While the activities of professionals may be directed at the transformation process, auxiliary staff are more likely to be involved in providing direct and personal patient care. (i.e., cleansing, feeding, providing ambulatory assistance etc.). Such activity would be less subject to change in direct response to changes in patients' moods or conditions than if medical care was involved. Furthermore, because of the defined nature of nursing care given, the incidence of

such activity being guided by intuition as opposed to set rules and procedures would be less. On balance, nursing goals relating to personal care may be stated much more explicity than goals for medical care which would result in activities being guided by established rules and procedures.

No significant differences were found between the two groups as to Variability and Uncertainty of Patients' Problems. This indicates that both are essentially observed similar levels of Variability and Uncertainty of Patients' Problems within the patient population. The absence of any variance regarding Uncertainty of Patients' Problems may reflect a failure on the part of the questionnaire to restrict measurement to medically relevant aspects of patients' problems, instead eliciting normative evaluations on the part of respondents. Questions such as those relating to the importance of knowing health history; of understanding patients' problems; and of showing skill and initiative in treating patients, etc., may reflect respondents' assessments as to what should occur moreso than what does occur. Because it is expected that both groups would share similar value orientations regarding the proper care of patients, this could explain the similarity in measurements.

The similarity in measurement regarding Variability may be interpreted differently. Since factor scores are the sum of the product of individual measurements and their factor weightings, it is possible to have similar factor scores but different measurements for different items. Thus while factors scores may be similar for both groups, they may be different in their composition. Such appears to be the case regarding Variability. Professional staff scored higher with regard to the non-

repetitiveness of decision-making (i.e., Varb. #14) but lower as to the percentage of patients having dissimilar health problems (i.e., Varb. #2) than did auxiliary staff. No difference was observed regarding the similarity of nursing care procedures (i.e. Varb. #15). These differences may be explained by the degree to which an abstract level of analysis is employed in investigating patients' problems. While attributes of outward appearance such as symptoms and manifestations may vary, the underlying cause or medical problem may be similar. Such abstraction would be in keeping with the level of education of professional nursing staff. This may explain why less variability of health problems was observed by professional staff. Auxiliary staff by comparison have less formal training from which to undertake such assessment and would, therefore, be restricted to symptoms and manifestations, not the underlying medical problem. The higher incidence of non-repetitive decision-making may reflect the orientation of professional nursing activities where an effort is made to respond to the individual needs of patients. Thus while the problems may be similar, the type of care provided may vary taking into account the individual characteristics of each patient (e.g., medical history, age, etc.).

Stress Variables

As indicated earlier, professional staff measured higher with regard to Patient Stress and Physician Stress: conversely, auxiliary staff measured higher with regard to Relief-Duty Stress and Patient Behaviour Stress. No difference was observed with regard to Environment Stress.

Higher Patient Stress on the part of professional staff may to a large degree be explained by differences in the goal-orientation of

nursing activities. The activities of professional staff tend to be directed at providing medical care to patients as a part of the recovery procedure, while auxiliary staff are minimally involved in such activity. This could explain why professional staff experience more stress if patients are very ill and the prognosis is poor, or if nursing staff are exposed repetitively to suffering, death, and dying. Such conditions may be perceived as imposing additional demands upon the nursing competence of professional staff who properly view recovery as a legitimate nursing goal. While auxiliary nursing staff may share similar sentiments as to patient recovery, they may feel however that such action is beyond their area of expertise and thus experience less stress. This may also explain why professional staff experience higher stress if nursing staff are frequently faced with crisis situations not considered part of normal duties. Higher stress due to anxiety or upset on the part of patients' family may be the result of increased contact with professional staff who would be better informed to discuss the patient's condition with the family.

The higher incidence of Physician Stress may result from professional staff involvement in the treatment process and their proximity to physicians. Since physicians direct the medical treatment of patients, professional staff would be subject to their guidance, direction and criticism on a day to day basis moreso than auxiliary staff. Thus impatient or hypercritical physicians are more apt to direct their demands and criticism towards professional staff. This would also explain why conflicting demands by physicians incur more stress among professional staff. Similarly, professional staff would experience more stress if

communications with physicians are poor, or if they are unavailable. Because of the necessary interplay between physicians and professional staff, any failure to communicate would result in ambiguity or lack of direction as to the course of medical treatment.

No significant difference was observed between the two groups regarding Environment Stress. This would suggest that neither nature of duties nor level of training is a determinant of stress as a result of such factors as workload, insufficient resources, personality conflicts, unpredictable scheduling etc. It would seem that such factors are controlled by criteria and events largely external to the issue of nursing roles performed by staff. For example, insufficient resources and heavy workload may be related to problems of resource allocation, while matters of unpredictable scheduling, conflicting demands, and unfinished work may be related to problems of organizational structure and management. Such factors bear little relationship to differences in nursing status, and may be expected to affect nursing staff on a universal basis.

The higher stress experienced by auxiliary staff regarding relief duty may as well be explained by differences in nursing duties and the level of care provided. This may be the result of higher incidence of relief activity among auxiliary nursing staff. Nursing skills of auxiliary staff may be more transferable across nursing units than professional staff and thus more prone to relief duty. Because of the degree of specialization which may be required of professional staff of the various types of nursing units, this may result in reduced transfer- ability of skills even across similar nursing units. In this regard it is interesting to note that more stress was experienced by auxiliary

staff regardless of the type of nursing unit whether they were similar or not.

High Patient Behavior Stress on the part of auxiliary staff may be related to differences in the type of care provided. While activities of professionals may be oriented towards providing medical care, auxiliary staff are more likely to be involved in providing direct and personal patient care. This may range from providing assistance in matters of personal hygiene to the physical movement and handling of patients. As a result the incidence of caring for patients who are less able to care for themselves would be higher among auxiliary staff. This may explain the higher stress due to caring for elderly patients.

Correlations Between Technology and Stress

Table 4 also displays the results of separate correlation analyses undertaken for each of the professional and auxiliary groupings. From the table, it would appear that differences exist between the two groups regarding interrelationships between Technology and Stress. In general terms, such separation appears to have strengthened the relationships for the professional group while having a weakening effect on the auxiliary group. For example, the strength of the relationship between Instability and Patient Stress increased from .4680 to .5311 when analysed for professionals only. Conversely the strength of the relationship dropped from .4680 to .2642 when analysed for the auxiliary group. The same pattern occurred with regard to the relationship between Instability and Patient Behavior Stress (i.e., from -.1836 to -.1946 for professionals and from -.1836 to -.1106 for auxiliaries). One exception however can be noted, regarding the relationship between Variability and Patient

Stress. While the strength of the relationship dropped from .2064 to
.1944 for professionals, it increased from .2064 to .2525 for auxiliary.
This would indicate a shift in emphasis from Instabili+y to Variability,
in both equally contributing to Patient Stress.

Initially this would suggest that indeterminancy of technology is
less of a contributing factor to the stress experienced by auxiliary
nursing staff. However, upon closer examination of technology in the
research questionnaire, it would seem that measurement essentially is
directed at assessing the activities of professional nursing staff as
opposed to auxiliary staff. As a result, the questionnaire may fail to
measure aspects of technology which are peculiar to the auxiliary nursing
profession. Interrelationships would therefore be weaker because of the
inability to fully measure auxiliary nursing technology. The significantly
weaker correlation between Instability and Patient Stress would be indica-
tive of this happening since Instability for the most part measures
professional, not auxiliary nursing activities and procedures.

In summarizing this portion of the analysis it would appear that
significant differences do exist between professional and auxiliary nursing
staff according to both Technology and Stress Variables. In general the
differences observed appear to reflect differing levels of nursing educa-
tion and such related factors as nursing goal orientations, and type of
nursing care provided. From the results of the Analysis of Variance pro-
cedure, professional nursing staff observed more Instability and Uncer-
tainty of Treatment and greater stess because of Patient and Physician
Stress. Auxiliary nursing staff by comparison observed less Instability
and Uncertainty of Treatment and experienced more stress due to Relief.

Duty and Patient Behavior Stress. Degree of involvement in providing medical care may also be a factor in explaining the weaker correlations between Technology and Stress observed for Auxiliary nursing staff. Failure to fully measure the nursing technology of Auxiliary staff may exclude aspects of Technology other than medical care which may contribute to Stress. Since medical care can be expected to be a smaller portion of auxiliary nursing activity, this would account for smaller portions of the variation in stress, thus the weaker correlations.

Nursing Subunit Differences

In this section we examine for differences between nursing subunits according to the factor variables of Technology and Stress. Since the unit of analysis was the individual nurse, the study would not be complete unless an attempt was made to interpret our findings at the subunit level. The purpose of this section will therefore be to examine for differences between subunits according to the variables discussed and to determine whether such differences are consistent with the correlations uncovered earlier between Technology and Stress. Two statistical procedures were employed for this purpose. The Analysis of Variance procedure including a Multiple Range Test was used to examine differences according to individual variables, while the Multiple Discriminant Analysis procedure was used across variables for Technology and Stress.

Significant differences by subunit type were observed across all the factor variables at the .05 level of significance. Table 6 displays the subunit means derived from the Analysis of Variance procedures, while Figure 1 displays the ordering of subunit types by homogeneous subsets following the Multiple Range Test procedure.

TABLE 6

SUBUNIT MEANS (ANALYSIS OF VARIANCE) / DISCRIMINANT FUNCTION COEFFICIENTS

VARIABLES	MEDIC	SURGERY	INTENS CARE	REHAB	AUXIL	PEDIAT	PSYCH	OBSTET	RURAL	TECH FUNCT 1	TECH FUNCT 2	TECH FUNCT 3	STRESS FUNCT 1	STRESS FUNCT 2
INSTABILITY	.1778	.2851	1.9993	-.7245	-.6966	-.3044	-.7501	-.2391	-.3912	.9515	-.2930	-.0242		
UNCERTAINTY OF TREAT.	-.1109	-.2325	.0508	.0838	-.1852	-.1194	1.3291	-.3098	-.1094	-.2870	-.6880	-.3040		
VARIABILITY	.3040	.0726	-.2612	.0470	-.3984	.2636	.2486	-1.0451	.0913	-.0542	-.2636	.9343		
UNCERTAINTY OF PAT PROB	-.1639	-.4007	.5378	-.0344	.2643	.2363	.7579	-.3098	-.3982	-.1131	-.6159	-.3293		
PATIENT STRESS	.5059	-.0668	1.3906	-.4577	.0535	-.0397	-.5039	-1.0365	-.0112				.4895	-.8509
ENVIRONMENT STRESS	-.0813	.0302	.0852	.0664	.6036	-.2534	-.2388	.0725	-.0591				.2287	-.0946
PHYSICIAN STRESS	-.1731	.0439	.0921	.0839	-.3426	.3600	-.1507	.1829	-.1630				-.2529	-.0822
RELIEF DUTY STRESS	-.1415	.0022	-.2623	-.1155	-.3316	.6774	-.0656	.1230	-.1660				-.3942	-.0595
PATIENT BEHAV. STRESS	-.1927	-.0807	-.6986	.4680	.9381	.6180	.2436	-.7657	.5275				.6985	.5034

SUBUNIT MEANS (DISCRIMINANT ANALYSIS)

DISCRIM. FUNCTIONS	MEDIC	SURGERY	INTENS CARE	REHAB	AUXIL	PEDIAT	PSYCH	OBSTET	RURAL
TECHNOLOGY FUNCT. 1	.2386	.4032	1.9529	-.7257	-.6694	-.2900	-1.1423	-.0349	-.2864
TECHNOLOGY FUNCT. 2	.0119	.2931	-.9681	.1557	.2083	-.0074	-1.1820	.7356	.3884
TECHNOLOGY FUNCT. 3	.3414	.1914	-.4145	.0058	-.4994	.1555	-.0675	-.8256	.1961
STRESS FUNCTION 1	.4825	-.1059	.3160	.1404	1.1271	-.8480	-.0605	-1.1391	.4393
STRESS FUNCTION 2	-.3196	.0141	-1.5304	.6376	.6459	.3645	.5222	.4768	.2681

Note: - all factor variables and discriminant functions are significant at the .05 level

Figure 1

MULTIPLE RANGE TEST - NURSING SUBUNITS

ORDERING OF NURSING SUBUNITS

low   high

VARIABLES

INSTABILITY   PSYCH REHAB AUX RURAL PED OBS MED SURG ICU

UNCERTAINTY OF TREATMENT   OBS SURG AUX PED MED RURAL ICU REHAB PSYCH

VARIABILITY   OBS AUX ICU REHAB SURG RURAL PSYCH PED MED

UNCERTAINTY OF PATIENT'S PROB.   SURG RURAL OBS MED REHAB PED AUX ICU PSYCH

PATIENT STRESS   OBS PSYCH REHAB SURG PED RURAL AUX MED ICU

ENVIRONMENT STRESS   PED PSYCH MED RURAL SURG REHAB OBS ICU AUX

PHYSICIAN STRESS   AUX MED RURAL PSYCH SURG REHAB ICU OBS PED

RELIEF DUTY STRESS   AUX ICU RURAL MED REHAB PSYCH SURG OBS PED

PATIENT BEHAVIOR STRESS   OBS ICU PED SURG MED PSYCH REHAB RURAL AUX

Instability

Four mutually exclusive subsets emerged form the Multiple Range Test which indicates significant differences according to Instability between the groupings. Psychiatry, Rehabilitation, and Auxiliary subunits exhibited the lowest degree of Instability, while Rural, Pediatrics, and Obstetrics subunits, followed by Medicine and Surgery, displayed progressively high degrees of Instability. Intensive Care units exhibited the highest degree of Instability. Such ordering of the subunits would appear to reflect the degree of physiological instability associated with the types of disorders treated by the subunits. For example, psychiatric patients would not be expected to suffer from physiological disorders, which compares to Intensive Care units which were designed specifically to cope with physiological instability.

Uncertainty of Treatment

Of the three subsets, Psychiatry subunits exhibited the highest degree of Uncertainty of Treatment. Because of the overlap between the remaining subsets, the only other differences occurred between Obstetrics and Surgery subunits which observed significantly less Uncertainty of Treatment than Intensive Care and Rehabilitation subunits. The high levels of Uncertainty of Treatment observed by Psychiatric subunits may indicate difficulties in predicting the outcome of nursing procedures such that nursing staff rely upon personal initiative, intuition, and patient feedback to direct nursing activities. Conversely, the lower levels of uncertainty observed by Surgery and Obstetric subunits may indicate a tendency to rely upon established techniques and procedures to direct nursing activities. In surgical units for example, operations are

normally scheduled, and surgical procedures and contingencies are well-defined and planned in advance. In Obstetrics, nursing procedures are similarly well-defined in accordance with the various stages of the child-bearing process.

Variability

Obstetrics subunits exhibited the lowest degree of Variability, followed by Auxiliary which, in turn exhibited the next lowest degree of Variability, distinct from all other subunits except Intensive Care. Intensive Care subunits as well exhibited significantly lower Variability than Psychology, Pediatrics and Medicine subunits. The low levels of Variability observed by Obstetrics subunits may reflect the highly specialized nature of their function in dealing with a singular medical condition, namely child-bearing. The low Variability of Auxiliary subunits may be related to the maintenance aspects of nursing care provided to the chronically ill and aged such that nursing activities may be non-varying and routine.

Uncertainty of Patients' Problems

Surgery subunits exhibited significantly less Uncertainty of Patients' Problems than other subunits except Rural and Obstetrics subunits. Conversely, Psychiatry subunits exhibited significantly higher Uncertainty of Patients' Problems than other subunits except for Intensive Care subunits. The low levels of uncertainty exhibited by Surgery subunits may be a function of the selective process by which patients normally undergo diagnosis prior to being admitted for surgery. As a result, uncertainty as to the nature of the disorder will normally be minimized in Surgery subunits. Conversely, the higher levels of uncertainty associated with Psychia-

try subunits may reflect difficulties in diagnosing the problems of its patients.

Patient Stress

Five mutually exclusive subsets reflecting varying levels of Patient Stress can be identified from the analysis. Obstetrics subunits appear to experience the least degree of Patient Stress which is followed by Psychiatry and Rehabilitation, then Surgery, Pediatrics, Rural and Auxiliary subunits and finally Medicine subunits in experiencing progressively higher degrees of Patient Stress. Intensive Care subunits appear to experience the highest degree of Patient Stress. From examination of the item variables which constitute Patient Stress, it would appear that exposure to critically ill or dying patients is a determining factor in explaining the ordering of subunits. For example Obstetrics, and similarly Psychiatry and Rehabilitation subunits would not be expected to have a significant number of patients who were seriously ill or dying. By comparison Intensive Care subunits can be expected to have higher proportion of patients given the nature of their function.

Environment Stress

Only two subsets were generated by the Multiple Range Test such that only Auxiliary subunits exhibited significantly higher Environment Stress than other subunits. No significant differences appear to exist between the remaining subunits.

Physician Stress

Because of the high degree of overlap between subsets, significant differences between subunits are restricted to a few exceptions. Most

notable of these include Auxiliary subunits which appear to experience

significantly less Physician Stress than Surgery, Rehabilitation, -

Intensive Care, Obstetrics and Pediatric subunits. Alternatively,

Pediatrics appear to experience significantly higher Physician Stress than

Auxiliary, Medicine, Rural, Psychiatry and Surgery subunits. The lower

stress of Auxiliary subunits may reflect the absence of active treatment such

that nursing routines, not physicians, determine nursing activities. This

would result in reduced interaction with physicians such that Physician

Stress would be minimized. Conversely, the high levels of stress experienced

by Pediatrics, may reflect interdependencies between physicians and nursing

staff to the extent that stress arises from their interaction.

Relief Duty Stress

Pediatric subunits appear to experience significantly higher levels of

Relief Duty Stress than all other subunits. Conversely, Auxiliary subunits

appear to experience significantly lower stress than either Surgery,

Obstetrics or Pediatric subunits.

Patient Behavior Stress

Obstetrics, Intensive Care and Pediatrics subunits appear to experience

significantly lower levels of Patient Behavior stress than all other units.

This is followed by Surgery subunits, and then by Medicine, Psychiatry and

Rehabilitation subunits indicating progressively higher levels of Patient

Behavior Stress. Because of the overlap with the next subset, only Rural

subunits experience higher stress than Medicine subunits. Auxiliary sub-

units appear to experience the highest levels of stress, significantly

higher than all other subunits. From examination of the item variables

constituting Patient Behavior Stress, it is possible that significant differences between subunits reflect differing characteristics of patients admitted to each of the subunits. For example, the high levels of stress associated with Auxiliary subunits may reflect the proportionately higher numbers of elderly patients found in such units. This contrasts with Pediatrics subunits which do not have elderly patients and correspondingly experience low Patient Behavior Stress. The absence of elderly patients may also explain the similarly low levels of Patient Behavior Stress. Intensive Care units also appear to observe low levels of stress, however for a different reason. Patients admitted to Intensive Care may be sufficiently ill to minimize troublesome behavior resulting in low levels of Patient Behavior Stress.

Multiple Discriminant Analysis

Table 6 also displays the discriminant function coefficients derived from separate analyses of Technology and Stress, as well as the subunit centroids for each of the functions. All of the functions derived from the analyses are significant at the .05 level. These are described below.

Technology Function 1 - "Instability"

From the discriminant function coefficients, it appears that function 1 is largely a measure of Instability, in weak contrast to Uncertainty of Treatment. Neither Variability nor Uncertainty of Patients' Problems contribute significantly to this function. This function was labelled "Instability".

Technology Function 2 - "Uncertainty"

Function 2 consists primarily of both the Uncertainty of Treatment and

Uncertainty of Patients/ Problems Variables. Instability and Variability also appear to contribute to the function but only to a minor degree. This function was labelled "Uncertainty".

Technology Function 3 - "Variability"

Function 3 largely consists of Variability except for a slight contrast with Uncertainty of Patients' problems. This function was labelled "Variability".

Stress Function 1 - "Patient and Behavior Stress"

Function 1 appears to measure both Patient Stress and Patient Behavior Stress in weak contrast with Relief-Duty Stress. This function was labelled "Patient and Behavior Stress".

Stress Function 2 - "Contrast Patient and Behavior Stress"

Function 2 is almost exclusively a contrast between Patient Stress and Patient Behavior Stress. This function was labelled "Contrast Patient and Behavior Stress".

Figures 2 and 3, respectively, display the relative positioning of the subunits according to the Technology and Stress function. From examination, it is evident that while some clustering occurs around the center, there is sufficient variation to permit analysis. Furthermore the subunits appear to display attributes of Technology and Stress consistent with the correlations discussed earlier. This is particularly true of those which bound on the periphery since this would indicate pronounced differences according to the variables measured. We will therefore concentrate much of our discussion upon these nursing units.
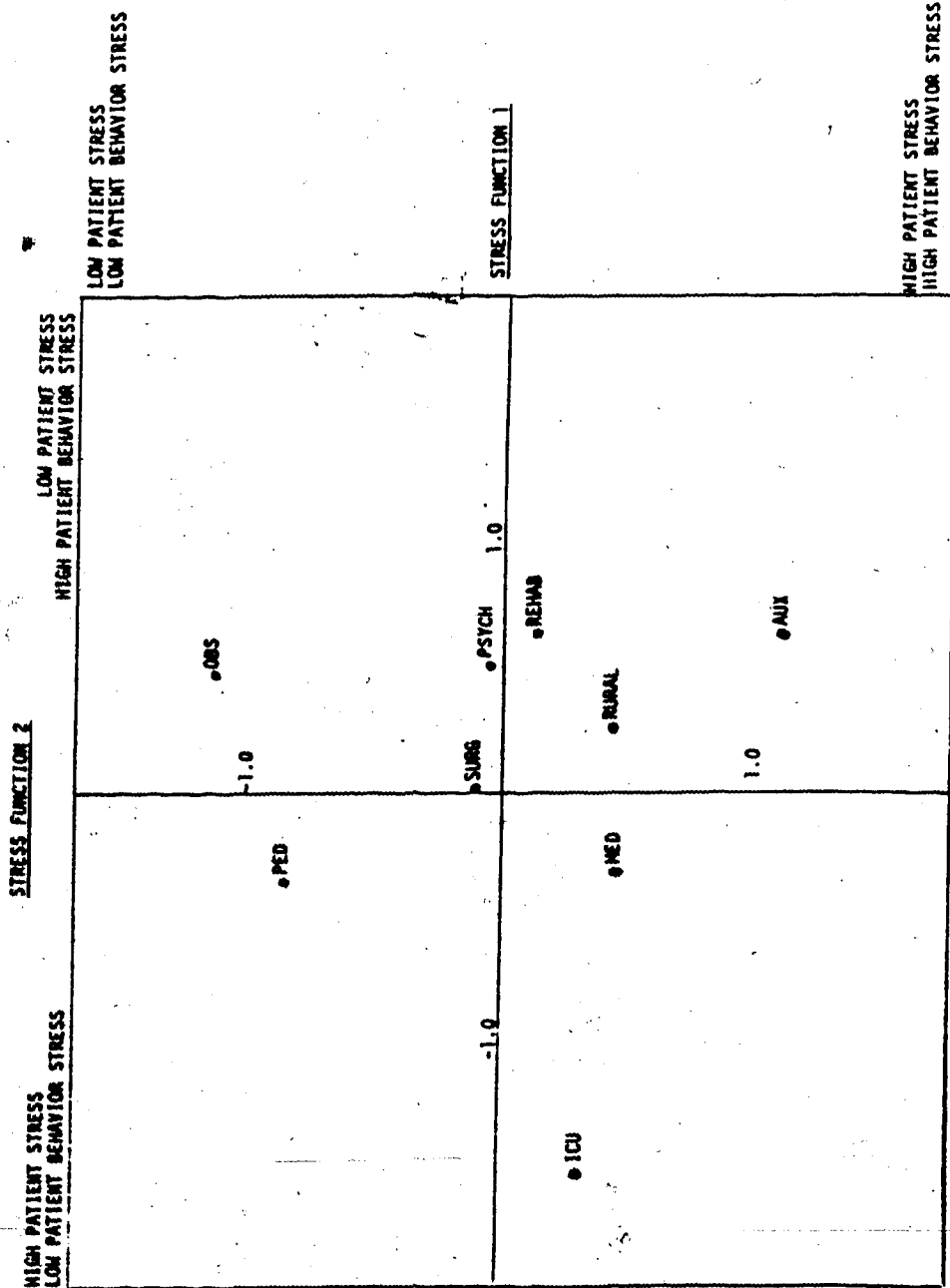
Intensive Care Subunits

DISCRIMINANT ANALYSIS TECHNOLOGY FACTORS
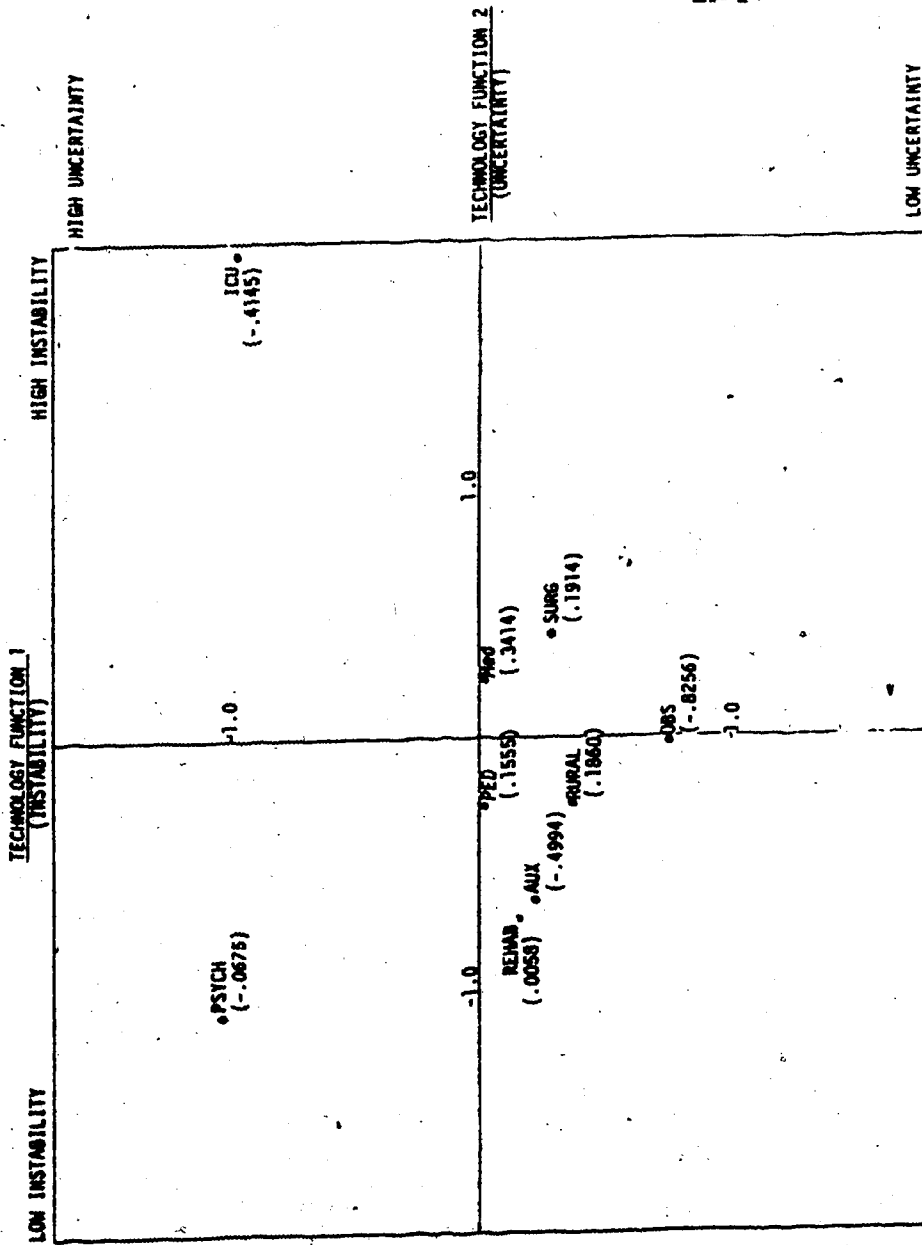
Figure 2

Note:(Variability)
Technology Function 3
means are identified
in brackets

DISCRIMINANT ANALYSIS STRESS FACTORS

Figure 3

Intensive care subunits are designed specifically to provide specialty nursing care on a crisis-intervention basis. Therefore a high proportion of the patients admitted may be expected to be highly unstable requiring immediate treatment. The type of ailment encountered is not an essential criterion for admittance as much as the need for "intensive technology" which may not be available within other types of nursing units. This would explain the extremely high degree of Instability observed for Intensive Care Units. Furthermore such units appear to observe a high degree of Uncertainty as to both Patients' Problems and Treatment, due to the problematic and often unanalysable nature of the ailment incurred, which has necessitated the need for intensive care. This is suggested since failure to arrest the ailment during the early stages due to insufficient knowledge may lead to crisis proportions and the need for intensive care. The low degree of Variability observed may reflect restrictions as to the types of illnesses treated by Intensive Care subunits.

From the relationships established earlier, it would appear that much of the extremely high Patient Stress experienced by nurses is related to the high proportion of Instability among patients in Intensive Care subunits. Instability moreso than Variability or Uncertainty, appears to induce-stress due to the severe demands imposed with regard to the medical treatment of patients. Because of conditions of instability, there is little to regulate types of treatment or the circumstances under which they are administered. Treatment is therefore geared to the needs of the individual patient which precludes any standardized procedures. Because of the unrestrained nature of the demands imposed, stress is incurred whenever such demands threaten to exceed the ability of individuals such that the outcome of actions taken would be uncertain. In Intensive Care, the incidence of Instability is high to the extent that nursing abilities are

severely taxed in coping with the needs of patients. Nursing staff for
example, are required to perform special tests and procedures which may be
highly technical in nature, and to do so under pressure in direct response
to fluctuations in patient's condition, all of which serves to induce stress.
The medium Variability observed would also appear to contribute to stress
to the extent that nursing staff are required to respond to the different
treatment needs of patients. The high Uncertainty is not expected to con-
tribute to stress due to the lack of any significant correlation. The low
Patient Behavior Stress may be explained by not only the relative absence
of elderly patients, but by the condition of patients which would preclude
most types of behavior, particularly those of a 'troublesome" nature.
This is also supported by the negative correlation which appears to
exist between Patient Behavior Stress and Instability.

Psychiatry Subunits

In contrast to Intensive Care subunits, Psychiatry subunits appear
to exhibit the lowest degree of Instability, the highest degree of Un-
certainty and medium Variability. Correspondingly, nursing staff appear
to experience considerably less stress with regard to Patient Stress,
and more stress with regard to Patient Behavior Stress. Psychiatry units
are concerned with treating socio-psychological problems rather than
physiological Instability. This would explain the low Instability, and
conversely, the high Uncertainty observed for these units. The lower than
average Patient Stress is consistent again with the correlations estab-
lished earlier and is indicative of the degree to which treatment is non-
physiological in nature. Patient Stress largely reflects circumstances
where the treatment implied is intended to alter the physiological condition
of patients, which is not the function of Psychiatry subunits. The higher

than average Patient Behavior Stress would also be consistent with Psych-
-iatry due to the manifested behavior of problems associated with socio-
psychological disorders. This is also consistent with earlier findings
since Patient Behavior Stress was found to be negatively correlated with
Instability.

Obstetrics Subunits

Obstetrics subunits cater to a very narrow range of pathology,
namely, female patients in the process of child-bearing. Consequently,
Obstetrics subunits observe very low Variability as to patients'
problems or treatment provided. Furthermore, because of the biological
imperatives associated with the child-bearing process, this would explain
the low Uncertainty observed for Obstetrics subunits. The average
Instability may reflect a normative distribution of patients who exper-
ience difficult childbirths (i.e. requiring inducement, caesarians,etc.).

Because of these factors, nursing staff would appear to experience
the lowest degree of Patient Stress than all other nursing subunits.
In particular, the low variability would suggest that standardized nursing
procedures dominate much of nursing activities which necessarily regu-
lates the types of demands imposed on nursing staff. Furthermore, the
lower than average Patient Behavior Stress may be explained by the
absence of elderly patients on the ward.

Auxiliary Subunits

Auxiliary subunits are comprised of patients requiring long term
care, which includes those who are chronically disabled and aged. While
the condition of patients may be stabilized, there is nontheless the
need to provide care on an ongoing basis. This need is reflected in the

findings to the extent that Auxiliary subunits observed less than average Instability, Uncertainty, and Variability. This result would suggest that the routinization of nursing activity would minimize Patient Stress. Contrary to this suggestion, Auxiliary subunits were found to exhibit slightly higher than average Patient Stress, third only to Intensive Care and Medicine subunits, which would appear to refute the underlying rationale for the correlations brought out earlier. It is possible that other factors not included in the analysis may have nullifies the correlations. This is plausible given the overall predictive capability of Technology variables in determining stress which leaves a significant portion to be explained by other factors. The same would apply to the extremely high degree of Patient Behavior Stress, except that it can be noted that elderly patients constitute a very high proportion of the patient and therefore contribute to the stress incurred. One possible explanation for Patient Stress would be the high incidence of nursing staff being exposed to suffering death, and dying, or having to perform painful but life-giving treatment to patients. These events may occur in the absence of any instability and be considered as independent phenomena. Such phenomena may apply equally to chronically-ill patients, whose conditions have been stabilized, but not cured of any disorder. Painful but life-preserving treatment may be as much a requirement for the on-going maintenance of life as it is for active recovery to health. Similarly, suffering death and dying may be as much a consequence for long term illnesses as they are for critically-ill patients, particularly if there is a high proportion of aged, as in Auxiliary subunits.

Pediatric and Medicine Subunits

Both Pedicatric and Medicine subunits exhibit similar characteristics

regarding Technology, except for Instability. Medicine appears to observe significantly higher Instability than Pediatrics. This is supported by the Multiple Range Test (see Figure) which indicates significant differences between the subunits. Correspondingly, Medicine appears to experience significantly higher Patient Stress. Pediatric subunits, however, experience significantly less Patient Behavior Stress, which can be explained by the absence of elderly patients, who are excluded from such subunits.

Rehabilitation, Surgery and Rural subunits

Of all the subunits examined, Rehabilitation, Surgery, and Rural subunits appear to exhibit the least discernable profiles regarding Technology and Stress. While this may be consistent with their operating environment, it is difficult to draw any conclusions as to the validity of any perceived relationships due to the lack of any outstanding features which distinguish one from the other. As a result, these will not be discussed other than to say that they cannot be shown to be inconsistent with earlier findings.

In summarizing this portion of the analysis, it is evident that the Multiple Discriminant findings are consistent with the correlations derived through analysis undertaken at the individual response level, and may be applied at the subunit level without serious loss in interpretation. In most instances, the findings support the underlying rationale for the correlations observed between aggregated characteristics of technology and levels of stress incurred. It should be noted that this was to some degree expected since it was the same population being measured, just regrouped in a different manner. What is important however, is the

degree to which most nursing subunits displayed relatively distinct characteristics with regard to technology and stress, which tends to confirm the validity of such measures in differentiating organizations such as nursing subunits.

CHAPTER IV

Limitations and Conclusions

In this chapter the limitations of the research are discussed and the conclusions arising from the results are presented. In addition, some implications for future research are provided.

Limitations

In the course of preparing and conducting the research, several limitations both conceptual and methodological were encountered which necessarily limits the scope and validity of our findings.

First, difficulties were encountered in the conceptualization of stress which in turn generated problems in operationalizing definitions and measurements. Thus, while we were able to suggest several types of stress, we were nonetheless restricted in our ability to apply and test for such knowledge in measuring stress. This is reflected in our inability to measure for the types of stress indicated by McGrath (1976). Instead, measurement consisted of physical sources and settings (i.e. patients, physicians, etc.), from which it was necessary to infer the types of stress which may be operable in a situation. The lack of construct validity was therefore a major limitation in this study. Furthermore, the questionnaire approach employed in the study may be problematic in measuring subjective experiences in respondents both quantitatively and qualitatively. Regarding the latter, since the term "stress" is commonly used, and may denote varying situations, consistent measurement using a questionnaire may be problematic. Similar comments would also be applicable to measurement of technology since these were measures of perception as well. This is reflected in the Variance

Accounted For of the factors derived for Technology and Stress using
the Factor Analysis procedure. In both cases the variance accounted for
56.4% and 57.2% for Technology and Stress, respectively, which limits
our ability to draw more than tentative conclusions from our findings.

In addition, both Technology and Stress were operationalized to
reflect the hospital setting, both in terms of sources of stress and
nursing technology. Since these measures would be inappropriate for
most other organizations, our ability to generalize on the basis of
our findings is limited to similar institutions.

Conclusions

The results of this study would suggest that relationships do exist
between Technology and Stress. As a behavioural outcome, stress appears
to result from the inability of organizations to sufficiently structure
and control tasks to known limits of human understanding and endurance.
From our study, Technology may be considered a major constraint to an
organization's ability to excersize such control because of unstable and
variable properties of raw materials which instigate exception routines
as noted by Perrow (1974, p.78). This notion is in keeping with Thompson's
view when he indicated that under norms of rationality, organizations,
at least hospitals seek to seal off their core technologies from environ-
mental influences (1967, p. 19). For human service orgahizations, the
inability to seal off their core techologies appears to result from envi-
ronmental influences such as unstable patients and variability regarding
patients' medical problems.

In examining the individual relationships indicated by our findings,
the strongest relationship occurred between Instability and Patient Stress

which is most probably task-based stress. This suggests that as the instability of a situation increased, there was a general tendency towards placing greater demands upon the medical competency of nurses. Stress from the task would occur whenever the potential existed for exceeding the abilities of nurses. This would be the case, given the non-routine and unregulated activities needed to cope with the situation. Under these circumstances, task-based stress can be expected to result for reasons of task difficulty, in that extraordinary nursing procedures would be required including technical equipment and tests etc.; task ambiguity, in that predictability of outcome is lessened; and task overload, in that treatment inclusive of extraordinary nursing procedures must be undertaken on an immediate and time basis. (McGrath, 1976).

The negative, though weaker relationship between Instability and Patient Behavior stress may also reflect task-based stress but for a different reason. In this situation the patients' ability to counter the treatment efforts of nurses may be seen as adding to task difficulty thus, resulting in stress. As instability of a patient increases he may become sufficiently insensitized to the situation, such that he no longer presents a problem. This would explain the negative correlation.

Variability was also found to be related to Patient Stress but to a lesser extent. Similar to Instability, Variability among patients tends to individualize treatment activities according to the needs of patients. As Variability increases, more nursing procedures would have to be undertaken on a non-routine basis. This could be seen as inducing task-based stress. The weaker correlation though, would suggest that this is less of a concern than Instability.

From our analysis, the Uncertainty variable divided into two variables, Uncertainty of Treatment, and Uncertainty of Patients' Problems. The results of the study did not indicate that a relationship existed between the concepts of Uncertainty and Stress. This may however be a feature which is localized to hospitals. Overton et. al. (1977) have already indicated that Uncertainty as operationalized for hospital's, appear to describe activities which conincide with the care aspect of nursing practice (Mauksch, 1966). Under these conditions, nursing efforts would be directed at non-treatment activities leading to the care and comfort of patients. Such activities would be matters of nursing routine and would not be expected to induce stress. Since medical treatment is directed by physicians, it is possible that they are expected to absorb the stress associated with having to undertake unanalysable search behavior, and cope with the lack of predictability of outcomes. The essential point is that nursing staff by the nature of their profession, may be excluded from the search process to the extent that routine activities need not be disrupted.

In addition to the actual relationships observed, it 's worthy to note that the relationships were primarily established with what may best be classed as Task-based stress. The conspicuous absence of identifiable relationships between Technology and stress variables such as Environment Stress, Physician Stress and Relief Duty Stress, which incorporates aspects of Role-based stress (e.g. conflicting demands, hypercritical physicians, personality conflicts, poor communications, etc.) would suggest that organizational roles are unaffected by technology. This is unusual, in that one would normally expect that as technology becomes less routine, role responsibilities and expectations for behavior would

be less distinct and thus lead to role conflict, overload and ambiguity. This however, may be the result of the methodological limitations raised earlier in the chapter in identifying and isolating Role-based stress from other types of stress. The extremely weak relationships suggested by the statistics may, therefore, reflect problems of design in measurement (e.g. stress variables) rather than of the actual relationships themselves.

Level of Nursing Education

Our findings generally indicate that auxiliary nursing staff do perform activities of a more routine nature. In this regard, auxiliary nursing staff observed significantly less Instability and Uncertainty of Treatment, which is most attributable to their lack of involvement in the medical care process. This result corresponds to the description provided earlier regarding the nature of duties assigned to auxiliary nursing staff (i.e. providing direct and personal patient care, etc.). Furthermore, in keeping with the relationships established earlier, auxiliary nursing staff experienced less Patient Stress and more Patient Behaviour Stress.

From analysis of the correlation procedure, it is further apparent that even though similar relationships between Technology and Stress are indicated for both groups, the relationships are weaker and provide considerably less predictive capability for auxiliary nursing staff. This suggests first, that technology is less of an overall determining factor in establishing stress levels for auxiliary nurses and, secondly that Instability is a major cause of stress for professional nursing staff only. In order to provide meaing to this, two explanations are possible.

First, it is possible that we have failed to operationalize essential elements of technology more in keeping with the duties of auxiliary staff (i.e., relating to such acitivities as physical handling of patients, cleansing, etc.). Thus we are unable to fully measure the technology employed which may result in reduced predictive ability. The fact that the relationship between Instability (which predominantly measures medical technology) and Patient Stress is significantly weaker for auxiliary staff, is indicative of such happening. The other explanation relates to the substantially smaller population size of the auxiliary grouping which may have introduced distortion to our findings. Of the two, however, the first is probably more likely, given the significant differences between the two groups.

Should this be the case, this lends support to our comments and those of others such as Overton et. al. (1977) made earlier regarding limitations as to the generalization of findings and the difficulties posed in operationalizing similar measures of technology across organizations. In this case however, the limitations may apply internally, for comparison across intra-occupational groupings such as professional and auxiliary nursing staff. While both groups may be involved in the same transformation process, separation of duties and responsibilities may pose problems of measurement in establishing a common basis for analysis. In taking the example of Overton et. al.(1977, p. 217) one step further, wherein it was suggested that the cause and context of uncertainty would be different for a physician, a nurse, a football player, etc., it can be suggested that the cause and context of uncertainty may also differ between a quarterback for example, and the place kicker. This would suggest then that the operationalization of technology variables must be developed under rigorous conditions,

recognizing not only differences across organizations but within as well.

Nursing Subunits

The findings of the discriminant analysis undertaken, would indicate that nursing subunits for the most part display attributes of both technology and stress consistent with the relationships discussed earlier. Since the relationships were statistically developed at the respondent's level, (i.e. unit of analysis), this is significant in that the same relationships appear to be replicated at the subunit level. This suggests that such relationships could be applied at the subunit level without serious loss of interpretation. In this regard, several subunit nursing specialties exhibited differences according to measures of technology and stress.

In most cases much of the variance in technology and therefore, stress can be explained at the subunit level with regard to the types of patients admitted and disorders treated. Exceptions were noted with respect to Auxiliary subunits, in that they displayed characteristics of stress which diverged from the expected levels. This was attributed to independent phenomena localized to those nursing units which possibly altered stress levels, i.e. chronically-ill patients, the elderly, etc.

In providing suggestions for future research, the results of our study would suggest that much more discussion and investigation regarding the conceptualization and operationalization of stress must be undertaken if it is to be examined in an organizational setting. While our study indicates that there may be some value in using such measures of technology to predict stress in organizations, several methodological problems were encountered which limited our findings. For this reason, any future research must

certainly give consideration to developing improved measures of stress.
Noting that this study concentrated on perceptual processes in measuring
stress, perhaps such studies could be expanded to include correlated data
which reflect the physiological and behavioral aspects of stress.

Furthermore, it may be interesting to analyse stress in relation to
other organizational variables which may alter or modify the effect of
technology. While it is important to develop an understanding of why tech-
nology affects stress, it is just as important to determine how organiza-
tions may alter stress through manipulation of other organizational variables.
Assuming that technology is a major source of constraint, in that it cannot
be directly or easily manipulated by organizations, it would be valuable
investigate how and to what extent levels of stress may be altered by
modification to other variables which may be directly manipulated by
organizations. Noting the limited predictive capability of technology
in determining stress, it is possible that other organizational variables
may have a modifying influence which has yet to be determined. While the
findings are not conclusive, for practitioners, it would seem that the
study has value in identifying possible differences in stress not only
across nursing subunit specialties but across the nursing population as
well. Furthermore, the study may assist in helping to identify how
technology may influence stress and therefore minimize its effects. At
the very minimum our findings would suggest that to effect changes in
stress, this will require different strategies for different subunits.

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APPENDIX A

NURSING STAFF QUESTIONNAIRE

QUESTIONNAIRE TO BE COMPLETED BY NURSING STAFF

University of Alberta
Department of Organizational Analysis and the
Division of Health Services Administration

Spring, 1977

This is a study about nurses. The main purpose of the study is to learn how different types of nursing units operate and what makes a hospital a good place in which to work.

Your hospital is one of many similar hospitals in Alberta which has been selected to participate in the present study. In each hospital, we need the cooperation of many people like yourself because the success of the study will depend on the information that you give us.

To find out how you think and feel about your unit and the people who work in it, we would like you to fill out this questionnaire. Your individual answers are <u>completely</u> confidential and will <u>remain anonymous</u> - <u>do not</u> sign your name to the questionnaire.

The final value of our study will depend upon the frankness and care with which you answer the questions. There are no right or wrong answers. The main idea is for you to answer the questions the way you feel - the way things seem to you personally. Your answers will be combined with those of many other nurses and the results of the research will be available to you when the research is completed.

Thank you very much for your cooperation.

Peggy Overton, R.N.,M.H.S.A.
Rodney shneck, Ph.D
Co-Investigators

A. SOME GENERAL QUESTIONS ABOUT YOUR WORK

Beside each of the statements listed below, please indicate by checking ( ) the answer which most closely represents your opinion. In all questions you are asked to estimate a percentage.

percent %

	0-5	6-25	26-50	51-75	76-100
1. In your estimation, what percentage of patients on your unit needs nursing observation more often than once every half hour?	( )	( )	( )	( )	( )
2. What percentage of the patients would you say have similar health probelms (or diagnosis)?	( )	( )	( )	( )	( )
3. For some patients more than others it is important to know complete details of their previous health history. For what percentage of the patients on your unit is it critical that the nurse know a detailed history from birth to present time?	( )	( )	( )	( )	( )
4. What percentage of the patients on your unit has complex problems that are not well understood?	( )	( )	( )	( )	( )
5. What percentage of the nurses' work involves performing technical procedures and special tests?	( )	( )	( )	( )	( )
6. What percentage of patients require the use of technical equipment (i.e., suctions, cardiac monitors, respirators, etc.)?	( )	( )	( )	( )	( )
7. What percentage of the patients on your unit on an average day rquire an intravenous infusion?	( )	( )	( )	( )	( )

8. On some units there is a greater
   pressure to give nursing care
   quickly because of patients'
   critical conditions. What
   percentage of the time is there
   a greater time pressure on your
   unit?   ( )   ( )   ( )   ( )   ( )

9. What percentage of the time does
   improvement in patients
   conditions really have to depend
   upon the skillful work and
   initiative of nursing
   personnel?   ( )   ( )   ( )   ( )   ( )

10. What percentage of your work
    requires the analysis of complex
    problems?   ( )   ( )   ( )   ( )   ( )

11. What percentage of the patients
    have written goals for their
    individualized care in the Kardex
    (nursing care plan)?   ( )   ( )   ( )   ( )   ( )

12. What percentage of the nursing
    care on your unit is directed at
    meeting patients' socio-
    psychological needs (as opposed
    to physical needs)?   ( )   ( )   ( )   ( )   ( )

13. What percentage of the nursing
    care given relies upon nurses'
    intuition rather than on set
    procedures or routines?   ( )   ( )   ( )   ( )   ( )

14. What percentage of the nursing
    care procedures are similar for
    most of the patients on your
    unit?   ( )   ( )   ( )   ( )   ( )

15. What percentage of the decisions
    made by nurses during their work
    are repetitive from one day to
    the next?   ( )   ( )   ( )   ( )   ( )

16. What percentage of new nurses
    starting work on your unit
    would find the nursing care
    specialty difficult to
    learn?   ( )   ( )   ( )   ( )   ( )

	0-5	6-25	26-50	51-75	76-100

17. What percentage of your work
changes in direct response to
chages in patients' conditions
or moods?

	0-5	6-25	26-50	51-75	76-100

18. What percentage of the time
are you highly dependent upon
other nurses on your unit for
help and/or are they dependent
upon you for help?

	0-5	6-25	26-50	51-75	76-100

19. In your estimation, what
percentage of the decisions
made by the nursing staff of
your unit are made independently
from physicians?

	0-5	6-25	26-50	51-75	76-100

B. ABOUT HOW YOU WORK

Beside each of the statements listed below, please indicate whether
you strongly agree, agree, disagree, or strongly disagree.

	Strongly Agree	Agree	Disagree	Strongly Disagree
20. Nurses on your unit have frequent verbal or written communication with medical staff.	( )	( )	( )	( )
21. On this unit, there are many emergencies when immediate nursing action must be taken in response to changes in patients' conditions.	( )	( )	( )	( )
22. Nurses are allowed to leave the nursing station without informing other nurses they are leaving.	( )	( )	( )	( )
23. On this unit, nurses have a great deal of freedom and few rules and procedures to follow.	( )	( )	( )	( )

	Strongly Agree	Agree	Disagree	Strongly Disagree
24. Even small matters about patients have to be referred to a physician for a final decision.	( )	( )	( )	( )
25. Nurses on this unit have a great deal of freedom in deciding nursing interventions for patients without asking physicians.	( )	( )	( )	( )
26. Most nurses on your unit follow their own ideas in implementing nursing care	( )	( )	( )	( )
27. There can be little nursing action taken on this unit until a physician writes	( )	( )	( )	( )
28. No matter what situation arises on this unit, we have procedures to follow in dealing with it	( )	( )	( )	( )
29. If the nursing staff want to make their own decisions about nursing care they are quickly discouraged here	( )	( )	( )	( )
30. On this unit, there are clear lines of reporting and authority	( )	( )	( )	( )
31. There are very precise definitions of nurses' duties on this unit	( )	( )	( )	( )
32. Responsibilities and authority are emphasized on this unit	( )	( )	( )	( )
33. Nurses frequently participate in decisions regarding what nursing care will be given to individual patients on this unit	( )	( )	( )	( )

	Strongly Agree	Agree	Disagree	Strongly Disagree
34. Nurses frequently participate in decisions to change or adopt new nursing techniques on this unit	( )	( )	( )	( )
35. There can be little action taken on this unit until the Headnurse approves the decision	( )	( )	( )	( )
36. Even small matters about patients have to be referred to the Headnurse for final decision	( )	( )	( )	( )
37. Nurses have to ask the Headnurse before doing almost anything	( )	( )	( )	( )

C. ABOUT WORKING WITH YOUR HEADNURSE

38. To what extent is your Headnurse willing to listen to your problems? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

39. To what extent does your Headnurse have a sincere and friendly interest in the personal welfare and problems of your nursing group? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

40. How much does your Headnurse encourage people to maintain high standards of nursing care? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

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41. To what extent does your Headnurse offer new ideas for solving job-related problems? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

42. To what extent does your Headnurse encourage people who work for her to exchange opinions and ideas? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

43. How well does your Headnurse handle the technical side of her job - for example, general expertise, knowledge of job, technical skills needed, etc.? (Check one)

_____ extremely well   _____ not too well
_____ very well   _____ not well at all
_____ fairly well

44. To what extent do you feel you personally can influence the activities and decisions of your Headnurse on matters that are of concern to you? (Check one)

_____ to a great extent   _____ to some exent
_____ to a considerable extent   _____ to no exent
_____ to a moderate extent

45. How frequently is work time lost because your Headnurse fails to do the proper planning and scheduling? (Check one)

_____ quite frequently   _____ almost never
_____ frequently   _____ never
_____ occasionally

46. How much confidence and trust do you have in your Headnurse? (Check one)

_____ none   _____ a great deal
_____ not very much   _____ complete confidence
_____ a fair amount   and trust

D. ABOUT WORKING WITH EACH OTHER

47. How friendly and easy to approach are the nurse on your unit? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

48. To what extent do nurses on your unit encourage high standards of nursing care? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

49. To what extent do nurses on your unit provide the help you need so you can plan, organize, and schedule work ahead of time? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

50. To what extent do nurses on your unit offer each other new ideas for solving job-related problems? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

51. How much do nurses on your unit encourage each other to work as a team? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

52. To what extent do nurses on your unit exchange opinions and ideas? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

53. To what extent does your unit plan together and coordinate its efforts? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

54. To what extent is information about important events and situations shared within your nursing unit? (Check one)

_____ to a very little extent   _____ to a great extent

_____ to a little extent   _____ to a very great extent
_____ to some extent

55. To what extent do you have confidence and trust in the nurses
on your unit? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

56. To what extent do the nurses in your unit work independently
from other nurses on the unit to accomplish their own assigned
tasks? (Check one)

_____ to a very little extent   _____ to a great extent
_____ to a little extent   _____ to a very great extent
_____ to some extent

E. ABOUT COMMUNICATION

57. In general, how do you feel about the kind of communication
which you receive from your Headnurse? (Check one)

_____ completely adequate   _____ rather inadequate
_____ very adequate   _____ inadequate
_____ fairly adequate

58. In general, how do you feel about the kind of information and
communication which you receive from attending physicians in
your unit? (Check one)

_____ completely adequate   _____ rather inadequate
_____ very adequate   _____ inadequate
_____ fairly adequate

59. How often do you usually talk with your Headnurse or immediate
superior about each of the following things? (Check one for
each item)

	About once a week or less	2 or 3 times a week	Several times a week	About once a day	Several times a shift or more
About ways in which patient care could be improved	( )	( )	( )	( )	( )

	About once a week or less	2 or 3 times a week	Several times a week	About once a day	Several times a shift or more
About ways in which nursing supervision could be improved	( )	( )	( )	( )	( )
About work	( )	( )	( )	( )	( )
About employee wages, hours, or benefits	( )	( )	( )	( )	( )
About ways in which working relations with other departments in the hospital could be improved	( )	( )	( )	( )	( )
About ways in which satisfaction or morale among nursing personnel could be improved	( )	( )	( )	( )	( )

60. How many times per day on average, do you confer informally (to discuss your day-to-day work problems) with other members of the nursing staff or your unit? (Check one)

_____ no times a day   _____ 2 or 3 times a day
_____ once a day   _____ many times a day

F. ABOUT SUPERVISION

Please indicate by checking ( ) the answer which most closely represents your opinion.

	percent %				
	0-5	6-25	26-50	51-75	76-100
61. What percentage of your work is checked ore reviewed by your Headnurse?	( )	( )	( )	( )	( )
62. What percentage of your work is checked or reviewed by attending physicians?	( )	( )	( )	( )	( )

percent %

	0-5	6-25	26-50	51-75	76-100
63. What percentage of your oversights or mistakes is likely to be called to your attention by your colleagues?	( )	( )	( )	( )	( )
64. What percentage of your oversights or mistakes is likely to be called to your attention by attending physicians?	( )	( )	( )	( )	( )
65. What percentage of the time is it necessary to follow strict nursing procedures?	( )	( )	( )	( )	( )
66. What percentage of the time do you check to see if you are following the rules?	( )	( )	( )	( )	( )

G. ABOUT STRESS

Listed below are a number of situations which may or may not be stressful on nursing units.

(a) Please indicate how stressful each situation is to you on your unit by checking the appropriate space.

(b) Please indicate how often the situation occurs on your unit by checking the appropriate space in the enclosed box.

67. How stressful is it if nursing staff have insufficient resources to do all the things that should be done?

_____ very little stress
_____ a little stress
_____ some stress
_____ quite a bit of stress
_____ very much strees

How often does this situation occur on your unit?
_____ never   _____ often
_____ rarely   _____ always
_____ sometimes

68. How stressful is it if nursing staff are unable to satisfy the conflicting demand of various people (e.g., patients, physicians, other paramedical staff, etc.?)

_____ very little stress
_____ a little stress

How often does this situation occur on your unit?

_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

69. How stressful is it if the scope or responsibilities of your job are unclear?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

70. How stressful is it if there are personality conflicts among nursing staff members?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

71. How stressful is it if nursing staff are insecure in their nursing knowledge or skills?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

72. How stressful is it if physicians appear impatient with or hypercritical of nursing staff?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

73. How stressful is it if physicians are not available when they are wanted?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

74. How stressful is it if physicians do not communicate well with nursing staff?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

75. How stressful is it if a patient's behavior or personality is troublesome?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

76. How stressful is it if a patient is very ill and his prognosis is poor?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

77. How stressful is it if nursing staff are caring from mostly elderly patients?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

78. How stressful is it if nursing staff must perform painful but life-perserving treatments for patients?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

79. How stressful is it if a patient's family is not informed of the condition of one of their members?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress   _____ rarely   _____ always
_____ very much strees   _____ sometimes

80. How stressful is it if a patient's family is upset or anxious about one of their members?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?
    _____ some stress   _____ never   _____ often
    _____ quite a bit of stress   _____ rarely   _____ always
    _____ very much strees   _____ sometimes

81. How stressful is it if scheduling and staffing are unpredictable or there are irregularities in the way time-off is scheduled?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?
    _____ some stress   _____ never   _____ often
    _____ quite a bit of stress   _____ rarely   _____ always
    _____ very much strees   _____ sometimes

82. How stressful is it if the workload is so consistently heavy that the nursing staff lack energy for leisure activities?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?
    _____ some stress   _____ never   _____ often
    _____ quite a bit of stress   _____ rarely   _____ always
    _____ very much strees   _____ sometimes

83. How stressful is it if the nursing staff are exposed repetitively to suffering, death and dying?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?
    _____ some stress   _____ never   _____ often
    _____ quite a bit of stress   _____ rarely   _____ always
    _____ very much strees   _____ sometimes

84. How stressful is it if the previous shift leave unfinished work that should have been handled during their shift?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?
    _____ some stress   _____ never   _____ often
    _____ quite a bit of stress   _____ rarely   _____ always
    _____ very much strees   _____ sometimes

85. How stressful is it if the nursing staff are frequently faced with crisis situations which are not considered normal work?

    _____ very little stress   How often does this situation
    _____ a little stress   occur on your unit?

_____ some stress   _____ never   _____ often
_____ quite a bit of stress _____ rarely   _____ always
_____ very much strees   _____ sometimes

86. How stressful is it if nursing staff are asked to relieve on other units of the **same** specialty?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress _____ rarely   _____ always
_____ very much strees   _____ sometimes

87. How stressful is it if nursing staff are asked to relieve on other units of a **different** specialty?

_____ very little stress   How often does this situation
_____ a little stress   occur on your unit?
_____ some stress   _____ never   _____ often
_____ quite a bit of stress _____ rarely   _____ always
_____ very much strees   _____ sometimes

H. ABOUT JOB SATISFACTION

Beside each of the statements listed below, please indicate whether you are strongly satisfied, satisfied, sometimes satisfied, dissatisfied, or very dissatisfied.

	Strongly Satisifed	Satisfied	Sometimes Satisfied	Dis-satisfied	Very Dis-satisfied
88. How satisfied are you with your opportunity on the job to fully use your skills and abilities?	( )	( )	( )	( )	( )
89. Are you satisfied with the feeling of accomplishment you get from the work you are doing? ( )		( )	( )	( )	( )
90. Are you satisfied with the opportunity your job allows you to do important and worthwhile things?	( )	( )	( )	( )	( )

	Strongly Satisifed	Satisfied	Sometimes Satisfied	Dis-satisfied	Very Dis-satisfied
91. Overall, how satisfied are you with the kind or work you do?	( )	( )	( )	( )	( )
92. How satisfied are you with your present Headnurse?	( )	( )	( )	( )	( )
93. How satisfied are you with your fellow co-workers?	( )	( )	( )	( )	( )
94. How satisfied are you with the types of patients you must deal with?	( )	( )	( )	( )	( )
95. How satisfied are you with the doctors you normally work with?	( )	( )	( )	( )	( )
96. How satisfied are you with your present salary?	( )	( )	( )	( )	( )
97. How satisfied are you with the physical conditions of the work place?	( )	( )	( )	( )	( )
98. Are you satisfied with your workload? ( )	( )	( )	( )	( )	

I. ABOUT YOURSELF

99. How long have you been working on this nursing unit?

_____ 6 months or less
_____ 6 months to 1 year
_____ 1 year to 3 years

_____ 3 years to 6 years
_____ 6 years to 9 years
_____ 9 years or more

100. How old are you?

_____ under 20 years
_____ 20 to 29 years
_____ 30 to 39 years

_____ 40 to 49 years
_____ 50 years or more

101. What is your position? (Check one)

_____ Staff Nurse   _____ Team Leader
_____ Nursing Aide   _____ Ward Aide
_____ Nursing Orderly   _____ Other specify
_____ Assistant Headnurse _____

102. What is the major specialty of your unit? (Check one)

_____ medical   _____ auxiliary
_____ surgical   _____ paediatric
_____ intensive care   _____ psychiatric
_____ rehabilitation   _____ other: specify
_____ nursing home   _____

103. What level of nursing education have you completed? (Check more than one if necessary)

_____ Master's degree   _____ C.N.A. Certificate
_____ Bachelor's degree   _____ Nursing Orderly
                                 Certificate
_____ R.N. Diploma   _____ Other: specify
_____ R.P.N. Diploma   _____
Clinical post-graduate course: specialty _____

104. How many years of nursing experience have you had since completion of your basic nursing education program? (Check one)

_____ less than 1 year   _____ 6 to 9 years
_____ 1 to 3 years   _____ 9 years or more
_____ 3 to 6 years

THANK YOU VERY MUCH FOR YOUR COOPERATION.