

Pain, Anxiety and Analgesics: A Comparative Study of Elderly and Younger Surgical Patients

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RÉSUMÉ

Afin de déterminer si l'expérience postopératoire diffère entre les patients âgés et les patients plus jeunes, 41 patients âgés (65 ans et plus) et 249 patients plus jeunes (moins de 65 ans) participèrent à cette étude. La douleur et l'anxiété furent mesurées les deuxième et troisième jours postopératoires. L'anxiété fut aussi mesurée avant la chirurgie. Le nombre d'analgésiques prescrits et donnés, ainsi que le délai entre l'administration du dernier analgésique et l'évaluation de la douleur furent notés. Tandis que l'intensité de la douleur ne variait pas significativement, le nombre d'analgésiques donnés était significativement différent, les personnes âgées en recevant moins. Les patients des deux groupes reçurent moins d'analgésiques le troisième jour postopératoire, indépendamment de l'intensité de la douleur. Les sujets des deux groupes choisirent les descripteurs de douleur de façon presque identique. De fortes associations furent observées entre l'anxiété postopératoire et la douleur, alors que l'anxiété préopératoire et la douleur, ne semblèrent pas reliées. Il fut conclu que les professionnels de la santé traitent la douleur des personnes âgées et plus jeunes de façon similaire, et que les personnes âgées requièrent moins d'analgésiques.

ABSTRACT

To determine if the post-operative experience of elderly and younger patients is different, data were collected from 41 elderly patients (65 years and older) and 249 younger patients (under 65 years). Pain and anxiety were assessed on days two and three post-operative. Anxiety was also measured pre-operatively. Amount of analgesic ordered and given, and time of last analgesic prior to pain assessment were recorded. Significant differences were found in the number of analgesics given, with the elderly receiving fewer analgesics. There were no significant differences in pain

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intensity levels. In both age categories patients were given less analgesic on the third post-operative day, regardless of pain intensity. The two groups chose almost identical pain descriptors. In both groups strong associations were observed between post-operative anxiety and pain, but pre-operative anxiety seemed unrelated to post-operative pain levels. It was concluded that health care professionals manage pain similarly for both younger and elderly patients, but the elderly require less analgesic for pain control.

The number of elderly patients undergoing surgery is increasing as our population ages, but little is known about the post-operative experience of these patients. More specifically, the pain experience of the elderly in the acute post-operative period has received scant attention.

There is considerable question about how the elderly perceive and tolerate pain. Studies have revealed a relationship between age and pain perception, suggesting that pain perception decreases with age (Clark & Mehl, 1971; Collins & Stone, 1966; Harkins & Chapman, 1977), but these studies used methodologies that could have contributed to a lesser response in the elderly. In one study of 41,119 patients in a health clinic, tolerance of pain was seen to decrease with age. However, the authors noted that the results were not consistent with those of clinical studies (Woodrow, Friedman, Siegelau, & Collen, 1972). Bellville and colleagues (1971) studied 712 post-operative patients, and found a strong association between age and pain relief, concluding that elderly patients obtain greater relief from analgesics.

There is some suggestion that health professionals respond differently to expressions of pain in elderly and younger patients. In four studies of post-operative outcomes, older patients were reported to receive fewer doses of analgesics than younger patients (Brown, Buchanan & Hsu, 1978; Faherty & Grier, 1984; Hargreaves, 1987; Johnson et al., 1978), but none of these studies compared the number of analgesics given with patients' perceived pain levels. Although Faherty and Grier (1984) noted that the number of analgesics prescribed for elderly patients was significantly less than for younger patients, the amount prescribed did not account for all the differences in the amount administered, that is, nurses gave even less than prescribed. Nayman (1979) found that younger post-operative patients initially required more morphine than older patients, but after two days the pattern reversed. It is not clear, then, whether the elderly receive fewer analgesics because they have less pain, or because health professionals are less attentive to their expressions of pain.

Another factor that may affect patients' pain levels is anxiety. A number of researchers have demonstrated a relationship between anxiety and post-operative pain (Jeans, Mackenzie & Taylor, 1983; Martinez-Urrutia, 1975; Scott, Clum & Peoples, 1983), but no studies were found in which the relationship between age, anxiety and pain were reported.

The purpose of this study was to determine whether the pain experience of the elderly patient in the acute post-operative period differs from that of the younger surgical patient. Quality and intensity of reported pain and amount of analgesic ordered and given were compared between age categories, and relationships between pain and anxiety examined.

Method

The research was conducted in an 843 bed health sciences centre as part of a larger study examining relationships between environment, anxiety and post-operative recovery in elective surgical patients. Data were collected for 16 weeks. The sample consisted of all surgical patients undergoing elective orthopedic, gynecologic or general surgery who agreed to participate and met the following criteria: age 18 years or older, able to read/speak English, undergoing general anaesthetic, returning to the pre-operative nursing unit following surgery, and no recorded history of psychiatric problems.

Post-operative pain was examined using the McGill-Melzack Pain Questionnaire (MMPQ) (Melzack, 1975). Acceptable levels of face, construct, concurrent and discriminant validity have been reported for this instrument (Reading, 1983). In completing the questionnaire, the patient is required to select from among 78 descriptors those words that apply to his/her present pain. The words are divided into four categories – sensory, affective, evaluative, and miscellaneous – and the words within each category are arranged in a hierarchy according to strength or intensity. For this study, the Pain Rating Index (PRI) was calculated as the sum of the scale values of each of the words in the instrument. A straight count of words chosen, a sum of words chosen in each category (sensory, affective, evaluative, and miscellaneous) and the words most commonly chosen by each age group to describe their pain were tabulated. Present Pain Intensity (PPI) was determined by the patient as representative of his current pain level, on a scale of 0–5 (with 0 being no pain, and 5 excruciating pain).

Time of last analgesic dose relative to administration of the questionnaire was coded into four categories: 1 = no analgesic; 2 = less than 15 or greater than 240 minutes (ineffective range); 3 = 15–29 minutes or 120–240 minutes (questionable range); 4 = 30–119 minutes (peak range). Analgesics were coded as follows: 1 = meperidine 0–75 mg or morphine 0–10 mg; 2 = meperidine 76–125 mg or morphine 11–15 mg; 3 = Tylenol #2 or 292 1–2 tablets or codeine 30–60 mg (Grossman & Sheidler, 1987).

To permit analysis of effect of type of surgery on reported pain, each surgical procedure was coded by the investigators into one of six categories: major or minor gynecologic, orthopedic or general surgery. Consideration was given to anticipated overall effect on the particular patient. Coding was validated by three clinical experts (experienced surgical nursing unit supervisors).

The State Scale of the State-Trait Anxiety Inventory (SAI) was used to assess anxiety. These anxiety scores, which range from 20 to 80, have been shown sensitive to changes that accompany the surgical experience (Martinez-Urrutia, 1975; Spielberger, 1980; Taenzer, Melzack, & Jeans, 1986).

A pilot study was conducted to refine methods and data collection. Following the pilot, research assistants were trained and an inter-rater reliability of .95 obtained on all instruments. Each patient was contacted three times, on the evening before surgery and on the second and third days post-operative. After consent was obtained in the pre-operative visit, the SAI was administered. On the second and third post-operative days, the SAI was again administered along with the MMPQ. Following the patient's discharge from hospital, information was collected from the chart, including number and strength of analgesics ordered and given, and time of last anal-

Table 1
Demographic characteristics and surgical categories by group

	Elderly (n = 41)	Younger (n = 249)
Age ($\bar{x} \pm SD$)	70.9 \pm 5.0	40.8 \pm 12.2
Sex F/M	24/17	186/63
Surgery (n)		
Orthopedics	18 (44%)	58 (23%)
Gynecology	9 (22%)	107 (43%)
General	14 (34%)	84 (34%)

gesic prior to administration of the MMPQ.

All data were coded and entered into a computer. The Statistical Package for the Social Sciences (SPSSx) was used for data analysis. After editing checks were completed, descriptive statistics were determined on each variable and comparisons made by t-tests and chi-square tests. Adjustments for baseline differences were made by controlling for that variable when necessary (Analysis of Covariance). Relationships between variables were determined from Pearson correlations. Significance level was set at 0.05.

Results

There were 80 men and 210 women in the study divided into two age groups: 65 years and older (elderly, $n = 41$), and less than 65 years (younger, $n = 249$). Distribution of subjects by age, sex and surgical procedure is shown in Table 1. The elderly had an age range of 65–85 ($\bar{x} = 70.9 \pm 5.0$ years) while younger patients were between 19 and 64 years of age ($\bar{x} = 40.8 \pm 12.1$ years). There were significantly more females (186) than males (63) in the younger group compared to the older group (24 females, 17 males), primarily because of the number of gynecology patients ($p < .05$). Further analysis indicated that type of surgery was the main confounding variable and consequently, analysis of covariance was applied to between-group comparisons of pain measures, anxiety and analgesic to control for type of surgery.

On Day 2 post-operative there were no significant differences in pain levels as measured by PPI; patients in both groups averaged mild to moderate pain (elderly = 1.7; younger = 1.9). Nor was PRI significantly different between groups (elderly = 16.5; younger = 19.4; $p > .05$). PPI was not significantly different between groups on Day 3 (elderly = 1.3; younger = 1.7), but a significant ($p < .05$) difference was found in PRI (elderly = 10.3; younger = 15.6) (see Table 2).

An analysis of drugs ordered, by dose and frequency, revealed no significant differences between older and young age groups ($p > .05$).

There were, however, significant differences ($p < .05$) between groups in total number of analgesic doses given on both second and third post-operative days, with elderly patients receiving fewer doses. Whereas almost all drugs were ordered every four hours as necessary (i.e. 6 doses/24 hours), average number of doses given to elderly patients was 2.2 on Day 2 and 1.3 on Day 3, and to younger patients, 3.1 doses on Day 2 and 2.1 on Day 3 (see Table 2). However, type of analgesic and dose size administered did not differ significantly between groups ($p > .05$). Similarly, time of analgesic administration relative to time of questionnaire was not significantly different between age categories ($p > .05$). At the time the patient questionnaire was

Table 2
Pain level and analgesic dose comparisons by group

	Elderly ($\bar{x} \pm SD$)	Younger ($\bar{x} \pm SD$)	Prob.* Level
PPI - Day 2	1.7 \pm 0.7	1.9 \pm 1.1	NS
Day 3	1.3 \pm 1.0	1.7 \pm 0.7	NS
PRI - Day 2	16.5 \pm 9.7	19.4 \pm 14.8	NS
Day 3	10.3 \pm 9.5	15.6 \pm 15.9	.02
Number of Doses - Day 2	2.2 \pm 1.7	3.1 \pm 1.8	.01
Day 3	1.3 \pm 1.5	2.1 \pm 1.8	.02

*controlled for type of surgery

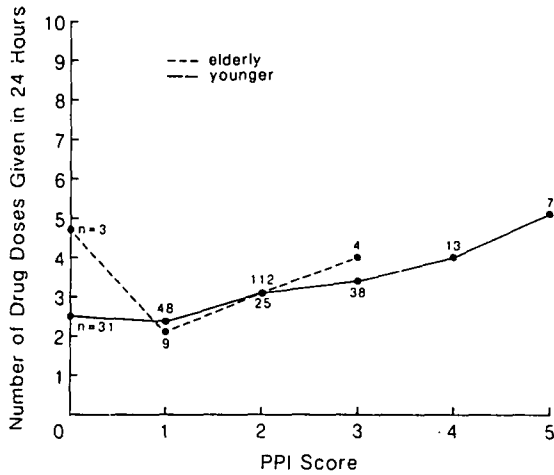


Figure 1: Pain Intensity and Analgesic Doses Day 2 Post-Op

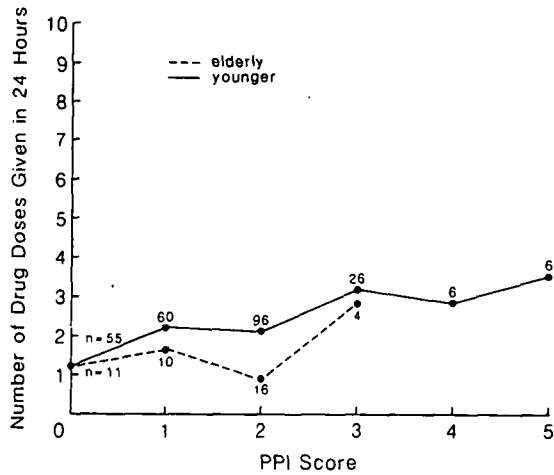


Figure 2: Pain Intensity and Analgesic Doses Day 3 Post-Op

administered, the largest percentage of patients on both days were in the ineffective analgesic range, as they had received analgesic less than 15 minutes or more than 240 minutes prior to questioning. Twenty per cent of elderly and 17 per cent of younger patients were in peak range of analgesic effectiveness on Day 2, having received analgesic within 30–119 minutes prior to questioning. On Day 3, 12 per cent of elderly and 14 per cent of younger patients were in the peak range.

A further examination of analgesic administration in relation to each level of pain intensity is shown in Figures 1 and 2. None of the patients in the elderly group experienced pain in the most severe categories ('horrible' and 'excruciating'), whereas a total of 20 (8%) younger patients on the second post-operative day and 12 (5%) on the third rated pain at the two highest intensity levels. However, there were no significant differences between groups in numbers of patients in each pain category ($p > .05$).

The graph shown in Figures 1 and 2 indicates that analgesic administration practices were similar for both groups. The slope of the graph on both post-operative days was positive, showing that patients with higher levels of pain were given more doses of analgesic. However, in both age groups the number of analgesics given was lower than the maximum number of doses ordered, even at the highest levels of pain intensity. At all levels of pain intensity, the amount of analgesic given was less on the third than the second post-operative day; even patients who complained of 'excruciating pain' received less analgesic on Day 3 than Day 2.

Words chosen on the MMPQ were examined to explore qualitative aspects of pain. On Day 2, elderly patients chose 11.1 7.8 words to describe their pain, while younger patients used 13.1 11.2 descriptors. Total number of words chosen on Day 3 were 7.5 6.7 for the elderly and 10.7 11.4 for younger patients. The differences were not statistically significant. An analysis of the number of words chosen in each of the following categories (sensory, affective, evaluative, and miscellaneous) revealed no significant differences between older and younger patients ($p > .05$). Lists of descriptors were similar for the two age groups. On Day 2 post-operative, the five words chosen most often by elderly patients were 'tender', 'annoying', 'tiring', 'sore', and 'tight', compared with younger patients' selection of 'annoying', 'sore', 'tender', 'tiring', and 'hurting'. Similarly, on Day 3, three ('tender', 'annoying', and 'tiring') of the five most frequently selected words were the same in both groups.

Pre-operative anxiety was significantly lower for elderly than younger patients ($p < .05$), but there were no significant differences in post-operative anxiety (see Table 3). There was no consistent relationship between pre-operative anxiety and post-operative pain in either group, although there were generally strong associations between post-operative anxiety and pain (see Table 4). Pre-operative anxiety was significantly correlated with post-operative anxiety ($p < .05$), particularly in the elderly patient.

Discussion

Data for this study were collection as part of a larger study resulting in unequal numbers of elderly and younger patients, and power of the tests is consequently reduced. Nonetheless, the findings are of interest, as few comparative prospective clinical studies between older and younger age groups have been undertaken.

Table 3
Anxiety level comparisons by group

Anxiety	Elderly ($\bar{x} \pm SD$)	Younger ($\bar{x} \pm SD$)	Prob.* Level
Pre-op	30.0 \pm 9.9	35.6 \pm 12.0	.01
Post-op Day 2	31.0 \pm 11.7	33.7 \pm 12.0	NS
Post-op Day 3	30.0 \pm 10.6	31.4 \pm 11.2	NS

*controlled for type of surgery

Table 4
Pain intensity and anxiety relationship by time and age category (correlation coefficients)

Pain Intensity	Anxiety Pre-op		Anxiety Day 2		Anxiety Day 3	
	Elderly	Younger	Elderly	Younger	Elderly	Younger
PPI Day 2	.23	.12	.37	.42*	.42*	.25
PPI Day 3	.45*	.17	.40*	.43*	.49*	.56*
Anxiety Pre-Op	--	--	.74*		.78	.46*
Anxiety Day 2	--	--	--	--	.88*	.66*

* $p < .05$

The time of completion of the pain questionnaire relative to analgesic administration was not standardized. As opioid absorption and peak effectiveness are known to vary substantially among individuals, regardless of age (Grossman & Sheidler, 1987; Sriwatanakul et al., 1983), "time since last dose" was categorized into fairly broad ranges to reflect individual differences more accurately.

Results of this study support previous findings indicating that elderly patients receive fewer analgesics than do younger patients (Faherty & Grier, 1984; Hargreaves, 1987). However, contrary to the findings of Faherty and Grier (1984), there were no differences in this study in drugs ordered for older and younger patients, either in type, amount or frequency. Therefore, observed differences in analgesic administration could not be attributed to physicians' orders.

Previous literature has implied that nurses are less sympathetic to expressions of pain in the elderly patient (Dudley & Holm, 1984; Faherty & Grier, 1984; Hargreaves, 1987). There was little evidence in this study to support that suggestion. Despite receiving fewer doses of analgesic, elderly patients reported the same pain intensity levels as younger patients, suggesting that elderly patients required less analgesic to maintain the same level of pain control as younger patients. This finding supports that of Bellville et al. (1971), who indicated that age is the most important variable in determining how much pain relief will be obtained from potent analgesics. Figures 1 and 2 reveal almost identical patterns of analgesic administration for the two age groups. Nurses appeared to be responding in a similar manner to pain levels of patients of all ages.

What can be questioned is why patients in both groups received less than the amount of analgesic ordered. At the time the pain questionnaire was administered, the largest number of patients, although only two or three days post-operative, had received their analgesic so long ago that it was no longer effective. The problem may be in the divergent definitions of the goal of pain

management, as there appears to be little consensus within health professional and patient populations. In recent studies, goals ranged from "complete relief of pain" to "pain relief only at peak periods of pain" (Weis et al., 1983), with most patients and health professionals reporting that complete relief for the patient was not an expectation (Cohen, 1980). Some patients have been reported as believing that a certain amount of pain builds character (Grossman & Sheidler, 1987).

In the present study, it could be argued that, for patients experiencing mild to moderate pain, pain management was appropriate; if the goal agreed upon between patient and nurse was a reduction in pain to manageable levels, patients were receiving adequate analgesic. Although research consistently shows pain management to be incomplete or inadequate (Marks & Sachar, 1973; Sriwatanakul et al., 1983; Weis et al., 1983), none of these studies have adequately explored the patient's point of view. The choice not to have further medication may be the patient's, who may refuse analgesic or fail to report pain, perhaps because of anticipated or experienced side effects of analgesic. Further research is required to determine why patients and health care workers do not seek complete relief from post-operative pain when many believe this to be an achievable goal (Sriwatanakul et al., 1983).

Of greater concern is the fact that some patients in the younger age group described their pain as 'horrible' or 'excruciating', even on their third post-operative day. For this small group of patients, pain control was grossly inadequate. Regardless of reported pain intensity, less analgesic was given to patients in both groups on their third post-operative day. This could suggest a decreasing responsiveness of nurses to expressions of pain as time since surgery lengthens, but again, it is also possible that patients were refusing analgesic.

The finding of a significantly lower PRI on Day 3 for elderly patients was of interest. Words chosen by the elderly were not as 'strong' as those chosen by younger patients to describe their pain. This could indicate that the pain had a somewhat different meaning for the two age groups. If this were the case, perhaps elderly patients refused analgesic more often than did younger patients.

The reasons for the observed differences at this point are largely speculative and could be a result of a variety of factors. For example, prior experience with pain could have an impact on reported pain levels, and presence of chronic pain could influence pain thresholds. Patients at different ages may have different criteria for reporting pain. Further research is required, with a particular emphasis on meaning of pain to the patient, and the relationship between that meaning and perceived need for analgesics. Relationships between pain and anxiety must be further explored. In this study, for both age categories relationships between pain and post-operative anxiety were moderately strong, supporting prior research (Jeans, Mackenzie, & Taylor, 1983). The relationships between pre-operative anxiety and post-operative pain were not consistent. However, the correlation between these variables was significant in the elderly group on Day 3. The elderly also had a significantly lower level of pre-operative anxiety. Perhaps their lower level of pre-operative anxiety contributed to a changed perception of the meaning of their pain. Another question that merits further exploration is why the elderly had lower pre-operative anxiety. How much does prior experience influence anxiety levels and pain perception?

Conclusion

In this study we found no evidence that the pain experience of the elderly post-operative patient is different in quality and intensity to that of the younger patient. The elderly appeared to require less analgesic to maintain the same level of pain control; however, this may be confounded by the fact that the majority of PPIs were determined outside the time for maximum analgesic efficacy. There was no evidence that nurses and physicians respond differently to post-operative pain of the elderly. In most instances in both patient groups, nurses administered less analgesic than required for complete pain relief. However, this study was unable to determine whether the choice was that of the patient or nurse. Physicians' ordering practices were essentially uniform; there were no differences in drugs ordered for elderly or younger patients. Existence of a relationship between post-operative anxiety and pain was demonstrated in both patient groups, although post-operative pain seemed unrelated to pre-operative anxiety. Further research into knowledge, attitudes and beliefs held by patients and health care professionals is required to explore factors underlying these findings.

References

- Bellville, J.W., Forrest, W.H., Miller, E., & Brown, B.W. (1971). Influence of age on pain relief for analgesics. A study of post-operative patients. *JAMA*, *217*, 1835-1840.
- Brown, J.S., Buchanan, D., & Hsu, L. (1978). Differences in sick role behavior during hospitalization after open heart surgery. *Research in Nursing and Health*, *1*, 37-48.
- Clark, W.C., & Mehl, L. (1971). Thermal pain: A sensory decision theory analysis of the effect of age and sex on d' , various response criteria and 50% pain threshold. *Journal of Abnormal Psychology*, *78*, 202-212.
- Cohen, F.L. (1980). Postsurgical pain relief: Patients' status and nurses' medication choices. *Pain*, *9*, 265-274.
- Collins, L.G., & Stone, L.A. (1966). Pain sensitivity, age and activity level in chronic schizophrenics and normals. *British Journal of Psychiatry*, *112*, 33-35.
- Dudley, S.R., & Holm, K. (1984). Assessment of the pain experience in relation to selected nurse characteristics. *Pain*, *18*, 179-186.
- Faherty, B.S., & Grier, M.R. (1984). Analgesic medication for elderly people post-surgery. *Nursing Research*, *33*, 369-372.
- Grossman, S.A., & Sheidler, V.R. (1987). An aid to prescribing narcotics for the relief of cancer pain. *World Health Forum*, *8*, 525-529.
- Hargreaves, A. (1987). Implementing TENS to control post-operative pain. Unpublished master's thesis, University of Alberta, Edmonton.
- Harkins, S.W., & Chapman, R.C. (1977). The perception of induced dental pain in young and elderly women. *Journal of Gerontology*, *32*, 428-435.
- Jeans, M.E., Mackenzie, F., & Taylor, H. (1983). Hospital stress: A comparison between long and short-stay patients. In M. Karvitz & J. Lauria (Eds.), *Nursing research: A base for practice* (pp. 391-401). Proceedings of the 9th National Conference, McGill University School of Nursing, Montreal, Quebec.
- Johnson, J.E., Rice, V.H., Fuller, S., & Endress, M.P. (1978). Sensory information, instruction in coping strategy and recovery from surgery. *Research in Nursing and Health*, *1*, 4-17.

- Márks, R.M., & Sachar, E.G. (1973). Undertreatment of medical inpatients with narcotic analgesics. *Annals of Internal Medicine*, 78, 173-181.
- Martinez-Urrutia, A. (1975). Anxiety and pain in surgical patients. *Journal of Consulting and Clinical Psychology*, 43, 437-442.
- Melzack, R. (1975). The McGill pain questionnaire: Major properties and scoring methods. *Pain*, 1, 277-299.
- Nayman, J. (1979). Measurement and control of postoperative pain. *Annals of the Royal College of Surgeons of England*, 61, 419-426.
- Reading, A.E. (1983). The McGill Pain Questionnaire: An appraisal. In R. Melzack (Ed.), *Pain measurement and assessment*, (pp. 55-61). New York, NY: Raven.
- Scott, L.C., Clum, E.A., & Peoples, J.B. (1983). Pre-operative predictors of post-operative pain. *Pain*, 15, 283-293.
- Spielberger, C.D., (1980). Manual for the State-Trait Anxiety Inventory. *Consulting Psychologists*. Palo Alto, CA.
- Sriwatanakul, K., Weis, O.F., Alloza, J.L., Kelvie, W., Weintraub, M., & Lasagna, L. (1983). Analysis of narcotic analgesic usage in the treatment of post-operative pain. *JAMA*, 250, 926-929.
- Taenzer, P., Melzack, R., & Jeans, M.E. (1986). Influence of psychological factors on postoperative pain, mood and analgesic requirements. *Pain*, 24, 331-342.
- Weis, O., Sriwatanakul, K., Alloza, J., Weintraub, M., & Lasagna, L. (1983). Attitudes of patients, housestaff and nurses toward post-operative analgesic care. *Anesthesia and Analgesia*, 62, 70-74.
- Woodrow, K.M., Friedman, G.D., Siegelau, A.B., & Collen, M.F. (1972). Pain tolerance: Differences according to age, sex and race. *Psychosomatic Medicine*, 34, 548-556.