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PLAYING IT SHREWD, NOT SHRILL

We have abundant evidence now that nursing needs access to more sources of funding for its growing research enterprise than are currently available. This demand arises from the fact that the number of nurse researchers is increasing each year and the number of research studies undertaken by these nurse researchers is increasing in complementary fashion. Hardy's article in the last edition (22,3) lamented the fact that, according to some reports, the amount of research funding per study is decreasing rather than increasing. This may or may not be a problem. If it means that a large number of small feasibility or pilot studies is being funded, along with a goodly number of large scale studies, it is probably not a problem. Rather, it may reflect a number of junior researchers applying for funds for their developmental work. The amount of funds required for these types of studies is small, but the achievement of funding is usually a milestone in the careers of these researchers.

It is important to acknowledge the other milestones that nursing research in Canada has achieved recently keeping in mind the implications of these milestones for our need of funding. The *Globe and Mail*, our so-called national newspaper, reported on Dr. Francine Ducharme, the first PhD graduate in Nursing in Canada. Both McGill University, her alma mater and the University of Montreal her sponsoring university, can be proud of her and their contributions to her success. We also can take pride in the fact that the University of Alberta has received its long-promised funding to mount a full-scale PhD program in nursing. This will be the first approved and funded program in the country, but we can anticipate at least three more programs (McGill-Montreal, the University of British Columbia and the University of Toronto) establishing PhD programs within the next twelve to eighteen months. Once these programs are operating we will have reasonable geographical access to doctoral work for nurses in Canada. Another recent helpful announcement has been that, in Ontario, an additional $350,000 per year was being provided for ten years specifically for career development specifically for nurses and rehabilitation scientists. This latter funding is added to the continuing pool of funds to which nurses have access for career awards in Ontario. All of these positive incidents add pressure on the limited resource pool of research project funding.

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Where do we go from here to get the research funds we need? Leslie Degner, in an editorial in the Spring 1990 *Canadian Journal of Nursing Research*, noted the success that American nurses had when they concentrated their efforts to achieve the National Center for Nursing Research. It is important to remember the opposition that nurses in the United States encountered, particularly from physicians, when they began their pursuit for a national institute for nursing research that could co-exist with the other national institutes of health. They settled for a centre for nursing research which has proven to be a wonderful consolation prize. As a Canadian equivalent, Degner suggests that we mount a lobby to achieve a special committee within the Medical Research Council in which the majority of the membership would be nurses and would review grants for nursing research. Hardy supports this in her article.

I think it is important for us to consider seriously whether this is the best funding mechanism for us. The Medical Research Council of Canada is a physician-dominated council and it is unlikely that in any of our lifetimes it will be other than a physician-dominated council. The executive of the council is a closed shop and we are unlikely ever to get access to it, let alone any power on it. The dentists and the pharmacists who overcame physician resistance to their participation in MRC and achieved their own review committees are still outsiders when it comes to issues of power and control. Pharmacists live under constant threat of loss of their committee, and, they are male dominated! Our experience with the MRC/NHRDP special initiative has not been wonderful. We do not have control of the processes that determine who is funded and who is not. Many individuals and faculties have had painful assaults on their self-esteem.

From my perspective, one of the most negative aspects of this and other experiences with MRC is that we are becoming bitchy and shrill as a discipline. I hear myself whining about unfair treatment by MRC and it is an unpleasant sound. We are better and smarter than this. Let's take a long hard look at what funding mechanism would serve us best. I support Degner, Hardy and Jeans in their calls for a converted effort to achieve what we want; however, increasingly I question whether a nursing research committee in MRC is the best that we can do. I fear it will commit us to whining in perpetuity.

Perhaps we should explore with the other female-dominated disciplines, such as physiotherapy, occupational therapy, communication disorders and nutrition, the possibility of a Health and Rehabilitation Research Council. In Canada, this may be the equivalent target to the American nurses' Center for Nursing Research. Before we decide to put a concerted effort into achieving a nursing committee with MRC let's explore other possibilities. The academic physiotherapists in Canada recently submitted an impressive

proposal for a special Physio committee of MRC that would fund both project and programmatic research. They avoided the career support route because of our experience. We must track what happens to this proposal to help us decide how to proceed; but, I suggest we talk to the physiotherapists to see if they would be interested in pursuing alternative paths. Whatever we decide, let's play shrewd and not shrill.

Dorothy Pringle

JOUER AU PLUS FIN, SANS ÉCLAT INTEMPESTIF

Tout concourt à prouver que les sciences infirmières doivent avoir accès à un plus grand nombre de sources de financement pour subvenir à leurs projets de recherche. Cette demande procède du fait que le nombre de chercheurs-infirmiers(ières) augmente chaque année de même que le volume de recherches. L'article de Hardy (CJNR: 23,3) déplore le fait que, selon certains rapports, le montant des subventions de recherche par projet décroît plus qu'il n'augmente. Cela peut être un problème ou pas. Si cela signifie qu'un nombre important de petits projets de faisabilité ou de projets pilotes sont subventionnés au même titre qu'un bon nombre d'études de grande envergure, il ne s'agit probablement pas d'un problème. Cela reflète plutôt le nombre de jeunes chercheurs qui sollicitent des crédits pour leurs projets de perfectionnement. Le montant des fonds nécessaires à ce type de recherche est peu élevé mais l'octroi de subventions est en règle générale important pour la carrière de ces chercheurs.

Il est important de tenir compte des autres percées opérées au titre de la recherche infirmière au Canada, tout en gardant à l'esprit les conséquences qu'ont ces percées sur nos besoins en matière de crédits. Le *Globe and Mail*, notre quotidien national, a fait paraître un article sur Francine Ducharme, la première titulaire d'un PhD en sciences infirmières du Canada. L'Université McGill, son alma mater et l'Université de Montréal, qui l'a parrainée, peuvent être fières à juste titre de son succès et du rôle qu'elles ont joué à cet égard. Nous pouvons également nous enorgueillir du fait que l'Université d'Alberta a reçu les fonds attendus depuis longtemps pour créer un programme de PhD en sciences infirmières. Il s'agira du premier programme subventionné et approuvé du Canada; trois autres au moins devraient prendre corps (McGill-Montréal, Université de Colombie- Britannique et Université de Toronto) dans les douze à dix-huit prochains mois. Lorsque ces programmes seront en place, nous disposerons d'un accès géographique raisonnable aux études de doctorat au Canada. Par ailleurs, en Ontario, 350 000 $ par an seront affectés pendant dix ans au perfectionnement professionnel des infirmières et des spécialistes de la réadaptation. Cette somme s'ajoute aux crédits réservés au perfectionnement des infirmières de l'Ontario. Tous ces faits exercent néanmoins une pression supplémentaire sur les fonds déjà limités qui existent pour les projets de recherche.

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Que faire pour obtenir les subventions de recherche dont nous avons besoin? Leslie Degner, dans un éditorial du *Revue canadienne de recherche en sciences infirmières* (printemps 1990), relate avec quel succès les infirmières américaines ont réussi à créer un *National Center for Nursing Research.* Il est important de se rappeler de la résistance que les infirmières des États-Unis ont dû vaincre, particulièrement celle des médecins, lorsqu'elles ont cherché à créer un institut national de recherche infirmière, parallèle aux *National Institutes of Health.* Leur centre de recherche infirmière constitue un prix de consolation assez remarquable. Degner suggère que nous organisions un lobby qui puisse aboutir à la création d'un comité spécial au sein du Conseil de recherches médicales et dont la majorité des membres seraient des infirmiers(ères) qui auraient pour mission d'évaluer les demandes de subventions adressées au titre de la recherche infirmière. Hardy lui apporte son appui à ce chapitre.

Il est important que nous considérions sérieusement qu'il s'agit là du meilleur mécanisme de financement qui s'offre à nous. Le Conseil de recherches médicales du Canada est un conseil dominé par les médecins et il est peu vraisemblable qu'il en soit autrement avant longtemps. La direction du Conseil est un cercle fermé et je doute que nous y ayons jamais accès, sans parler de la possibilité d'exercer sur lui la moindre influence. Les dentistes et pharmaciens, qui ont réussi à vaincre la résistance des médecins et ont obtenu leur propre comité, sont encore étrangers au CRM lorsqu'il est question de pouvoir et de contrôle. Les pharmaciens vivent dans la menace constante de perdre leur comité et sont largement dominés par un effectif masculin! Notre expérience des initiatives spéciales du CRM/PNRDS n'a pas été très concluante. Nous n'exerçons aucun contrôle sur les procédures qui permettent de déterminer qui obtient des subventions et qui n'en obtient pas. De nombreuses personnes et professeurs ont subi des revers cuisants à ce chapitre. Selon moi, l'aspect le plus négatif de ce phénomène et des autres expériences que nous avons du CRM est que nous devenons une discipline criarde et mesquine. Je m'entends me plaindre du traitement injuste que nous réserve le CRM et il s'agit là d'une attitude des plus déplaisantes. Nous valons mieux que cela. Nous devons déterminer quel mécanisme de financement est le mieux à même de nous servir. J'approuve Degner, Hardy et Jeans lorsqu'ils demandent qu'un effort concerté soit engagé afin d'obtenir ce que nous voulons mais je mets de plus en plus en doute la validité d'un comité de recherche infirmière au sein du CRM. Je crains que ce dernier ne nous oblige à nous plaindre ad aeternam.

Peut-être devrions-nous consulter les représentants des disciplines dominées par les femmes comme la physiothérapie, l'ergothérapie, les sciences de la communication et la nutrition afin d'évaluer la possibilité de créer un conseil de recherche sur la réadaptation et la santé. Au Canada, celui-ci pourra être l'équivalent du *Center for Nursing Research* créé par les

infirmières américaines. Avant que nous décidions d'engager un effort concerté pour la création d'un comité infirmier au sein du CRM, il nous faut envisager d'autres options. Les physiothérapeutes universitaires du Canada viennent de déposer un projet impressionnant pour la création d'un comité spécial au CRM qui s'occuperait de financer la recherche thématique et les projets. Ils ont évité l'option du perfectionnement professionnel du fait de notre expérience à ce chapitre. Il nous faut suivre l'évolution de ce dossier car il pourrait bien nous aider à décider quelles stratégies adopter. Je suggère que nous nous entretenions avec les physiothérapeutes pour déterminer s'ils se tiennent prêts à envisager d'autres moyens. Quoi qu'il en soit, il nous faut jouer au plus fin, sans éclat intempestif.

Dorothy Pringle

STAFF NURSES' PERCEPTIONS OF FACTORS INFLUENCING THEIR ROLE IN RESEARCH

Denise Alcock, Gisèle Carroll and Maxime Goodman

The relationship between nursing research and nursing practice is clearly identified in the literature. Research-based knowledge assists clinicians to solve patient care problems, to evaluate clinical practice protocols and to implement new programs (Conway, 1978; Duffy, 1985; Seaman, 1987). The integration of nursing research and nursing practice promotes accountability for practice (Ventura & Wagligora-Serafin, 1981) and influences policy and decision-making (Leatt, 1986). Lancaster (1984) points out that, as health care funds diminish and demands for accountability predominate, research is essential to provide the data base for clinical practice decisions.

Many clinical practice questions are addressed most effectively by merging the talents of the health care team (Hinshaw, Chance & Atwood, 1981). Jacox (1980) stresses the need for collaboration between nurses in practice settings and those in academic settings. The staff nurses' observational and analytical skills prompt the identification of research questions as a result of audits, personal experience with treatment protocols, staff discussions and observed trends in illness or treatment responses (Wilson, 1984). Clinicians ensure that the research is relevant to nursing practice, and they are in an excellent position to determine whether methods for data collection from patients or unit staff are feasible. However, staff nurse involvement in research activities has been limited.

McClure (1981) makes the statement that too few practitioners are genuinely concerned about research, either in terms of the process or the outcomes. She adds that the vast majority of active nurses in the United States have little knowledge of, and even less interest in, nursing research. Most nurses are concerned about the professionalization of nursing but do not see the link between research and professionalization.

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Hunt's (1987) review of the literature on translation of research findings into practice suggests that nurses do very little professional reading, and that they rely heavily on established routines in order to maintain stability in unpredictable work situations. Therefore, more effort is directed toward maintaining the status quo than toward effecting change.

Several models have been proposed to stimulate involvement of staff nurses in research (Davis, 1981; Egan, McElmurry & Jameson, 1981; Haller, 1986; Hoare & Earenfight, 1986; Hunt, 1981; James & Lantz, 1987, Stevenson, 1978; Zalar, Witches & Walker, 1985). Examples of criteria for the successful involvement of staff nurses in research activities include the support of nursing administration; a climate whereby peers are accepting of a nurse researcher's activities; and, the availability of research advisors. Unit-based research favours studies with immediate relevance for the practice of the participating nurses. A supportive environment includes such facilities and resources as library services, computers, research and ethics review committee, research discussion groups, research bulletin boards, statistical consultants and a receptivity to nursing research on the part of both management and the research establishment in the agency (Alcock, 1989).

Zalar, Welches and Walker (1985) describe a nursing consortium approach to increasing research in clinical settings that involved nine nursing service agencies in a localized geographic area. The aim of the consortium model was to provide more effective use of "expert" researchers' time, and to increase research productivity at a minimum cost.

The literature suggests that staff nurses are in an excellent position to identify research problems, collaborate with university nurse researchers and researchers from other disciplines and to implement clinical practice changes that will have a positive impact on the quality, efficiency and cost of health care. Thurston, Tenove, Church and Bach-Paterson (1989) conclude that clinically-based research is a reality for more than one-half of Canadian teaching hospitals. However, very little is known about the staff nurses' perceptions of nursing research or about their roles in nursing research.

Objectives of the study

The first objective of this study was to develop a survey tool that would address the following questions.

1. What is the staff nurse's perception of the value of nursing research?
2. What is the staff nurse's perception of her or his role in research?
3. What is the staff nurse's interest in nursing research?
4. What is the staff nurse's research experience?
5. What is the staff nurse's perception of the research climate (e.g. support systems, assistance available) in the agency?

The second objective was to survey four groups of staff nurses in Ontario.

Method

Sample and sample size

In June 1988, the College of Nurses of Ontario listed 19,864 staff nurses who worked in general teaching hospitals, 16,339 in non-teaching hospitals with more than 100 beds, 2,055 in public health and 2,602 in home care/visiting nursing. Sample size determination was based on Cochran's equation (1963; p. 75; formula 4.1) which incorporates the known size of a population, the population proportion P, and the desired width of the chosen confidence interval around the observed sample proportion P. Given the known population size of 40,860, a conservative value of P of 0.50, and a 95% confidence interval of width p±0.05, the required sample size was determined to be 380. Calculated proportionate sample sizes were determined, in order to have staff nurse representation from teaching hospitals (184), non-teaching hospitals (152), public health (20) and home care/visiting nursing (24). In an attempt to avoid a small number of returns in the public health and home care/visiting nurse groups, a total of 30 and 32 questionnaires respectively were distributed for a total sample size of 398.

The randomized selection of subjects was undertaken by the College of Nurses of Ontario.

Questionnaire

Questions were based on criteria identified in the literature as being important in promoting the involvement of staff nurses in nursing research. The questions were reviewed for face validity by experts in clinical settings and by nurse researchers.

The questionnaire has six sections that address: demographic data, perceived value of nursing research, perceived role in research, interest in research, experience in research and perception of research climate in the workplace. A scientific review committee ,with experts in survey design, reviewed the questionnaire and suggested that the negative and positive statements of the questionnaire be more randomly placed. These revisions were made. The questionnaire was randomly distributed to 19 staff nurses in a pediatric hospital (not included in study sample). The staff nurses were asked to complete the questionnaire, and to indicate in the margin if the question was not clear or could not be answered by the choices provided. All 19 questionnaires were returned with comments to the effect that the questions were clearly stated, but that a "don't know" column was essential for items relating to the presence of support systems. The column was added for relevant items.

Data Collection

The questionnaires were mailed with a covering letter which outlined the purpose of the study, the names and telephone numbers of the researchers, the sample selection method, and the manner in which data would be managed. Participants were asked to return the questionnaire in the stamped enclosed envelope within seven days.

Analysis of the data

Data were analyzed on the University of Ottawa Amdahl computer using SPSS-X. Analyses were conducted on individual survey items as well as on composite scores that were calculated by summing responses to the sets of related items in each of the following five areas of the survey: perceived value of nursing research; perceived role in research; interest in research; research experience; and, perception of supportive research climate in the health care agency. In calculating composite scores, responses to negatively-posed items were reversed. Reliability analyses of the composite scores from all available respondents indicated high internal consistency among items in each of the five sections, with alphas of: 0.814, 0.714, 0.868, 0.789 and 0.781, respectively.

Frequency distributions were obtained for responses to each of the individual survey items. For simplicity, items requiring responses on a four-point Likert scale (strongly agree, agree, disagree and strongly disagree) were divided into agree or disagree. Percentages of respondents are expressed to the nearest whole number.

One-way analyses of variance (ANOVA) were calculated on the five composite scores, as a function of age group (30 or less; 31-40; 41-50; 51 or more) and as a function of type of agency (teaching hospital; non-teaching hospital; public health, home care/visiting nurse). T-tests were used to compare educational level groups (diploma versus baccalaureate) on the five composite scores. Within each set of analyses for the three independent variables, an alpha of 0.01 (0.05 divided by five tests) was used to correct for multiple testing.

Results

Of the 398 questionnaires mailed, 178 were returned. The low return rate of 45% may indicate a low level of interest in research. The percentage of questionnaires returned by each group is as follows: Public health nurses, 63%; home care/visiting nurses, 53%; teaching hospital nurses, 39%; and non-teaching hospital nurses, 47%. The post office was unable to locate 17 addressees. As a point of reference, with 178 respondents, the 95% con-

fidence interval around an observed proportion of 0.50 is ±0.07 and the 95% confidence interval around an observed proportion of 0.90 is ±0.04.

Demographic data

All age groups are well represented, 74% of the respondents had not completed a baccalaureate in nursing degree and 79% had been registered nurses for more than five years. Forty-five percent had been in their current position for over five years and 73% for over two years. Eighty-seven percent of the nurses who responded were working full time; 9.6% were employed part-time. A comparison of the demographic characteristics of the subjects with 1989 Management Data Series Information (Health Division, Statistics Canada) on registered nurses employed in nursing in Canada and in the province of Ontario reveals very similar age distributions for the 30 to 39 and the 40-49 age groups. There were more respondents in the 30-year-old-and-less category (26%) than in Ontario (16%) and Canada (18%) and less respondents in the 51-or-more category (14%) than in Ontario (21%) and Canada (18%). It may be that the older nurses surveyed chose not to return their questionnaires.

A comparison of the level of education of respondents with nurses in Canada indicates no significant difference. However, there is a difference between level of education of respondents and nurses in Ontario (X^2=12.65, df=3, $p<0.05$). There were more respondents with baccalaureate degrees and with post-basic diplomas or certificates; 2% of the respondents had a Master's degree, as compared to 1% of nurses in Ontario. Only 9.6% of the respondents were employed part-time, as compared to national estimates of 38%. Considering that the questionnaire return rate was 45%, it may be that part-time nurses did not return their questionnaires, and this may reflect on their level of interest in nursing research.

Perceived value of nursing research

Although 92% of respondents agreed that nursing research was useful in solving patient care problems, only 70% perceived that research promoted accountability for practice. Eighty-two percent of staff nurses agreed that research findings provide the facts needed to make clinical practice decisions and 89% agreed that research helps improve nursing practice. A lower percentage (73%) perceived research to be cost-effective.

The ANOVA on the composite score for the perceived value of research, as a function of age group, was not significant ($p>0.01$). The ANOVA for the type of agency in which the nurse worked was statistically significant (F=4.27, $p<0.01$, df=3,168). A post-hoc Duncan's Multiple Range test indicated that public health nurses had significantly higher perceived value of research than nurses in teaching and non-teaching hospitals.

Perceived role in research

The majority of nurses perceived that they had a role in identifying nursing care problems (99%), in solving the problems (96%), in suggesting ways to improve patient care (99%), in applying research findings to practice situations (93%) and they agreed that they should be aware of all the research being conducted in their workplace (85%). Ninety-three percent agreed that they should be involved in nursing research if it addresses ways to improve the quality of nursing care. Fifty-one percent indicated that the staff nurse should conduct the research studies. Eighty-two percent indicated that they would be involved in the collection of data for nursing studies, but only 45% agreed that they have a role in collecting data for non-nursing studies. Even if data collection were incorporated into the daily nursing routine, only 51% would agree to be involved.

The ANOVA on the composite scores for perceived role in research indicated no significant differences in mean composite scores among age groups or among types of agencies.

Perceived interest in research

Most staff nurses (94%) were interested in finding answers to specific nursing problems, in participating in workplace studies (84%), in knowing the results of workplace studies (96%) and in conducting research that is part of the work assignment (85%). Eighty-eight percent of the nurses in this study were interested in changing practice based on research findings. It is therefore noteworthy that only 71% were interested in reading about research studies. Only 45% were interested in conducting research if it is not part of the work assignment. This is congruent with the responses to a previous question which indicated that 50% of staff nurses perceive that they have a role in data collection only if it is part of their daily routine. There is also a low level of interest (62%) in being a member of a committee to promote and review nursing research.

The composite score for perceived interest in research was not significantly different across age groups or place of employment ($p<0.01$).

Research experience

Only 36% of respondents have taken a course in research methods or statistics. This is not surprising in view of the fact that 74% of the respondents have not completed a baccalaureate degree in nursing. Twenty-four percent had identified a problem that led to a research study, 73% had completed questionnaires for research projects, 27% had conducted interviews and 39% had collected specimens for a research project. Only 10% had been

a principal investigator, 10% a co-investigator, 11% had assisted with the writing of a grant proposal, 3% had written a grant proposal, 2% had received funds to conduct research and 3% had published research results. About half (51%) stated that, based on research results, they had changed their practice. It is to be noted that 75% of the respondents have not attended a research conference. The composite score on total research experience did not differ among age groups or by type of agency.

Perception of support from research climate

Perceptions of support and encouragement from nursing administration are as follows: 41% indicated that they were encouraged to question their nursing practice; 48% agreed that they were encouraged to develop more effective and efficient methods of practice through research studies; and 44% identified nursing administration as supportive of nurses who conduct research. Less than 50% perceived that they received support and encouragement from nursing administration; only 38% perceived support from physicians; but 64% indicated that nurses were supportive of colleagues who are involved in nursing research. More than one-half (54%) of the respondents indicated that university nursing professors are not available to act as research advisors, and 59% did not feel that university nursing professors collaborate with agency nursing staff on research projects. Sixty-nine percent indicated that other disciplines (dietetics, social work, psychology) are interested in collaborating on research projects. Sixty-two per cent of the respondents stated that nurses who participate in the design or data collection of a study do not receive recognition for participation.

Neither of the ANOVAs on the composite scores for perception of supportive research climate indicated statistical significance across age groups or place of employment ($p=<0.01$).

It was interesting to note that, on the items listing research resources, the "don't know" responses ranged between 30 and 45%. Many nurses do not know what research resources are available in their agency.

Educational background and perceived value, role, interest, experience and support

T-tests indicated that diploma graduates differed from baccalaureate nurses on each of the five composite scores. The baccalaureate nurses indicated a higher perceived value of nursing research, a greater perceived role in research, a greater interest in research, more research experience and a greater perception of a supportive research climate in the health care agency. Each t-test reached statistical significance ($p<0.01$), except for the comparison for support, which approached significance ($p=0.12$).

Pearson correlations of all composite scores

Pearson correlations were calculated between each pair of composite scores (value, role, interest, experience, research climate). Eight of the ten correlations were statistically significant ($p<0.05$, 2-tailed tests). Moderate associations were observed as follows: perceptions of the value of research and role ($r=.45$); the value of research with interest in research ($r=.54$); the value of research with research experience ($r=.36$); the perceived role with interest in research ($r=.54$); and, interest in research with research experience ($r=.41$).

Comments by respondents

Approximately one-third of the respondents (32%) added comments at the end of the questionnaire. The comments can be grouped into themes. Theme 1 dealt with nursing administration. Unfortunately, all of the comments were negative. Nursing management was perceived as inhibiting, rather than fostering, nursing research.

Theme 2 focused on the lack of time to do research. There was an emphasis on nursing shortages, heavy workloads and direct patient care activities that take priority over research activities.

Theme 3 presented personal opinions about research. The examples of the opinions are "research is not relevant to my practice" and "research applied to work fouls things up".

Theme 4 was the positive comments about research and the workplace. For example: "If we, as nurses, felt we were a valid profession, the majority would understand that it is research, not habit, routine or fourth sense that should guide our practice."

Discussion

The majority of nurses in the study valued nursing research; most agreed that they would be involved in the collection of data for nursing research projects. This is in marked contrast to McClure's (1981) statement that few practitioners are genuinely concerned about research process or outcomes, and, that nurses do not perceive the link between research and professionalization. In this study, the value that nurses placed on nursing research was mainly influenced by professional preparation and the type of agency in which the nurse was employed. Baccalaureate-prepared nurses placed the most value on research. This may reflect an increase in the research content of most B.Sc.N. programs in the last decade. If the number of responses from nurses employed in various agencies is examined, it will be noted that community-based nurses had the higher response rates and that those in

teaching hospitals had the lowest response rate. In the "comments" section, it was frequently noted that staff nurses have little time to devote to research; this may well have influenced the participation of nurses in teaching hospitals. Although no significant difference in the perception of a supportive research climate was noted across type of employment agency, there may be other factors that influenced those nurses in public health agencies to place a higher value on nursing research than those in teaching and non-teaching hospitals.

Staff nurses express interest in research and value research, but they are not informed about their own research milieu. They may not know how to seek out the information, or, they may not feel they have a right to have access to research support services. Staff nurses are an untapped resource, with potential to contribute to the advancement of nursing research activities. Information about research resources could be provided at orientation, through research discussion groups or other avenues. Most (93%) of the respondents perceived that they have a role in the application of research findings in their clinical practice. However, if they are not informed about the research milieu in their agency, and about one-third do not read the research literature, the implementation of research-based change will be limited.

The literature clearly defines the vital role of nursing administration in fostering clinical practice research (Davis, 1981; Egan et al, 1981; Stevenson, 1978). Yet, these findings appear to indicate that nursing administrators have not taken an active role in fostering the existing interest of their staff nurses in research. Although research resources may be present, nursing personnel have not been made adequately aware of their accessibility. There were comments reflecting frustration with the lack of demonstrated support from nursing administration; these may originate from lack of communication on the subject of nursing research. It would have been useful to have obtained the views of nurse administrators about the research role and available resources for staff nurses.

The role of the administrator is vital to the development of nursing research and to the implementation of practice change, based on research findings. However, staff nurses perceive that they do not have a supportive research climate in their agencies; as such, it would appear that administrators should address ways and means of facilitating staff nurse involvement in research. Undoubtedly, in times of cost constraints, released clinical time for research activities may be limited. However, the cost effectiveness of implementing changes, based on research findings that contribute to improved outcomes, must be taken into consideration. Recognition for the contributions of staff nurses to projects conducted by other professionals can also be facilitated by administration.

University nursing faculty must also examine their approach to clinical practice research. Staff nurses perceive more interest in collaboration on research projects from allied health disciplines than from university nursing colleagues. The "comments" section suggests that university nursing faculty preferentially relate to nursing management, rather than to staff nurses. There appears to be a lack of appreciation, on the part of university faculty, of the potential contribution of staff nurses to research projects.

Staff nurses are willing to collaborate with researchers on design and data collection, and to implement clinical practice changes based on findings. Nursing research interest groups, nurse administrators, clinical agency staff development and research departments and university nursing faculty must all take an active role in examining ways to foster and facilitate staff nurse involvement in research.

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RÉSUMÉ

Facteurs susceptibles d'influer sur le rôle en recherche du personnel infirmier : le point de vue des intéressés

On a réalisé un sondage auprès d'un échantillon aléatoire d'infirmiers/ères ontariens en vue de déterminer leur perception de la valeur de la recherche infirmière, leur rôle et leur expérience en matière de recherche ainsi que leur perception du climat de recherche dans leur établissement. Cent soixante-dix-huit infirmiers/ères ont renvoyé le questionnaire dûment rempli. La majorité des participants sont d'avis que la recherche infirmière qui se rapporte directement aux aspects cliniques de la profession est importante et se déclarent prêts à recueillir des données pour les projets de cet ordre. Cinquante pour cent seulement se disent disposé(e)s à recueillir des données pour des études relevant d'une autre spécialité, même si la collecte des données s'inscrit dans leurs tâches quotidiennes. Bien que 87 % des infirmiers/ères travaillent à plein temps, de 30 à 45 % ignorent pourtant les ressources dont leur établissement dispose pour épauler la recherche. Moins de 50 % reconnaissent que les cadres infirmiers apportent leur appui à la recherche et seulement 41 % affirment que leurs supérieurs les encouragent à s'interroger sur l'exercice de leur profession. Selon les infirmiers/ères de soins généraux qui travaillent à plein temps, les professionnels de la santé oeuvrant dans des domaines connexes semblent plus disposés à éventuellement collaborer à un projet de recherche que leurs collègues infirmiers diplômés d'université. Les résultats du sondage identifient les obstacles à la participation de fait des infirmiers/ères aux activités de recherche.

THE EFFICACY OF INCENTIVE SPIROMETERS IN POST-OPERATIVE PROTOCOLS FOR LOW-RISK PATIENTS

Barbara L. Davies, J. Peter MacLeod and Heather M. J. Ogilvie

Respiratory complications, including fever, atelectasis, pneumonia and respiratory failure, are the most frequent cause (20-40%) of postoperative morbidity and mortality (Bartlett, Gazzaniga & Geraghty, 1973). These complications are attributed to postoperative alveolar collapse with decreased vital capacity, functional residual capacity, absence of spontaneous sighs and retained secretions (Jackson, 1988; Peters & Turnier, 1980; Van De Water, 1980).

Incentive spirometry (IS) is the most widely used technique to minimize these postoperative complications (O'Donohue, 1985). In a 1985 random survey of hospitals of varying size and geographic location in the United States, incentive spirometry was used in more than 95% of the hospitals and was used more widely than chest physiotherapy, intermittent positive pressure breathing (IPPB), blow bottles and continuous positive airway pressure (CPAP) (O'Donohue, 1985). In Canadian hospitals the frequency of usage of incentive spirometry had markedly increased. Not only was it being used for postoperative patients at high risk for pulmonary complications, but incentive spirometry was also being used by lower-risk patients on medical, obstetrical, gynecological and orthopedic wards. The increasing annual costs for equipment, distribution and respiratory personnel were of concern to administration.

Hourly incentive spirometry is recommended for the first 48-72 postoperative hours to compensate for the shallow monotonous breathing pattern with anesthesia (Bakow, 1977). The major advantage is that both patients and health care personnel can see evidence of inspiratory effort, by means of a ball that rises in a tube. Improved patient performance and increased motivation are claimed by some users and manufacturers (Jenkins & Soutar, 1986).

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Numerous studies have evaluated incentive spirometry and have found it to be a simple, effective respiratory manoeuvre to prevent postoperative respiratory complications (Alexander, Schreiner, Smiler & Brown, 1981; Bartlett et al.; Craven, Evans, Davenport & Williams, 1974; Dohi & Gold, 1978; Fried, 1977; Minschaert, Vincent, Ros & Kahn, 1982; Oulton, Hobbs & Hicken, 1981; Van De Water, Watring, Linton, Murphy & Byron, 1972). (See Table 1)

On the other hand, there are several reports suggesting that incentive spirometry offers no advantage over other methods of respiratory care (Celli, Rodriquez & Snider, 1984; Dull & Dull, 1983; Gale & Sanders, 1980; Jung, Wright, Nusser & Rosoff, 1980; Lyager et al., 1979; O'Connor, Tattersall & Carter, 1988; Schwieger et al., 1986; Stock et al., 1984). (See Table 2) Furthermore, Zibrak, Rossetti and Wood (1986) demonstrated that marked reduction in all categories of respiratory therapy, including incentive spirometry, did not adversely affect outcomes of patient morbidity, mortality, pulmonary complications and length of hospital stay. A literature review of the research in this field is difficult to conduct because of differences in reported risk factors (age, smoking status, site of operation, duration of anesthesia, past respiratory illness); in definitions of pulmonary complications; presence of control groups; and, in teaching strategies.

Patient compliance is a key factor in evaluating the effectiveness of any program to reduce postoperative respiratory complications. The majority of the studies listed in Table 1 and Table 2 do not evaluate actual patient performance of prescribed exercises. Patients were supervised by a variety of health personnel, including doctors, nurses, respiratory technicians, physiotherapists and research assistants. The frequency of supervision varied from a minimum of once a day to a maximum of every hour. Lyager et al. (1979) reported "a fairly wide difference in the frequency with which the individual patient used the spirometer" (p.315). Craven (1974) noted that only 11 out of 35 patients used IS in the defined satisfactory manner.

There remains considerable controversy in current literature and practice as to the most effective method of preventing postoperative respiratory complications. Considering the increasing use of incentive spirometry and the resultant cost to a surgical population, further carefully-controlled clinical studies are indicated. This study compares the efficacy and cost of three respiratory protocols for deep breathing and coughing exercises in a low-risk, homogenous population, and monitors patient compliance.

Table 2

Studies Not Supporting Incentive Spirometry for Prevention of Postoperative Complications

Reference	Number of Subject's Type of Surgery	Study Groups	Frequency-Type of Staff Supervision	Outcome
Van De Water et al., 1972.	30 bilateral adrenalectomy.	1) IPPB-4x/day x 5 days postoperative. 2) ISx5 days postoperative.	1) Inhalation therapist during the day, nurses at night. 2) Nurses encouraged use of IS 4x/day. Note timing device attached to IS.	1) 6/15 had pulmonary complications. 2) 3/15 had pulmonary complications.
Bartlett et al.,1973.	150 laparotomy.	1) Control. 2) IS to be used 10x/hr. counter attached.	Seen 2x/day by investigators (MD).	1) -19/75 pulmonary complications -35/75 atelectasis/consolidation. 2) -7/75 pulmonary complications -24/75 atelectasis/consolidation.
Craven et al., 1974.	70 upper abdominal surgery.	1) IS 10x/hr. x 5 days postoperative. 2) Routine chest physio 2x/day x 5 days postoperative.	"Closely observed" 1) Note that only 11/35 used IS in a satisfactory manner.	Abnormal chest 1) 40% 2) 63%
Fried , 1977.	150 Thoracic surgery.	1) PEEP and IS. 2) PEEP, IS, IPPB. 3) PEEP. 4) IS. 5) PEEP, IPPB. 6) IPPB. 7) coughing and deep breathing by nurses.	Postoperative therapy q2h. (extubation)	1) Atelectasis least often.
Dohi & Gold, 1978.	64 abdominal surgery.	1) IS x 5 days postoperative. 2) IPPB q4h x 5 days postoperative. Both groups received bronchodilator drug.	Respiratory therapist supervised. 1) 5x/hr. x 8 hrs. 2) 4x/day.	Developed pneumonia atelectasis or bronchitis. 1) 10/34 (29%). 2) 17/30 (57%).

Table continues

Table 1

Studies Supporting Incentive Spirometry for Prevention of Postoperative Complications - (Continued)

Reference	Number of Subject's Type of Surgery	Study Groups	Frequency-Type of Staff Supervision	Outcome
Alexander et al., 1981.	377 Cholecystectomy Hysterectomy Herniorrhaphy.	1) Spirocare IS 3 x daily. 2) Breathing exercise (IS). 3) IPPB. 4) Breathing exercise (IS)+IPPB. 5) Control routine care. 6) Breathing exercise postoperative goal of 80% of preoperative value (IS).	1) Inhalation therapist 3xdaily. 2) No supervision. 3) Therapist 3 x daily. 4) Therapist 3 x daily. 5) No supervision. 6) Therapist 3 x daily.	Postoperative complication rate by X-ray similar in all groups. No difference in complication rate by type of surgery. Lowest complication rate (16.5%) was patients who achieved 80% preoperative inspiratory volume.
Oulton et al., 1981.	25 coronary artery operations.	1) Chest physiotherapy. 2) Chest physiotherapy Triflo IS. 3) Chest physiotherapy and spirocare IS.	1) "Standard physiotherapy". 2) IS 3x/day x 4 days. 3) IS 3x/day x 4 days. supervised by physiotherapists.	Pulmonary complications. 1) 2x group 3. 2) 2x group 3. 3) ½ group 1 or 2.
Minschaert et al., 1982.	22 upper abdominal.	1) Chest physio and IS x 10 days post-op. 2) Chest physio x 10 days post-operative.	1) IS 6x/hr. during day time. 2) Frequency not stated.	1) Faster return to preoperative pulmonary volumes.

Table 1

Studies Supporting Incentive Spirometry for Prevention of Postoperative Complications

Reference	Number of Subject's Type of Surgery	Study Groups	Frequency-Type of Staff Supervision	Outcome
Lyager et al., 1979.	103 Abdominal surgery for gallstones or peptic ulcer.	1) Bartlett IS 4x/hr. during waking hours x 4 days. 2) Control.	Medical Staff 1) Mean use IS 60x/24 hrs. wide frequency noted.	No difference in incidence, severity or course of postoperative complication between groups.
Jung et al., 1980.	126 Upper-abdominal surgery (primarily cholecystectomy).	1) IPPB. 2) Resistance breathing (blow glove). 3) IS (spirocare).	Technician all groups 4x daily through waking hours x 3 days.	No difference among the three groups in atelectasis by Day 3.
Gale & Sanders, 1980.	109 Heart surgery-cardio pulmonary bypass.	1) IPPB. 2) IS - Bartlett Edwards.	Treatments given 4x/day x 3 days.	No difference in rate of atelectasis by X-ray.
Dull & Dull, 1983.	49 Cardiopulmonary bypass surgery.	1) Early mobilization. 2) Early mobilization and breathing exercise. 3) Early mobilization and IS.	Physical therapist 4x/day.	No significant differences in improving lung volumes, airflow or postoperative complications.
Celli et al., 1984.	172 Upper and lower abdominal surgery.	1) Control. 2) IPPB 4x/day. 3) IS 4x/day. 4) Deep breathing exercises 4x/day under supervision.	Treatments supervised by a respiratory technician x 4 days.	Pulmonary complications. 1) 48%. 2) 22%. 3) 21%. 4) 22%.
Stock et al., 1984.	38 Median sternotomy for cardiac operations.	1) Coughing and deep breathing (CDB). 2) IS. 3) CPAP.	Physician or trained respiratory therapist q2h during waking hours x 72 hours.	No difference of X-ray evidence of atelectasis between groups. CPAP was less painful than IS or CDB.
Schwieger et al., 1986.	40 Cholecystectomy.	1) IS (inspiron) 5 min. hourly 12x/day x 3 day. 2) Control.	Specialized respiratory therapist.	No difference between groups in postoperative complications at 2nd and 4th day.
O'Connor et al., 1988.	40 Cholecystectomy.	1) IS (inspiron). 2) Routine chest physio.	Chest physiotherapist.	No significant differences between gorups.

Methods

The project was approved by the hospital research ethics committee. The afternoon prior to the day of surgery, patients scheduled for an abdominal hysterectomy or tuboplasty gave informed consent for participation in the project. All potential subjects were non-smokers, less than 50 years old, no more than 20% above their ideal weight and had no history of cardiac or pulmonary disease. Subjects were obtained from one gynecological ward to maximize control.

Sequential sample assignment to groups was selected to avoid cross-over effects between the groups. Data were collected from a control group (Group I) before the introduction of any change in program. These patients were instructed, preoperatively, on deep breathing and coughing exercises and monitored postoperatively by the individual nurse assigned to their care. In order to control for any change in the usual nursing practice the nurses were not informed of the true purpose or nature of the study.

Group II patients were instructed in a consistent, systematic manner in deep breathing and coughing exercises by one of two research assistants. The preoperative teaching was given at a convenient time on the afternoon prior to surgery. Patients practised the exercises until they could demonstrate them effectively for the research assistant. Patients received instruction forms to keep at their bedside. The research assistant then returned later the same afternoon or evening for a repeat practice session preoperatively. The length of teaching times were recorded. In the postoperative period, the teaching was reinforced and the exercises monitored every two hours, from 9am-9pm. A self-report form was used for patients to record exercises practised and ambulation on an hourly basis, for 72 hours post-operatively during waking hours.

Group III patients were instructed in the same manner and frequency as Group II patients, except that they were taught to use an incentive spirometer (Inspirx). The preoperative inspiratory flow achieved by the patients was recorded and was the goal to be achieved in the postoperative period.

The research assistants were two senior baccalaureate nursing students employed for the summer. Videotaped simulations were made of each of the research assistants demonstrating deep breathing and coughing exercises and incentive spirometry with volunteer subjects. These simulations were scored by two clinical and two research nurses, and a 90% reliability quotient was obtained. The structured teaching protocols and checklists were derived from Lindeman and Van Aerman (1971) and Rice and Johnson (1984). They were evaluated by nursing, medical and respirology personnel and pretested with

revision. The research assistants also received training in pulmonary function testing and graph interpretation in the respirology department. They practised the pulmonary testing until their results were judged to be 90% reliable.

Spirometry tests, including forced vital capacity (FVC), forced expiratory flow 25%-75% (FEF 25%-75%) and forced expiratory volume in one second (FEV_1), were done at the beside using a vitalograph. These tests were done preoperatively as a baseline, then 24, 48 and 72 hours after the operation. The patients wore a noseclip and were sitting upright during the measurement. A minimum of two graphs were obtained to ensure that the patient complied in maximizing their respiratory effort. Measurements were taken from the best graph. The research assistants calculated the pulmonary function values and a random sample of their calculations was checked by respirology staff.

A chest X-ray was taken preoperatively and on the third postoperative day. The X-rays were reviewed in a random order by a qualified chest physician who had no knowledge of patient assignment to group. X-rays were reported in terms of atelectasis or consolidation. Apex to diaphragm height was measured as an index of degree of inflation at total lung capacity. Patient records were reviewed for the incidence of pulmonary complications, frequency of pain, medication intake and length of hospital stay.

Table 3

Characteristics of Treatment Groups

Group	I Control	II Deep Breathing and Coughing	III Incentive Spirometer	Total
Number	9 (35%)	8 (30%)	9 (35%)	26 (100%)
Mean age (years)	42	36	32	37
Mean duration anasthesia (minutes)	163	201	181	182
Mean number analgesics in 72 hrs postoperative	13.1	12.9	13.7	13.2
Mean number days in hospital, postoperative	5.9	6.3	5.0	5.7

Results

A total of 26 subjects participated in the study (Table 3). Ten eligible patients declined participation, primarily because of apprehension of the required additional chest X-rays. Group I (control) had 9 patients, Group II (structured deep breathing and coughing) had 8 patients and Group III (incentive spirometer) had 9 patients. The mean age of the patients was 37 years, with a range of 27-48 years. The mean duration of anesthesia was 181 minutes, with a range 120-305 minutes. The mean number of doses of analgesics for the first 72 hours postoperative was 13.2, with the range of 8-20. The type of drugs used for anaesthesia and analgesia were also compared, with no differences between groups. The mean length of post-operative hospital stay was 5.7 days, with the range from 3-8 days. The frequency of postoperative complications including severe pain, genitourinary and gastrointestinal problems were also compared, with no differences between groups.

Absolute and % predicted values of the preoperative FVC, FEV_1 and FEF (25-75%) were not significantly different between the groups (Table 4). The Kruskal-Wallis test with $p \leq .05$ was used to compare the groups. There was a 28%-40% decrease in the Day 1 postoperative FVC values, compared to the preoperative baseline values. All groups' mean pulmonary function values gradually increased from postoperative Day 1-Day 2-Day 3. (Figure 1). There was no statistically-significant difference when comparing the gain scores of preoperative values and Day 3 values of any of these groups using the Kruskal-Wallis test at $p \leq .05$ level.

Pulmonary complications are reported in Table 5. There were four patients (15%) with fevers over 38°C within 72 hours after surgery, with cough or sputum. The percent reduction in diaphragmatic excursion between the preoperative and Day 3 X-rays were compared; no differences were found between the groups. Atelectasis was reported in 4 patients based on the third day postoperative X-ray (15%). A total of 6 patients (23%) had one or more respiratory complications.

The preoperative teaching time required for deep breathing and coughing exercises and incentive spirometer exercises was similar between Groups II and III (Table 6). The initial preoperative teaching session lasted an average of 7.4 minutes and the repeat preoperative practice session lasted an average of 1.9 minutes, for a mean total of 9.3 minutes. The salary costs were determined on the reported mid-range 1990 pay scales for registered nurses (Table 6).

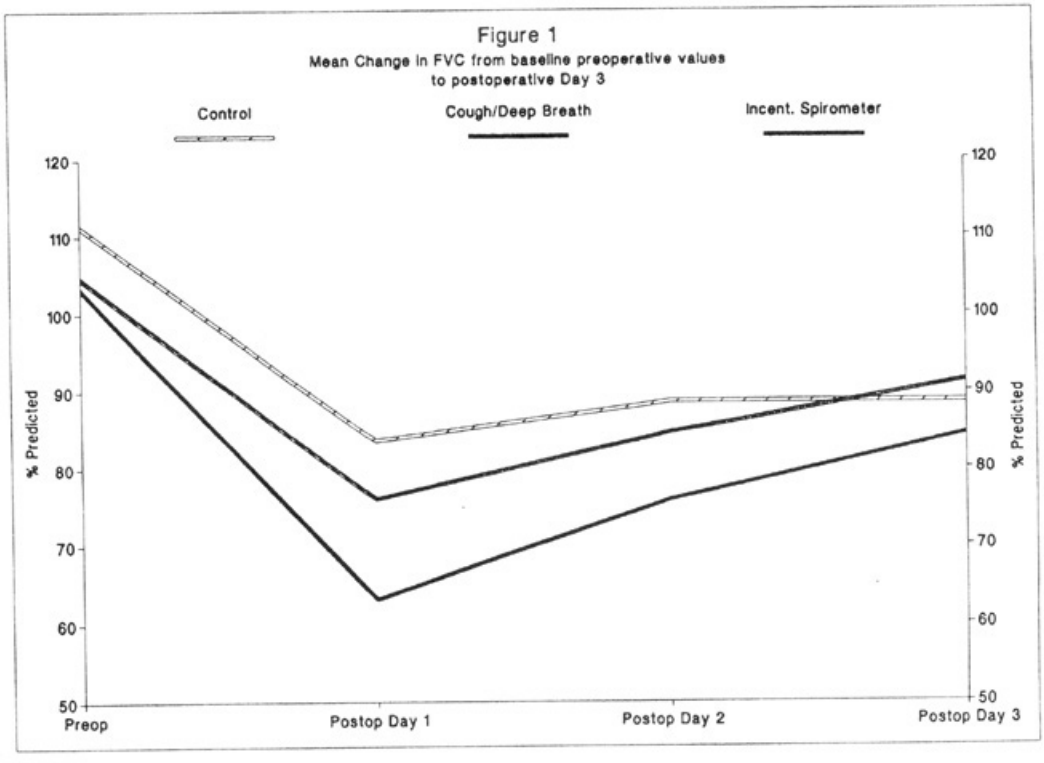
Figure 1
Mean Change in FVC from baseline preoperative values
to postoperative Day 3
Control
Cough/Deep Breath
Incent. Spirometer
% Predicted
120
110
100
90
80
70
60
50
Preop
Postop Day 1
Postop Day 2
Postop Day 3

Table 4

Pulmonary Function Values

Group		I Control N=9 Actual	% Predicted	II Deep Breathing and Coughing N=8 Actual	% Predicted	III Incentive Spirometer N=9 Actual	% predicted
FVC (mean) Preoperative		3.51	111.3%	3.68	104.6%	3.97	103.2%
	Day 1	2.62	83.7%	2.60	76.1%	2.46	63.2%
	Day 2	2.80	88.7%	2.89	84.7%	2.91	75.9%
	Day 3	2.80	88.7%	3.12	91.4%	3.25	84.5%
FEV_1 (mean) Preoperative		2.89	121.6%	2.60	98.9%	2.87	86.6%
	Day 1	1.87	79.1%	1.88	71.2%	1.78	59.0%
	Day 2	2.09	86.1%	2.10	79.7%	2.21	75.0%
	Day 3	2.25	94.0%	2.14	80.9%	2.38	80.7%
FEF 25%-75% (mean)							
Preoperative		3.38	109.8%	2.50	74.9%	2.87	79.7%
Postoperative	Day 1	1.68	54.2%	1.84	54.5%	1.63	45.1%
	Day 2	1.95	62.4%	2.12	62.6%	1.99	55.2%
	Day 3	2.32	74.7%	2.20	64.9%	2.27	62.8%

No statistically-significant differences between the groups.

Table 5

Postoperative Pulmonary Complications

Group	I Control N=9	II Deep Breathing and Coughing N=8	III Incentive Spirometer N=9	Total N=26
Fever > 38°C within 72 hours postoperative with cough or sputum attributed to respiratory complications.	2	1	1	4 (15%)
Atelectasis 3rd day postoperative X-ray	3	1	0	4 (15%)
Total number with one or more complications	3*	2	1	6 (23%)

*Note that two patients had both fever and atelectasis.

Table 6

Preoperative Teaching Time, Cost Analysis

Group		II Deep Breathing and Coughing N=8	III Incentive Spirometer N=9	Total N=17
Mean preoperative	INITIAL	7.0	7.7	7.4
teaching time	REPEAT	2.0	1.7	1.9
(minutes)	TOTAL	9.0	9.4	9.3
Mean total teaching cost ($18.76/hour)				
mid-range RN 1990 salary		$2.81	$2.94	$2.91
Cost incentive spirometer 1990			$11.39	
Total Cost		$2.81	$14.33	

The postoperative teaching contact with Groups II and III was similar because it had been outlined in the protocols that the research assistants would visit patients every two hours, from 9 a.m. to 9 p.m., to assist them with breathing exercises. The patients in Groups II and III initiated the exercises themselves on alternate hours during the postoperative period with very similar frequency. Total mean patient compliance in Group II was 19.4 times over the 3 days compared with a mean of 19.1 times for Group III.

Ambulation, defined as the number of times the patients walked a minimum of 20 feet during the first three postoperative days, was compared in Groups II and III. The mean total for 3 days was 15 times (range 6-28). Group II mean (14) was similar to the Group III mean (16). No record was requested from Group I because the recording itself might have influenced the patient's or nursing staff behaviour. A true control group was deemed of paramount importance. Groups II and III were already recording breathing exercise practice on a self-report form and ambulation was added to the form.

Discussion

The baseline preoperative pulmonary function values are relatively high, most likely because of the deliberate exclusion of risk factors including smoking. The post-operative pattern of pulmonary function values was similar to those reported in the review of literature by Jackson (1988) and Pontoppidan (1980). The pulmonary function values decreased substantially (35%-55%) immediately after the lower abdominal surgery.

The postoperative pulmonary function values from Day 1 to Day 3 gradually increased in all three groups, but there were no statistically-significant differences between the groups in the rate of improvement. These results are in accordance with four studies that specifically compared incentive spirometry to deep breathing and coughing exercises and found no difference in the prevention of postoperative complications (Celli et al., 1984; Dull & Dull, 1983; O'Connor et al., 1988; Schwierger et al., 1986; Stock et al., 1984). There are other studies that also did not support any increased benefits of incentive spirometry. These studies compared incentive spirometer to other respiratory manoeuvres including IPPB, blow glove, early mobilization and CPAP (Gale & Sanders, 1980; Jung et al., 1980; Lyager et al., 1979).

The total number of postoperative complications was 6 (23%) and is within the expected range for this population. The complications are distributed across the groups, with one more in the control group. However, the number of complications per group is small and further statistical analyses would not be appropriate. The total sample size was small because of the strict inclusion criteria for low respiratory risk, specific type of surgery and use of one unit to maximize control.

It is interesting to note that, in the total group, 2 patients had both fever and atelectasis while 4 had only one or the other. The diagnostic accuracy of fever alone as a measure of postoperative pulmonary complication has been questionned because fever was an accurate indicator of X-ray evidence of atelectasis in only 56% of their subjects (Roberts, Barnes, Pennock & Browne, 1988).

An important study by Zibrak, Rossetti and Wood (1986) has demonstrated that marked reduction in all categories of respiratory therapy, including a 55% reduction in incentive spirometry, did not increase patient morbidity and mortality. Furthermore, one American center has devised a preoperative respiratory therapy program (PORT), in an attempt to provide the level of respiratory care most appropriate for postoperative patients (Torrington & Henderson, 1988). They have developed a single preoperative risk assessment form and claim that for low-risk patients, they have been able to restrict excessive use of incentive spirometry successfully.

Given the finding of no statistical differences in the various pulmonary function tests between groups and the small number of complications, it would seem that the usual practice of having the individual nurse assigned to patient care (control group) teach patients deep breathing and coughing exercises is sufficient for patients at low risk of respiratory complications.

Patient compliance during this study was monitored in Groups II and III, as part of the structured program to encourage patient participation. It is interesting to note that patient-initiated exercises on the alternate hours when the research assistant was not present were similar in Group II and Group III. This does not support the claims by manufacturers and other studies that patients are more likely to voluntarily carry out respiratory manoeuvres with an incentive spirometer (Alexander et al., 1981; Bartlett, Brennan, Gazzaniga, Hanson, 1973; Craven et al., 1974; Jenkins & Soutar, 1986). The name "incentive" is a misnomer.

The use of highly-structured teaching protocols for deep breathing and coughing exercises before and after surgery may not be necessary. The pulmonary function values do not indicate any significant differences between Group I (Control) and Group II (Structured). There is a copious amount of literature on various types of preoperative teaching programs. Hathaway (1986) did a meta-analysis of 68 studies and demonstrated a consistently positive effect of preoperative instruction on postoperative outcomes. However, categories of organization of instruction (structured/unstructured) and type of presentation (individual/group) did not produce differences. Similarily, Vallejo (1987) did a meta-analysis and found no difference in effectiveness of structured versus non-structured preoperative information. Lindeman, in a 1988 review of patient education, reported that there was a wide range of teaching strategies, and most were effective. Recent review articles on the method of patient education recommend that a preoperative instruction program be based on individual situational needs (Armstrong, 1989; Hathaway, 1986). Such an individual program was ususal nursing practice on the control group's unit.

The cost of having a registered nurse teach an ideal preoperative program for either deep breathing and coughing exercises or incentive spirometer practice was very low (less than $3.00). The incentive spirometer cost of about $11.00 markedly increases the total cost: it does not seem warranted in a low-risk surgical population. With the widespread use of incentive spirometers and the current trend to use technical devices, this is a useful finding to help control current health care costs.

This study of low-risk patients is an important baseline study, from both ethical and practical viewpoints. Further carefully-controlled research evaluating the efficacy of incentive spirometers with a larger sample size, in

high-risk populations, is now indicated. Risser (1980) has identified both fixed respiratory risk factors (age, site of operation, duration of surgery) and alterable risk factors (obesity, smoking, preexisting health problems). Preventive strategies for these alterable factors should be implemented. For example, smokers should be strongly encouraged to discontinue the habit at least eight weeks before chest or abdominal surgery (Jackson, 1988). In addition, the use of specific teaching protocols and careful monitoring of patient compliance is feasible and important for future research, in order to obtain meaningful results.

Summary

Incentive spirometry offered no statistically significant advantages to pulmonary function when compared to unstructured or structured deep breathing and coughing exercise programs, for patients at low risk of developing pulmonary complications. The additional cost of incentive spirometer equipment does not seem warranted in these patients. Furthermore, patients with or without an incentive spirometer were willing to comply with a structured breathing exercise program with the same frequency of practice sessions. Patients in this diagnostic category did not require a technical device to reward and motivate them for performing maximal inspiratory manoeuvres.

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RÉSUMÉ

Évaluation de l'efficacité des spiromètres d'encouragement chez les patients à faible risque: comparaison de trois protocoles respiratoires post-opératoires

Cette étude visait à comparer l'efficacité de la spirométrie d'encouragement (se) à celle des exercices de respiration profonde avec toux (rpt) dans la prévention des complications respiratoires post-opératoires chez les patients à faible risque. Les 26 sujets non fumeurs ont été affectés de manière séquentielle à trois groupes. Le groupe I (groupe témoin; N=9) a reçu les instructions habituelles de rpt d'une infirmière attitrée. Le groupe II (structuré, rpt; N=8) a reçu les instructions de rpt de l'un de deux adjoints de recherche formés à cette fin conformément à un protocole structuré. Après l'intervention chirurgicale, l'entraînement s'est intensifié et les exercices ont été surveillés toutes les deux heures, de 9 h à 21 h pendant 72 heures. Le groupe III (structuré, se; N=9) a reçu un protocole similaire à celui du groupe II, mais comportant des instructions sur l'utilisation d'un spiromètre d'encouragement. Les épreuves de fonction respiratoire post- opératoires n'ont pas affiché de différence marquée, les résultats au test de Kruskal-Wallis étant de $p \leq 0,05$. Les complications respiratoires post-opératoires ont été rares. Statistiquement, la spirométrie d'encouragement ne présente aucun avantage et le coût additionnel de l'équipement ne semble pas justifié chez les patients à faible risque. L'observance du traitement a été comparable avec ou sans se, indiquant que le recours à un petit appareil n'est pas nécessaire pour accroître la motivation.

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Selon les normes de la convention collective en vigueur. L'Université Laval applique un programme d'accès à l'égalité qui consacre la moitié des postes vacants à l'engagement de femmes.

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PREDICTORS OF ADAPTATION IN WOMEN HOSPITALIZED DURING PREGNANCY

Marilyn Ford and Ellen Hodnett

Hospital admission for high-risk pregnancy undoubtedly represents a period of stress, both for the expectant woman and for "significant others" with whom she holds ties of kin or friendship. Antepartum hospitalization is, in terms of the physical safety of mother and infant, widely believed to be beneficial (Blake, Pollitzer and Reynolds, 1979; Martin, Allen & Stinson, 1979), yet little is known about the overall impact of this event on the expectant woman and her family. Few studies have identified specific factors that create stress for women who are hospitalized during pregnancy (Waldron & Asayama, 1985; White & Ritchie, 1984). However, some evidence exists to suggest that these women may experience difficulty adapting to their at-risk situations (Corbin, 1987; Merkatz, 1976; Rosen, 1975). Despite this, little is known about specific factors that influence adaptation in women who are hospitalized for high-risk pregnancies.

Review of Literature

Stress is a perceptual phenomenon that arises from a demand/capability imbalance (Lazarus, DeLongis & Folkman, 1985). Thus, stress is a result of the individual's appraisal of his or her ability to cope with the demands of a particular situation, rather than the situation itself.

Antepartum stress has been associated with maternal and infant complications (Downs, 1977; Gorsuch & Key, 1974; Newton, Webster, Blau, Maskrey & Phillips, 1979), emotional disequilibrium (Norbeck & Tilden, 1983; Tilden, 1983) in low-risk pregnant women, and with anxiety and depression in low-risk women, high-risk women and their mates (Mercer & Ferketich, 1988). As well, relationships have been found between stressful life events during pregnancy and diminished family functioning (Mercer, Ferketich, DeJoseph, May & Sollid, 1988; Smilkstein, Helsper-Lucas, Ashworth, Montano & Pagel, 1984), and in addition, to slower progression in maternal role behaviours (Curry & Snell, 1985).

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Social support has been defined as interpersonal relationships that provide reassurance and a sense of one's ability to rely on or confide in another (emotional support); information or advice that assists the individual in problem-solving (informational support); and direct aid or services that convey a message of the person's worth (tangible support) (Schaefer, Coyne & Lazarus, 1981). Social support has been proposed as an important factor that affects health through the adaptation to stressful life events. From this perspective, social support is viewed as a resource that affects health both directly, and, in a less direct manner, by mediating or buffering the relationship between stress and health (Cassel, Kaplan & Gore, 1977; Cobb, 1976; Dimond & Jones, 1983; Norbeck, 1988). Adaptation may be considered an indicator of health and relates to the individual's response to stressors as he or she attempts to adjust or accommodate to the situation in a positive way (Dimond & Jones, 1983). Social support in pregnancy has been linked to maternal role attainment (Mercer, Hackley & Bostrom, 1984), fetal attachment (Cranley, 1984), and adaptation to parenthood (Cronenwett, 1985) in low-risk populations.

In a longitudinal field study of 20 hospitalized women with pregnancies complicated by chronic illness, Corbin (1987) described the management strategies employed by this group of women to deal with imposed situational stressors. Findings indicated that the adequacy of informational support greatly influenced the ability of participants to manage and control their high-risk situations successfully. Adequate emotional support was associated with decreased emotional conflict in making decisions about the pregnancies.

Nuckolls, Cassel and Kaplan (1972) studied the relationship between psycho-social assets, social stresses and the prognosis of pregnancy in 170 primiparous army wives. The category of psycho-social assets combined five qualities including ego-strength, qualities of marriage, relationships with extended family, social resources and feelings about the pregnancy, into a single variable. Neither life change nor psycho-social assets were independently associated with complications. However, when the interaction of life change and psycho-social assets was examined, it was found that, in the presence of high life change, women with low psycho-social assets had a complication rate of 91% as compared to 33% for women with many psycho-social assets. Hence, psycho-social assets may have a buffering effect on stressful life events. However, the interpretation of the study results are limited, as the differential effects of individual aspects of the variable psycho-social assets were not considered.

In a more recent study, Norbeck and Tilden (1983) examined the effects of life stress, social support and emotional disequilibrium on complications of pregnancy in a sample of 117 low-risk pregnant women. Total social support

was not found to be an independent predictor of total complication rate, nor of gestational, labour or infant complications. However, the interaction of tangible support, one type of support considered, and life change was significant for each type of complication.

While there are relatively few studies that have examined the role of social support in pregnancy, existing studies have generally focussed on populations of expectant women with initially normal pregnancies. Only one study was found that examined the relationships between stress, social support, anxiety and depression in women with identified high-risk pregnancies (Mercer & Ferketich, 1988). No studies were found that examined the relationships between stress, social support and adaptation in women with high-risk pregnancies, whether hospitalized or non-hospitalized. The purpose of the present study was to describe the effects of perceived stress and social support on adaptation in a sample of hospitalized antepartum women.

Conceptual framework

Dimond and Jones' (1983) conceptual model of social support and adaptation to stress was used to guide the investigation (Figure 1). Six variables are identified in this model. Solid lines indicate main (direct) effects; broken lines indicate buffering (interactive) effects. While it was acknowledged that each of the variables and hypothesized relationships presented in the model could be important in understanding the role of social support in adaptation, this study was limited to the examination of three variables, the stressor, the perceived adequacy of social support and the adaptive response, as well as the relationships between these variables.

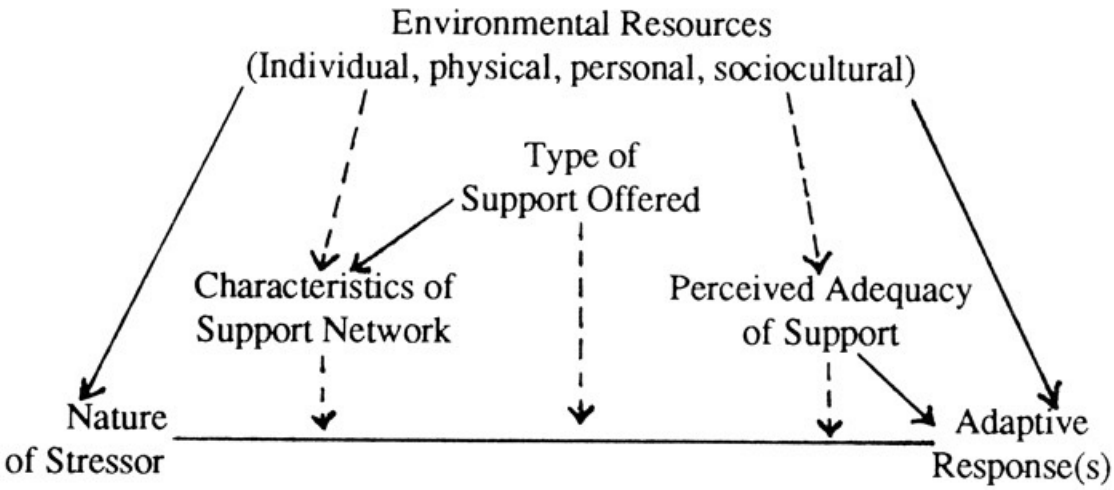

Figure 1
A proposed Model for Social Support and Adaptation to Stress.

Source: Dimond, M. & Jones, S.L. (1983). Social Support: A review and theoretical integration. In P. Chinn (Ed.), *Advances in nursing theory development* (pp. 235-249), Rockville, MD: Aspen.

According to Dimond and Jones (1983), in order for a situation to be stressful, it must be perceived as potentially harmful or overwhelming. The nature of the stressor, then, is defined as the degree of perceived stress experienced by women who are hospitalized for high-risk pregnancies. The nature of the stressor determines the type of adaptive response (Dimond and Jones, 1983). Thus, the greater the perceived stress, the less adaptive the response. In this study, adaptation is defined as the response of women to stressors experienced in antepartum hospitalization, and is operationalized as the degree of perceived adjustment to stressors relative to this situation.

The perceived adequacy of social support refers to the extent to which an individual perceives the environment to be supportive (Dimond & Jones, 1983). Mercer & Ferketich (1988) advise the use of perceived support as opposed to either received support or network size as a more salient dimension of support in pregnancy; perceived support was the only significant predictor of anxiety and depression in their sample of women with low and high-risk pregnancies. In the conceptual framework for this study, the perceived adequacy of social support positively affects the adaptive responses of women both directly, and also indirectly, by buffering the effects of stress.

Hypotheses

Consistent with the conceptual model, three hypotheses were tested.

1. Perceived stress will be negatively related to adaptation.
2. Perceived adequacy of social support will be positively related to adaptation.
3. Social support will have a buffering effect on the relationship between perceived stress and adaptation.

Selected demographic variables were also tested to determine if these represented additional sources of unexplained variance in the adaptation experienced by study participants.

Method

Design

A descriptive, correlational design was used to study the variables of interest.

Sample and setting

A convenience sample of 27 hospitalized, pregnant women was recruited from a regional perinatal center. Women on the antepartum unit who were

experiencing a high-risk pregnancy of 20 to 38 weeks gestation, who had been hospitalized for a 1 to 4 week period, who were emotionally, physically and mentally competent to respond to questions and who were fluent in English were asked to participate in the study. All subjects who were approached agreed to participate and informed consent was obtained. Two women who agreed to participate were excluded from the sample as they were unable to identify stressors relative to their life situations. Interviews were conducted in a quiet room on the antepartum unit and lasted from 30 to 60 minutes.

Measures

Perceived stress was measured on the *Stressors in Antepartum Hospitalization Tool* (SAHT), an instrument designed for the study based upon a previously developed method (Close, 1986; Llewellyn-Thomas et al., 1984a, 1984b). The SAHT is a two-part instrument that elicits information about types and magnitude of stressors experienced by women who are hospitalized antepartum, and, an index of the total amount of perceived stress related to this situation. Findings from Part I, which were derived by asking subjects to use free thought to identify stressors, to a maximum of eight, and then rate each of these on a 100 mm linear analogue scale according to the amount of stress it created, are reported elsewhere (Ford, 1987). In Part II, subjects were asked to consider the total degree of stress they were experiencing from all sources identified in Part I, and rate the degree of perceived stress on a 100 mm linear analogue scale from "no stress" (0) to "the greatest stress imaginable" (100). This score, which represents perceived stress in the present report, was highly correlated with the mean rating from part I (r=.86), indicating adequate internal consistency. An index of content validity of 1.00 was established for the SAHT, based upon the consistency of each item with its stated objective, as assessed by two health professionals with expertise in the maternal-child health field (Waltz & Bausell, 1981).

Adaptation was measured on a one-item scale developed by the investigator. Subjects were asked to determine the degree to which they perceived themselves as making a positive adjustment to the stressors previously identified and rate this on a 100 mm linear analogue scale from "not at all" (0) to "completely" (100). An index of content validity of 1.00 was determined in the same manner as outlined for the SAHT. As subjects were asked to indicate their perceptions at the time of the interview, stability across time could not be used as an indicator of reliability; the perceptions of both stress and adaptation depend upon circumstantial factors, which may change frequently in high-risk pregnancy.

Linear analogue scales are frequently used to capture feelings, perceptions and sensations which may be difficult to measure on scales with

predetermined intervals (Lee & Kieckhefer, 1989). Previous research has demonstrated the ease of administration, reliability and validity of this approach (Bond & Lader, 1974; Llewellyn-Thomas et al., 1984a, 1984b; Sutherland, Walker & Till, 1988). In the present study, this method provides a highly sensitive way of describing the subjective experiences of participants.

Perceived adequacy of social support was measured on a six-item scale, the *Social Support Questionnaire* (SSQ), that combined five items developed by Cohen (Schaefer et al., 1981) to measure the adequacy of emotional and informational support, and one item that taps tangible support as adapted from the *Norbeck Social Support Questionnaire* (Norbeck, Lindsay & Carrieri, 1981). Subjects were asked to indicate the degree to which specific individuals in their support network provided emotional, informational and tangible support on a five-point Likert Scale from 1, "not at all" to 5, "extremely". Two sources of support, a significant other and a significant nurse, were rated by study subjects. Total social support was calculated as the sum of each of these two ratings and has a possible range of 12 to 60.

The four questions that measure emotional support on the SSQ have been found to be highly related to one another (average inter-item correlation =.93) and discriminate from both informational and tangible support items (Schaefer et al., 1981). Tilden (1983) reported a coefficient alpha reliability of .98 for the four emotional support items using a convenience sample of 141 women with uncomplicated pregnancies in their second trimester; the alpha coefficient for emotional support items in the present study was .86. The item used to measure tangible support has been reworded for consistency with the SSQ, and is otherwise similar to the tangible support item (Norbeck et al., 1981), which has reported test-retest reliability of .86.

Information regarding occupation, marital status, culture, education, income and previous hospitalization was asked of the subjects. Information regarding medical history including parity, gestation, length of hospitalization, risk category, and diagnosis, as well as age, was obtained from the subject's medical record. The determination of risk was made by the subject's physician using standard guidelines on the Ontario Antenatal Record, where A represents low risk, B represents moderate risk (often sufficient for hospitalization) and C represents high risk.

Data analysis

A correlation matrix of the study variables was constructed using Pearson r correlations (Table 1). The buffering effect of social support (hypothesis 3) was not tested, as no significant relationship was found between perceived stress and adaptation ($r=-0.23$, $p=0.24$) and subjects' scores for adaptation

lacked variability (Table 2). Three-quarters of subjects' scores (n=21) fell above 50. Multiple regression analyses were conducted to explore further the relationships between the combination of perceived stress and social support, as well as selected demographic variables, to adaptation. Forward stepwise multiple regression was employed to determine if length of hospitalization (LOH), income, risk (dichotomized as lower-risk or higher-risk), or age, together with social support and perceived stress, accounted for a significant portion of the variance in adaptation. Categorical variables were transformed into dummy variables for the analysis. Variables were entered into the regression model in order of the strength of the relationship held with the dependent variable, based on a correlation matrix of the variables. The level of significance for this study, determined a priori, was .05.

Table 1

Correlation Matrix of Selected Study Variables

Variables	TSTRESS[a]	TSS[b]	LOH[c]	RISK[d]	INCOME[e]	GEST[f]	AGE[g]	ADJ[h]
TSTRESS[a]	1.00	-0.01	0.27	0.17	-0.32*	-0.07	-0.24	-0.23
TSS[b]	.	1.00	0.13	0.28	0.34*	-0.13	0.15	0.41*
LOH[c]	.	.	1.00	0.16	0.07	-0.24	0.25	-0.35*
RISK[d]	.	.	.	1.00	-0.22	-0.11	-0.36*	-0.22
INCOME[e]	.	.	.	.	1.00	-0.01	0.50*	0.29
GEST[f]	.	.	.	.	.	1.00	-0.04	0.03
AGE[g]	.	.	.	.	.	.	1.00	0.20
ADJ[h]		.	.	.	.	.	.	1.00

[a]Perceived stress; [b]Perceived adequacy of social support; [c]Length of hospitalization in days; [d]Risk category of pregnancy; [e]Annual household income; [f]Gestation of pregnancy in weeks; [g]Age of subjects in years; [h]Perceived adaptation.
*p<.05

Table 2

Ranges, Means, and Standard Deviations of Study Variables

Variable	Actual Range of Scores	M	SD
Perceived stress	18-100	67.03	19.02
Social support	35-57	45.74	6.1
Adaptation	18-99	67.63	31.89

Results

Subjects ranged in age from 17 to 39 years of age (M=28.9, SD=2.1) and all but four were married. As a group, subjects represented a broad range of cultural backgrounds and were well educated (M=14.1 yrs. of education, SD=2.1), with approximately 60% possessing a college diploma or university degree. Household income ranged from $5,000 to $l00,00 per annum (M=$48,159,SD=$26,ll0).

The majority of subjects were multiparous (N=23), although 8 of these 23 subjects had no living children. The gestation of current pregnancies ranged from 24 to 38 weeks (M=31,SD=3.9). Ten of the pregnancies were classified as lower risk "B", while 17 represented higher risk "C"; one-third of the sample had experienced at least one previous pregnancy loss. Subjects had been hospitalized for an average of l0.4 days (range =7 to 28) and represented a wide range of obstetrical and medical diagnoses including premature rupture of membranes (N=8), premature labour (N=6), diabetes (N=5), antepartum hemorrhage (N=3), pregnancy-induced hypertension (N=3), incompetent cervix (N=l) and acute depression (N=l). A sizeable portion of subjects had been hospitalized previously during the current pregnancy (30%) or during a past pregnancy (22%).

While a positive relationship was found between social support and adaptation (r=.41, p=0.04), no significant relationship was found between perceived stress and adaptation (r=-.23, p=0.24). Hence, hypothesis 2 was supported by the study findings while hypothesis 1 was not supported.

Results of the multiple regression analyses were as follows. First, the effect of stress and social support on adaptation was examined. The independent variables (perceived stress, social support) were not related to one another (r=-.01, p=0.96) and were entered separately into the regression model. As social support possessed the strongest relationship with the outcome variable (adaptation), it assumed the first position in the model. With both independent variables entered into the regression model, the overall R^2 was 22%. Social support accounted for 17% of the variance and perceived stress was negatively correlated with adjustment, representing a change in R^2 of 5%. However, the F-to-Remove was small (1.63) and the p-value was non-significant (p=.21). Thus, the contribution of perceived stress in the regression model was highly questionable.

Next, analyses were conducted to determine if selected demographic variables represented additional sources of unexplained variance in the model. The model that accounted for the most significant portion of the variance is presented in Table 3. Social support (SS), length of hospitalization (LOH), and risk together accounted for 43% of the variance (p=0.004). While the p-

value for the variable risk was not significant at the .05 level, both the F-value and the change in R^2 were significantly large to merit the inclusion of this variable in the model, particularly in light of the small sample size (N=27). The final model, then, suggests that subjects in the sample who had greater perceived social support, who had been in hospital for a shorter time when interviewed, and were of lower risk, experienced greater adaptation to stress in antepartum hospitalization. Partial correlations of the other variables (stress, income, gestation, age) were all less than .15 (non-significant). The variable of perceived stress did not significantly contribute to the model when risk was included in the model.

Table 3

Summary of Stepwise Multiple Regression Analysis: Predictors of Adaptation in Hospitalized Antepartum Women (N=27)

		Final Step				*Cumulative*		
Step	Variable entered	B	SE	F-to-remove	P	R^2	F	P
1	TSS[a]	1.97	0.59	11.06	0.003	0.17	6.63	0.02
2	LOH[b]	-1.42	0.61	5.45	0.03	0.34	6.88	0.02
3	RISK[c]	-14.32	7.38	3.76	0.06	0.43	5.76	0.004

[a]Total social support; [b]Length of hospitalization in days; [c]Pregnancy risk

Discussion

The failure of perceived stress to achieve significance as a predictor of adaptation is noteworthy. This finding may be related to the use of perceived stress as an indicator of the stressfulness of antepartum hospitalization, rather than a more objective measure. Previous studies, which utilized life change as a measure of stress, have found significant relationships between stress (life change) and pregnancy complications (Norbeck & Tilden, 1983; Nuckolls, Cassell & Kaplan, 1972). A possible explanation for this effect relates to differences in the timing of data collection. Studies using objective measures of stress also tended to use a prospective approach, such that data regarding stress and the outcome variable were collected at separate intervals. In the present study, data on the study variables were collected during the same interview and, thus, subjects may have experienced difficulty separating the issues. Further, subjects' stress and adaptation scores were based upon their perceptions, and, therefore, were more likely to be influenced by their emotional states at the time of data collection. It is possible that the interview process may have had some beneficial, cathartic effect, such that

subjects perceived themselves to be better adapted following the interview, and conveyed this in their scores for stress and adaptation.

The direct effect of social support on adaptation (hypothesis 2) was supported, as evidenced by a significant correlation between these variables ($r=.41$, $p=0.04$) and by the significant portion of the variance accounted for by social support when entered alone into the regression model. This finding is not surprising in that the importance of social support in low-risk pregnancy has been documented in previous studies (Cranley, 1984; Cronenwett, 1985; Mercer et al., 1984).

While the buffering effect of social support (hypothesis 3) could not be tested, the perceived adequacy of social support was found, in combination with other variables not included in the conceptual model, to influence adaptation significantly. It is particularly noteworthy that the amount of variance in adaptation explained by social support (17%) was substantially greater than the social support effect on emotional disequilibrium reported by Tilden (1983) in her sample of low-risk pregnant women (3%). However, if one accepts the premise that social support is a resource sought after to promote adaptation to stressful life events, then hospitalized pregnant women, who may have an increased need for social support because of their at-risk situations, should benefit to a greater extent from the provision of an adequate level of support than their low-risk counterparts. While the variance in adaptation explained by social support in the present study is considerably less than the effect of social support in reducing complication rate reported by Nuckolls et al. (1972), the results of the latter study should be cautiously considered as social support was treated as one component of a larger variable in the analysis. In the present study, the analysis related to social support was also limited. As the social support instrument used contained only one item for each of the categories of informational and tangible support, the differential effects of types of social support could not be tested.

The presence of length of hospitalization as a variable in the regression model is interesting in light of the fact that the length of hospitalization in this study really reflects a slice in time (i.e. the number of elapsed hospital days when the subject was interviewed, the minimum of which was seven days). Thus, the better adapted subjects in this sample tended to be hospitalized for the minimum period allowed by the study (seven days) with adaptation decreasing as the number of days in hospital increased. As the crisis of admission to hospital has been quite well documented, it is possible that women who are hospitalized antepartum may experience a period of poor adaptation around the time of admission, followed by a period of relative calm and adjustment (perhaps at seven to eight days of hospitalization), and, then a gradual decrease in adaptation as hospitalization progresses (Merkatz, 1976; White & Richie, 1984). This period of stabilization at seven to eight

days may reflect the individual's initial efforts of coping with the crisis of hospital admission, possibly through the use of denial. As the length of hospitalization increases, the woman must face the reality of her at-risk pregnancy and attempt to establish more long-lasting mechanisms for dealing with the stress encountered. This explanation is plausible when one considers that, of the two subjects who were unable to describe stressors, both had been hospitalized for seven days and appeared to rely quite heavily on the use of denial throughout the interview process. Further, some evidence exists that hospitalized antepartum women may experience emotional changes at around eight days hospitalization, that appear to be related to coping with the crisis of hospitalization (Waldron & Asayama, 1985). Regardless, longitudinal studies are needed to document the process of adaptation that occurs over time in this population.

Further, while risk in this study was determined by a grade based on the women's medical status, the interviews provided evidence that this variable also involves a subjective component that relates to the woman's perception of the degree of danger present for the fetus. As such, the subjective meaning of risk to each individual woman may have influenced adaptation in the study sample. The findings of Corbin's (1987) study of women with pregnancies complicated by chronic illness support the premise that women make an appraisal of pregnancy risk that is independent of, and sometimes divergent from, the risk status determined by medical personnel.

Nursing implications

The finding that social support was predictive of adaptation in the study sample has important implications for nursing practice. Nurses should assess the level of support available to individual women from within their own support network. As the woman's support network is often partially or totally disrupted by the physical separation that hospitalization creates, alternative sources of support should be accessible while in hospital. The nurse may coordinate the process of providing social support, by referring the woman and her family to other members of the health care team, such as chaplains and social workers, making patient-to-patient introductions, and, presenting oneself as available to the patient and her family. This coordination may be enacted as part of a formalized, multidisciplinary team that deals specifically with psycho-social aspects of antepartum hospitalization and devises an individualized, coordinated plan of care to assist each antepartum patient in dealing with particular areas of difficulty encountered.

The study findings also suggest that the hospitalized antepartum woman's level of adaptation may decrease as hospitalization progresses. Nurses should be aware of this pattern, but also be constantly alert to individual differences that may exist, so that appropriate support resources may be mobilized in accordance with the antepartum woman's changing needs.

This study involves a number of limitations, including a small, convenience sample and limited testing of the reliability and validity of the measurement tools. A need exists for methodological studies to assess the psychometric properties of these instruments further. In particular, the development of a reliable and valid measure of social support, including several items per subscale, which is suitable for hospitalized pregnant women, would permit more complex statistical analysis of this variable. Subjects in this study represented a somewhat advantaged group of women in terms of education and socio-economic status, yet these women experienced considerable stress. In light of this, serious questions arise as to the experience of less socially-advantaged groups of women related to antepartum hospitalization.

Nonetheless, social support is emerging as an important factor that affects the adaptation of pregnant women. Through assessment of the support available to these women and improvement of their support network when required, nurses may play a significant role in assisting these clients toward adaptation. Further research, with larger, more diverse samples, is required to clarify the relationships between stress, social support and adaptation as they occur over time, and to determine other factors that influence adaptation.

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RÉSUMÉ

Variables prédictives d'adaptation chez des femmes hospitalisées pendant la grossesse

L'expérience subjective de 27 femmes hospitalisées pour une grossesse à risque est décrite en fonction du stress perçu, du soutien social et de l'adaptation. Le modèle conceptuel d'adaptation au stress et de soutien social de Dimond et Jones (1983) a été utilisé dans le cadre de l'étude. Trois hypothèses dérivées du modèle conceptuel qui décrit la relation entre ces variables ont été vérifiées. On n'a noté aucune relation entre le stress perçu et l'adaptation (r=-0,23, p=0,24). Toutefois, on a observé une association positive entre l'adéquation perçue du soutien social et l'adaptation (r=0,41, p=0,04). La combinaison du soutien social, de la durée de l'hospitalisation et du risque que présentait la grossesse s'est révélée une valeur prédictive importante de l'adaptation: c'est ainsi que les femmes qui bénéficiaient du plus grand soutien social, dont la durée d'hospitalisation était la plus courte au moment de l'entrevue et dont la grossesse comportait par ailleurs le moins de risques affichaient le plus haut niveau d'adaptation. Ces observations portent à croire qu'une hospitalisation avant l'accouchement est une expérience stressante; le soutien social est une ressource importante qui influe sur l'adaptation.

MAINTAINING THE ANONYMITY OF VULNERABLE SUBJECTS

Sara R. Frisch, Dawn Fowler-Graham, Valerie Shannon and Paula Dembeck

Current North American standards for research on human beings assert that the researcher must inform potential participants about the study and, without coercion, obtain their consent to participate. Sometimes, however, nurses initiate research on people who are dependent upon them. The dependent relationship raises questions about whether potential participants are able to consent without coercion. Dependent groups include patients or families of patients. Nurses may also be vulnerable to coercion if the researcher is a nursing administrator studying nursing practice.

The purpose of this paper is to examine the strategy used by researchers who faced the problem of dependency in a study of head nurse stress. Investigators included nursing administrators with managerial responsibility for some of the participating head nurses. The strategy adopted was to keep participants unknown to the researchers. The tactics that were used will be discussed, as will evidence for their importance and effectiveness. Tghe problems that were created by using these tactics will also be examined.

Literature Review

Polit and Hungler (1989) suggest beneficence, justice and voluntariness are the major ethical principles guiding nursing research. Beneficence refers to a judgment about the potential harm of participating in a study, relative to its potential benefits. The principle of justice relates to fair and equitable treatment of those studied, including protection of their privacy. The emphasis on voluntary participation in research stems from respect for human dignity. Researchers attempt to ensure participation is voluntary through the process of informed consent.

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Informed consent has several facets. Among these are ensuring the subject knows and understands the research and the roles of others who may be involved. An initial understanding is established when the investigator explains the study to a potential participant. Studies can go in unanticipated directions, however, particularly during the interchange between the researcher and participants in qualitative investigations (Ramos, 1989). Respondents may exceed the agreed boundaries if they become caught up in relating their experiences to a researcher (Weitz, 1987). Several authors discuss the particular ethical difficulties faced by qualitative researchers (Brannen, 1988; Cowles, 1988; Munhall; 1988; Robinson & Thorne, 1988).

Another facet of informed consent concerns being able to give consent freely. Ethical guidelines of the The Canadian Nurses Association (1983) note that research subjects who are competent should not have their freedom of choice affected by expecting benefits or fearing loss of existing benefits. Ethical guidelines provided by the Canadian Social Sciences and Humanities Research Council (1986) state that, "there should be no coercion, constraint or undue inducement" in obtaining consent. Groups for whom freely given consent may be an issue include students, prisoners, patients and employees.

Patients are the focus of most discussions of ethics in health care research. To minimize coercive influence on them, informed consent can be sought by an individual on whom the potential subject is not dependent (World Medical Assembly, 1975). Strategies to protect nurses who are asked to participate in research on their work have not been described in the nursing literature.

Those who study nurses' work are often asked how they will act if their research reveals a nurse's performance is a threat to patients' well-being. Mirvis and Seashore (1982) discribe ethical dilemmas that they encountered as social scientists studying organizations. The discussion illustrates other ways in which employees face a potential loss of benefits when their work is being researched. They present one case where the researchers had guaranteed confidentiality to employees, and management personnel had also agreed that data would be confidential. Nonetheless, a manager requested information from a researcher when considering an employee for promotion. In the manager's perspective, access to information that might benefit the organization took precedence over the researchers' assurance of confidentiality. The researcher did not provide the information despite feeling that it would support the promotion. The employee was not promoted.

The Study

The research project started because nursing staff and administrators were interested in workplace stress. A review of the literature located many

studies of staff nurse stress, but there were relatively few reports on head nurses. The role of head nurse is important to the organization and was thought to be significantly different from that of staff nurses. Given the importance of this role and the lack of recent research, the investigators decided to focus this project on head nurses.

An exploratory study was designed that would help elaborate the framework for a larger scale investigation. Data were collected with open-ended interviews because of the exploratory nature of the project and the paucity of prior research on head nurses' workplace stress. The investigators wanted to look at coping and, as such, planned to follow Lazarus's paradigm (Lazarus & Folkman, 1984) which uses interviews to obtain data. Generally, the investigators wanted to know about head nurses' experience as they described it in their own words.

Four teaching hospitals were included in the study. A sample of six head nurses was drawn from three hospitals and three from the fourth hospital, for a total of 21. The sample was deliberately diverse. The investigators sought head nurses who varied widely in their job tenure, educational preparation and type of unit as well as other factors. An hour-long tape recorded interview was conducted with each respondent.

Strategies for reducing coercion

Stress, as it is experienced by head nurses, is a sensitive issue. The decision to conduct interviews with head nurses on this topic posed problems because two of the investigators were senior administrators to whom head nurses were responsible and accountable. The researchers thought head nurses might not feel free to refuse to participate in such a study if their bosses were making the request. Head nurses might also circumscribe their responses to questions during the interview. Thus, unless care was taken, the study would be ethically unacceptable and scientifically flawed.

The investigators felt that ensuring participants would remain anonymous would address these concerns. They assumed that explaining how anonymity would be achieved to potential interviewees would substantiate the promise of anonymity. It was further assumed that the promise of anonymity would remove coercion to consent and would allow participants to speak freely.

Several tactics were used to create anonymity. One was to employ an interviewer so that investigators would not conduct interviews themselves. The issue was whether to select a nurse as the interviewer. The interviewer had to be independent of the participating hospitals and, upon further consideration, had to be outside of the local nursing community to reduce respondents' concerns about possible "leaks." This was because the local nursing community

is closely-knit and all participating hospitals are affiliated with the same university. Many people were educated at the university, have taught there, or are involved in teaching students on their units. People frequently change jobs from one hospital to another, attend conferences together and sit on inter-hospital committees. Anyone from this group would be known to others and could be seen as having potential to share information from the interviews. The interviewer also had to be someone who was unlikely to become an employee of any of the respondents.

The decision also had implications for the kind of information respondents might give. Respondents might expect a nurse to understand what they were saying, and they might react negatively to probing from a nurse interviewer. Similarly, a nurse interviewer might be less likely to probe presumed understandings because of her own familiarity with the profession. A non-nurse interviewer's probes might be more legitimate to respondents, but the probes would have to be done in a way that communicated understanding and empathy. The decision was made to hire an experienced non-nurse interviewer.

Another tactic was to separate the investigators from the process of selecting subjects and seeking their consent. Purposive sampling was used because the study was exploratory and the sample size was small. The investigators developed criteria for potential respondents. Each participating hospital identified a liaison person who was not otherwise associated with the research project. The liaison person approached head nurses who met the criteria and who might be interested in participating in the study. Names of interested head nurses were given directly to the interviewer. The interviewer then contacted the head nurse and gave a more complete description of the study, answering any questions. If the head nurse was willing to participate, the interview was scheduled at a mutually-agreed-upon time, and in a location preferred by the respondent.

Interviews were tape recorded. Investigators could not hear the tapes, so the third tactic was to give investigators only disguised transcripts. This "disguising" had to go beyond the common methods of removing or changing names of the hospital, the unit and persons. Thus, references to specific illnesses or disease, or to specialized equipment, were also changed or removed. Numbers, such as the number of beds or staff, were changed. The changes did not alter the essential nature of the unit. For example, the number of beds might be changed from 14 to 12 or 16, thus maintaining its small size. Structural features such as the position of assistant head nurse were hospital-specific, and references to them were modified. The term for a nurse who had just graduated and was awaiting licensure was also specific to a hospital; it was altered so the same phrase appeared in all interviews.

The non-nurse interviewer was not familiar with the settings and individuals and so was not sensitive to all the cues that could reveal a respondent's identity. Steps were taken to assure that the disguising would be thorough. Training interviews were set up with people who had been head nurses in the participating hospitals. These interviews were used to sensitize the interviewer to the kinds of disguising that were required. A faculty member at a university school of nursing, who was familiar with the settings but was not employed in any of them, acted as a consultant. She reviewed and made suggestions about the disguised training interviews and indicated whether they still contained revealing information. The interviewer continued to discuss disguising with this consultant during preparation of transcripts for analysis by the investigators. A sociologist affiliated with the university school who had conducted several studies of nurses at the participating hospitals also acted as a consultant.

The disguised interviews were given to the one investigator who was not administratively responsible for head nurses. She made further changes before sharing them with her co-investigators. There were some transcripts that could not be adequately disguised without altering the meaning of the interview. These were withheld from all the investigators and analyzed by the interviewer.

Evidence that concerns were well-founded

It was evident to the interviewer that the research team appropriately anticipated participants' reactions to being in this project. All head nurses contacted by the interviewer expressed concern about who she was and where the interviews would take place. Many asked about the purpose of the study. Several head nurses expressed concern as to why the investigators wanted this study done and several asked the interviewer how she was selected for the position. The detail and precision of the questions went beyond the boundaries of general inquiry. Respondents sought detailed information as to the reasons for the research, what would be done with the data and what the implications would be for their position and their work. Several respondents did not want to be interviewed on their unit. One would only participate if the interview was done outside the hospital.

Potential respondents' apprehensions about their anonymity was apparent in their questioning before giving consent. They repeatedly asked "What are you going to do to make sure the researchers will not know who we are?" Respondents wanted assurance that the investigators would not see undisguised transcripts. They also inquired about how the disguising was going to be done. One head nurse gave a hypothetical example and asked how the interviewer would disguise it.

Concerns surfaced during the interview as well. Before elaborating a response, several respondents asked, "This is going to be disguised?" or "No one will see this?" Others were reluctant to go into any detail, even after several probes. One, in particular, gave predominantly "yes" and "no" answers and would respond to much probing with, "Oh, I can't really say." The respondent also sat in a closed, defensive posture. The interviewer felt this head nurse did not really want to be part of the study, even though consent had been given.

Most respondents appeared to participate willingly in the interviews, but the interviewer observed that head nurses who had been in the job longer were more negative, more frustrated and more concerned about confidentiality. Respondents who had been head nurses for less time seemed more relaxed and talked excitedly about their job and what they hoped to accomplish. They laughed more throughout the interview and seemed less caught up in issues of confidentiality. The investigators also saw this relationship between affect and tenure in the job during their analysis of disguised interviews.

Problems raised by the approach

The tactics that were adopted to address ethical concerns raised various problems. Problems arose from the decision to employ an external interviewer, in conjunction with a need to complete interviews in a relatively short time. Investigators conduct their own interviews in most qualitative studies. This gives them the opportunity to modify later interviews, if earlier ones fail to provide desired information, or to change the researcher's perspective on the research questions. In this study, the investigators were, of necessity, second-hand parties to the interviews. The interviewer gained an understanding of the investigators' thinking by participating in the preparatory discussions to refine the research issues and develop the interview schedule. Contact was maintained with the interviewer while interviews were in progress, but the constraints of anonymity limited the information about interview content that could be shared. The turn around time to transcribe, disguise and verify disguising was so long that investigators did not see disguised transcripts until the entire set of interviews was completed. Ideally the investigators would have reviewed and discussed each disguised transcript with the interviewer before the next interview was conducted. This was not possible, so the project lost some of the flexibility that normally characterizes qualitative studies.

Another difficulty in the method of investigation was the need to avoid questions that could explicitly "give away" the identity of the interviewee. For example, while investigators were ultimately interested in how the organization affected employees' experience of stress and coping, questions

that would reveal the respondent's hospital were not included. Similarly, the interview did not test whether settings such as emergency rooms or intensive care areas are more stressful than others. Explicit questions to explore this would have endangered anonymity.

The data analysis may have been affected by the need to ensure investigators did not hear the taped interviews. Often the qualitative investigator's data in a study goes beyond a respondent's words. The researcher notes non-verbal behaviours and patterns of voice tone and inflection in understanding a respondent's meaning. These cues were unavailable to the investigators. While the interviewer punctuated transcripts, the investigators were limited in their capacity to verify different interpretations by reference to cues from the interview or the tape. The interviewer gave investigators general information about her perceptions of an interviewee's affect during the interview and also confirmed or contradicted impressions garnered from the transcripts. Nonetheless, richness was lost.

It is also possible that "disguising" altered interview content in important ways. Nursing experts who were external to the settings were used as consultants to avoid this. They were asked to judge whether a change was significant. The possibility remains that disguising distorted interview content, especially when it required changing an example used to illustrate a point.

Learning from experience

A number of tactics to achieve anonymity were used in recognition of the ethical issue of voluntary participation. Overall, the tactics worked reasonably well. Improvements can always be made, however, even with similar resources and constraints.

The subject selection procedure could be improved. A liaison was used to ensure investigators did not know who was invited to participate. Using individuals familiar with the head nurses facilitated purposive sampling, but the liaison may have been too closely connected to the nursing administration at participating hospitals to minimize potential coercion. An alternative approach would be to send every potential participant a demographic information sheet to be returned to the interviewer. Completion of the sheet would indicate willingness to be contacted, and the interviewer could use the information to select who would be invited to participate in the interview.

The picture of the respondents' affect could also be improved. The interviewer gave the investigators her impressions about the tone of an interview. The interviewer could also make detailed notes about the atmosphere and the respondent's reactions after each interview and could be more closely involved in the data analysis. Information about non-verbal behaviours and

patterns of tone of voice and inflection, which are an essential part of interpreting meaning, could be inserted into the transcripts.

Nursing experts were consulted to ensure disguising did not alter the content of interviews significantly. Investigators also had planned to have respondents read disguised interviews to ensure essential features had not changed. This step was not taken because of constraints of time and finances. A summary of results was sent to each participant. All head nurses at participating hospitals were invited to forums at which results were reported back and questions were encouraged. Researchers who have sufficient resources can check back with each respondent to verify interpretations and disguising. This is most useful if it occurs after completing an initial analysis of the interviews.

This was an exploratory study in an area in which there has been little research to date. The researchers wanted to capture the range of head nurse experiences and thus sought a heterogeneous sample. This complicated the disguising of the interviews because unique units, such as emergency, were included and were difficult to mask. Investigators whose research objectives allow selecting a more homogeneous sample will have less difficulty managing this aspect of disguising.

Conclusions

The means by which some nursing administrators addressed the problem of conducting interview research on their staff, while meeting ethical concerns of non-coerced participation, have been discussed in this paper. The reactions of head nurses approached for this study indicate that these members of managerial staff were concerned about being asked to participate. On the whole, the interviewer felt most respondents were comfortable with the guidelines and procedures used to protect participants, although there was still doubt as to whether some respondents felt free to say "No".

The concerns expressed in this paper about ensuring that employees can decide to participate in research without feeling coerced also apply when conducting research with patients or their families. Patients and families are assured that their decision about participating in the research project will not affect the care received by the patient. Is this assurance sufficient? Is it believed? The common observation that patients and family members express high levels of satisfaction with nursing care may be a result of their feeling coerced because they fear the consequences of saying something negative. Investigators who are giving direct care must be particularly careful to ensure that patients and families believe they can freely consent. An independent researcher must also provide assurances because she may be perceived as a representative of the health care facility, therefore someone

with power over the care received by the patient, even if she is not directly involved in giving care.

The strategy described in this paper helped obtain valuable data on a sensitive topic from a vulnerable group, even though it caused some problems in the data analysis. The tactics for ensuring anonymity allowed researchers to collect data through face-to-face interviews, which can produce much richer data than paper and pencil instruments. The measures taken to ensure anonymity enabled most respondents to talk quite openly about the stress they experienced, and how they coped with it. Hindsight suggests how the tactics could be improved. Nonetheless, meaningful data was obtained because investigators anticipated and addressed the potential coercion faced by the dependent group being researched.

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RÉSUMÉ

Respecter l'anonymat des sujets vulnérables

On admet généralement que le consentement éclairé est un aspect important de la recherche effectuée dans le respect de la déontologie. Conformément aux directives déontologiques de l'AIC (1983), on ne peut parler de consentement éclairé que si les sujets sont libres de donner ou de refuser leur consentement. Certains groupes - c'est le cas des employés - sont plus exposés que d'autres à la coercition quand on cherche à obtenir leur consentement. Le présent article décrit une stratégie utilisée pour faciliter l'obtention d'un consentement de plein gré alors que des cadres supérieurs de personnel infirmier effectuaient une étude qualitative du stress chez les infirmiers chefs. La stratégie visait à garantir l'anonymat des participants. On a donc fait appel à des intermédiaires pour choisir et interroger les sujets et on a masqué les transcriptions des entrevues avant de les remettre aux chercheurs en prenant soin de retenir celles dont le masquage menaçait d'altérer foncièrement les données. On a la preuve de l'importance et du succès de ces mesures. On examine également l'effet des mesures visant à assurer l'anonymat au niveau de l'analyse des données. Les chercheurs qui étudient les patients et leurs familles doivent aussi atténuer la contrainte pour obtenir un consentement éclairé.

PREDICTORS OF NARCOTIC ANALGESIC ADMINISTRATION IN THE FIRST 48 POST-OPERATIVE HOURS

Robin Weir, Jacqueline Roberts, Gina Bohn Browne, Joan Crook and William Barnes

Of the various types of pain problems, post-operative pain should be the least complex to manage because its source is usually distinct and its course is self-limiting (Keeri-Szanto, 1979). Nonetheless, there is widespread evidence that the management of pain in surgical patients is regularly and systematically inadequate (Angell, 1982; Cartwright, 1985; Marks & Sachar, 1973; Smith & Utting, 1976). Concern about this apparent failure in pain management has produced a substantial body of literature that addresses factors influencing the degree of pain reported, the analgesia required and the amount of analgesia administered post-operatively. A variety of demographic, clinical and treatment variables have been shown to be associated with the administration of post-operative analgesia. However, there are discrepancies in the results of the studies, and there is no indication as to the importance of these diverse variables in explaining the use of analgesics post-operatively.

The purpose of this prospective study was to weigh simultaneously the importance of selected patient characteristics, intra-operative procedures and the post-operative analgesic management regimen as factors that may combine to explain the frequency of administered analgesic doses. More specifically, the purpose of the study was to quantify the contribution of these selected variables to the use of analgesics in adult surgical patients in the first 48 hours post operation.

Among demographic factors associated with the frequency of post-operative analgesia, sex, height, weight, body surface area and age have been

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investigated (Austin, Stapleton & Mather, 1980; Bellville, Forrest & Miller, 1971; Beyer, DeGood, Ashley & Russell, 1983; Faherty & Grier, 1984; Kaiko, 1980; Keeri-Szanto & Heaman, 1972; Nayman, 1979; Pilowsky, Manzap & Bond, 1969; Taenzer, Melzack & Jeans, 1986; Tamsen, Hartvig, Fagerlund & Dahlström, 1982). Pain reports by patients have been studied relative to these post-operative analgesic requirements (Angell, 1982; Cohen, 1980; Donovan, Dillon & McGuire, 1987; Marks & Sachar, 1973; Smith & Utting, 1976; Weis, Sriwatanakul, Alloza, Weintraub & Lasagna, 1983), as well as to their association with other clinical variables such as site, nature of the operation and type of incision (Bullingham, 1984; Pflug & Bonica, 1977) and the type of analgesia administered (Henderson & Parbrook, 1976). Treatment variables that have been examined include the prescribed dose of analgesia (Austin, et al., 1980; Cohen, 1980; Beyer, et al., 1983; Keeri-Szanto & Heaman, 1972; Marks & Sachar, 1973; Smith & Utting, 1976), the administered amount (Marks & Sachar, 1973; Smith & Utting, 1976; Cohen, 1980; Sriwatanakul, et al., 1983; Faherty & Grier, 1984) and the interdosing interval (Nayman, 1979; Bullingham, 1984, 1985). None of the studies that were reviewed examined the collective influence of all the above variables on doses administered. Across studies, the influence of each of the above variables is inconsistent. These discrepancies in study results have not only been attributed to problems in design and measurement, but also to attitudinal biases and knowledge deficits of physicians and nurses in making their decisions about the amount and frequency of analgesia requirements (Epstein, Read & Winickoff, 1984; Taenzer et al., 1986; Teska, Daut & Cleeland, 1983).

For this study, it was postulated that the number of doses and total amount of narcotic given would be a function of some combination of the personal characteristics of the patient, clinical variables including the type of surgery and surgical supports, and the prescribed pain treatment. In this case surgical supports refers to intra-operative procedures such as type of anaesthesia, insertion of drains, nasogastric tubes, etc.; pain treatment includes the dose and schedule of prescribed analgesics. It was also proposed that those patients with factors that are empirically associated with more predictable responses to narcotics (e.g. age and weight) would have more frequent doses and greater total amounts than those patients with factors assumed to pose a risk.

The present report was part of a larger study that examined the efficacy of regularly scheduled analgesia in the prevention of atelectasis in abdominal surgery patients (Barnes et al., 1985). Regular pain medication as a post-operative regimen was not superior to a PRN regimen in preventing or allowing the progression of pulmonary pathology following surgery. Clinically, the patients who received the "attention placebo" plus PRN medication had the lowest rate of post-operative lung pathology, while the PRN medication group without the regular attention had the highest rate.

It was proposed that minimal movement (and possibly minimal ventilatory change), which accompanied the regular attention of vital signs (the frequency of which was not controlled for in the other two groups), may have accounted for the direction of these results (Barnes et al., 1985). A number of subjects (27% of original 248) were lost from the analysis because they were not maintained on the appropriate regimen; as such, we wanted to examine the pattern of administration of analgesia to determine whether or not there was some explanation for this incomplete implementation of the experimental manoeuver.

This study was designed to examine, through the use of multivariate statistics, the influence of demographic and clinical variables alone and in combination with the randomly prescribed analgesic regimens on the frequency of narcotic dosing. The data source was the patients' medical charts, which included medication profiles, vital sign records and the operating room and recovery room records. Trained research assistants abstracted the required data from the chart record of the patients as they were enrolled into the trial.

The hypotheses were:

1. Surgical and post-surgical care variables, as compared to other demographic variables, would account for the most variance in the number of doses and total amount of narcotic administered.
2. Lower amounts and fewer doses of medication would be found for patients who were older, female and weighed less.
3. The number of narcotic analgesic doses and total amount administered would be related to the prescribed analgesic schedule, i.e. regular dosing or PRN.
4. The frequency of PRN dosing would be altered by scheduled, regular interactions between the patient and nurse.

Methods

Study setting and subjects

The subjects were 248 patients (68 male and 180 female), between the ages of 16 and 70 (mean = 45.95, SD 14.20), who underwent elective intra-abdominal surgery during the study period. They were recruited from the practices of six general surgeons who carried out the surgical procedures in one of three general hospitals in an industrial city with a population of 350,000, in southern Ontario.

Potential subjects were identified prospectively through the daily operating room schedule furnished by the surgeons' offices. Patients who met the

inclusion criteria (elective intra-abdominal surgery and aged between 16 and 70 years) were screened for existing chest disease, major thoracic deformity, specific medical conditions or problems and the ability to speak English, and then were asked to participate in the study.

Two hundred and seventy-eight consenting patients who met the inclusion criteria were then randomly allocated to one of three pain management regimes. These regimes included the intramuscular injection of analgesia every three hours; on a PRN basis; or, on a PRN basis with an attention placebo (four hourly vital signs measurement) during the first 48 hours. Vital sign measurement in the other two study groups was allowed to vary according to conventional practices of the institution. Of the 278 consenting and eligible subjects, 30 were excluded from the analysis because their medical conditions and treatment (nerve block, epidural anaesthesia, mechanical ventilation, i.v. morphine) prevented their adherence to the allocated analgesic regimen. Thus, 248 patients were followed for 48 hours post-operation.

Once the analgesia group was determined, a colour-coded card, with printed instructions for the implementation of the appropriate analgesic study regimen, was affixed to the patient's chart. The orders for the medication were written by the attending surgical resident or surgeon. The ward nursing staff carried out the prescribed medication regimen.

Variables and Sources of Data

Demographic variables

Subjects' age, gender and weight were obtained from their medical records, as they were enrolled in the study. The influence of weight, gender and age on the prescription and administration of analgesia is inconsistent across studies. However, narcotics are usually prescribed on a dose-per-weight basis and there is some evidence that older post surgical patients receive less than younger adults (Faherty & Grier, 1984).

The smoking history of patients was obtained; the number of cigarettes smoked per day was counted and summarized in five groups of ten. One additional group was made for those who smoked more than 41 cigarettes per day. Keeri-Szanto and Heaman (1972) demonstrated that smokers metabolize most analgesics faster than non-smokers; this could influence the amount of medication requested and administered.

Clinical variables

Subjects' surgeons were identified and coded. The clinical variables "primary diagnosis of cancer or not" and "seriousness of surgery" were selected

to attempt to probe the effect of nurses' attitudes on particular diagnostic categories. The label "cancer" was selected because of its association with suffering. All diagnoses were grouped into either "cancer" or "no cancer" groups. In addition, it was judged that the name of the surgical procedure itself might create an expectancy, among experienced surgical nurses, about narcotic requirements.

Patient diagnosis has been shown to have a significant effect on how nurses assess patient suffering (Davitz & Pendleton, 1969). It appears that conditions viewed as physically most painful, that is conditions associated with trauma, influence how nurses assess pain (Dudley & Holm, 1984). To test this assumption, two experienced surgical nurses were given the list of surgical procedures from the study sample and asked to rate which procedure they would expect would require more analgesia than the others. Nine surgical types were identified as serious in this manner, with an interrater agreement of K-.786. These nine types were entered into the analysis as "serious surgery", while the others were considered "not serious".

An additional factor associated with the degree of pain is the site of the operation. Specific incision sites were grouped according to whether they were in the upper or lower abdomen. Those incisions that involved both upper and lower abdomen were placed in the upper abdomen group because upper abdominal incisions are reported as more painful (Bullingham, 1984). Length of anaesthesia was included as an indicator of complexity of the surgical procedure; length of stay was included as a further reflection of complexity and seriousness. These variables were judged as possible influences on staff's prescribing and administering practices.

Treatment variables

The amount and frequency of doses of Demerol-equivalent narcotics administered in the first 48 hours were obtained from the patient's medication profile. In addition, individual counts were made, for each patient, on the presence or absence of drains, nasogastric tubes and routine physiotherapy. These treatments are associated with discomfort and pain and assumed to influence the assessment of pain, and subsequent administration of analgesia. There is some evidence that pulmonary atelectasis is, in part, caused by inadequate ventilation; this might be due to the inhibiting effects of abdominal pain (Benhamou, Samii & Doviant, 1983; Coleman, 1987). Consequently, pulmonary complications were considered to be an important indicator of pain that might explain analgesic administration practices. Finally, tallies also were made as to whether analgesia was administered in the recovery room. This was done because such an occurrence suggests that any intra-operative analgesia that was administered had lost its effect, and that the patient was in pain early in the post-operative period.

Analysis

Stepwise forward multiple-regression analyses were done, using analgesic treatment group as a covariate to explore the collective influence and order of importance of the demographic, clinical and treatment variables on the number of analgesic doses given, as well as on the total amount of narcotic analgesia administered. Sixteen variables were entered in the analysis (Table 1). These included demographic variables (age, gender, weight, history of smoking and number per day); clinical variables (surgeon, primary diagnosis of cancer or not as diagnosis, seriousness of surgery, incision site, length of anaesthesia and length of hospital stay); treatment variables (presence of drains, nasogastric tube, physiotherapy, recovery room analgesia and presence or absence of lung pathology). In addition, analysis of variance procedures were used to examine the difference in frequency of administered analgesics, by treatment group, within the first 48 hours. A t-test was used to compare the difference in the mean amount of analgesic administered between the regular medication group and the combined PRN group.

Table 1
Summary Table of Regression Variables

Variables	Measures
Dependent variable (Outcome)	
Number of analgesic doses	Continuous
Total amount of analgesia administered	Continuous
Demographic variables	
Age	Continuous
Weight	Continuous
Number of cigarettes smoked per day	Continuous
Gender	Categorical
Smoking history	Categorical
Clinical variables	
Surgeon	Categorical
Diagnosis	Categorical
Seriousness	Categorical
Operative site	Categorical
Length of anaesthesia	Continuous
Length of hospital stay	Continuous
Treatment variables	
Drains	Categorical
Nasogastric tubes	Categorical
Routine physiotherapy	Categorical
Pulmonary complications	Categorical
Recovery room analgesia	Categorical

Results

There was a statistically-significant difference among the three randomized treatment groups in the mean *number of doses* of analgesia given over the first 48 hours (ANOVA, $F_{2, 245}$=47.9, p<.001) (Table 2). The regular Q3H medication group received more doses than the other two groups (Scheffe p<.05). Similarly, there was a statistically-significant difference between the regular Q3H medication group and the combined PRN groups (t=5.39, df=246, p<.001) in the *mean amount* of narcotic administered (Table 3). The type of narcotic that was ordered did not differ significantly (x^2_6=4.9, p=.56) across the three study groups. Demerol was the most frequently administered narcotic and constituted 93-98% of the types; all non-Demerol narcotic doses were transformed into equivalent milligrams of Demerol.

Table 2

Comparison of Mean Number of Analgesic Doses Administered in First 48 Hours Under Three Schedules of Prescription

	Regular Q3H Medication group N=85		PRN Medication group N=75		RN Medication With Vital Signs N=88	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Number	13.86	(3.2)	9.93	(2.8)	9.77	(3.12)

ANOVA, $F_{2,245}$=47.9, p<.001

Table 3

Comparison of Mean Amount* of Analgesia Administered in First 48 hours Between Regular Medication Group and Combined PRN and PRN with VS Group

	Regular Q3H medication group N=85		Combined PRN & PRN with vital signs groups N=163	
	Mean	(SD)	Mean	(SD)
Amount	963.6	(284)	764.5	(260)

t=5.39, df 246, p<.001

*equivalent mg of Demerol

Within the regular Q3H medication group, 42% of the subjects received the maximum prescribed number of doses of analgesia on a three-hour schedule. On a more conservative schedule of every three-to-four hours, 79% of the group received the prescribed number of doses of analgesia. Conversely, within the PRN medication group and PRN with vital signs group, only 33% and 27% of the groups, respectively, received analgesia doses on a three-to-four-hour schedule.

After the covariate "group" was accounted for, only one of the sixteen variables had a statistically-significant association with the number of narcotic doses administered. "Serious surgery" (r=.22) contributed an additional 4% of the variance in the number of analgesic doses given over the first 48 hours. The more serious the surgery, the more analgesic was given. The results are shown in Table 4.

Table 4

Results of Forward Stepwise Multiple Regression Analysis to Determine Statistically-Important Predictors of Analgesia Doses Given in First 48 Hours (Groups 1, 2 and 3). (N=248)

Predictor Variable	Pearson r	R	Multiple R2	Change in R2	Beta	P (on entry)
Group	+.5297	.5297	.2806	.2806	.5297	<.0001
Seriousness of surgery	+.2242	.5641	.3182	.0376	.1942	<.0003

(Serious=1) (Non-serious=0)

To examine the possible predictors for number of analgesic doses administered more closely, the sample was separated into two groups, the regular Q3H medication group (n=85) and the combined PRN and PRN with vital signs groups (n=163). Tables 5 and 6 present the stepwise multiple-regression results. Gender and primary diagnosis of cancer were related to number of doses within the regular Q3H medication group. Males received more doses and cancer patients received fewer doses. These variables combined to account for 11% of the variation in the number of doses given.

Within the combined PRN and PRN with vital signs groups (n=163), where the administration was at the discretion of the nurse, seriousness of surgery, the administration of analgesia in the recovery room and gender were related to the number of analgesic doses. In this combined group, patients whose surgery was of the serious type, received medication in the recovery room, were female and received more doses of analgesia. These variables combined to account for 13% of the variation in the number of analgesic doses given. The results are show in Table 6.

Table 5

Results of Forward Stepwise Multiple Regression Analyses to Determine Statistically-Important Predictors of Analgesic Doses Given in First 48 Hours Within Regular Q3H Medication Group (Group I). (N=85)

Predictor Variable	Pearson r	R	Multiple R2	Change in R2	Beta	P (on entry)
Gender	+.246	.246	.060	.060	.246	.02
Primary diagnosis of cancer	-.226	.338	.114	.054	-.232	.03

Male=1, Female=0; Cancer=1, Non-cancer=0

Table 6

Results of Forward Stepwise Multiple Regression Analysis To Determine Statistically-Important Predictors of Analgesic Doses Given in First 48 Hours Within the Combined PRN and PRN with VS Groups (Groups 2 and 3). (N=163)

Predictor Variable	Pearson r	R	Multiple R2	Change in R2	Beta	P (on entry)
Seriousness of Surgery	+.273	.273	.075	.075	.273	.0004
Medications in R.R.	+.149	.317	.100	.025	.160	.0345
Gender	-.130	.363	.132	.032	-.179	.018

Male=1, Female=0

Discussion

The primary aim of the present study was to examine any relationship between the frequency of administered narcotic analgesia and a number of demographic and clinical variables under controlled schedules of narcotic prescription.

The most important predictor of the number of analgesia doses found in the stepwise regression analysis was the prescribed schedule of narcotic administration. Regularly-scheduled narcotic analgesia was associated with a higher number of administered doses. The expected difference between the PRN with vital signs group and the PRN group was not found. The

hypothesis was that the PRN with vital signs group had the advantage not only of being more flexible than the Regular Q3H Medication group, but also had access to a nurse on a regular basis and would not need to search for help. Hence this group should receive more doses than the PRN group and be more similar to the Regular Q3H group. In fact the two PRN groups did not differ in dose frequency. These results suggest that when dosing is a function of the interaction between patient and nurse (i.e., the discretion of the nurse and the request for, or acceptance by, the patient), then there is a reduction in the amount and frequency of administered narcotic.

Interestingly, even within the regular schedule of prescription, 21% of the subjects failed to receive the maximum number of doses prescribed. Furthermore, within the PRN scheduled groups, approximately 70% of the subjects also failed to receive all the doses of analgesia available by the prescription. This discrepancy between the amount of analgesic ordered and the amount received is congruent with other studies (Cohen, 1980; Donovan et al., 1987; Faherty & Grier, 1984; Marks & Sachar, 1973; Smith & Utting, 1976; Sriwatanakul et al., 1983), and may be indicative of the inadequacy of pain management.

From a different perspective, a 20% failure rate is consistent with the mean estimated error rate (range 1.6% - 38.5%) in drug administration in general (Girotti, Carrick, Tierney, Chesnick & Brown, 1985). It is also considered an acceptable level for defining provider compliance (Sackett, Haynes & Tugwell, 1985). Nonetheless, allowing for a 20% non-compliance rate in the groups, there were still 50% of the subjects within the PRN groups who did not receive the maximum prescribed doses. It is important to acknowledge that, from this study, it cannot be assumed that more analgesia would have been better or that PRN, in this case, was inferior to the regular regimen because this was not an efficacy study. The findings do, however, suggest that even on a regular dosing schedule, the rates of dose administration are influenced by factors other than physician orders. This might imply that physician's orders may be circumvented by important patient factors, such as sleeping or refusing the medication, rather than the availability and judgement of the nurse.

The multiple-regression analyses demonstrated the limited extent to which demographic, clinical and treatment variables influenced the administration of narcotics. These analyses predicted, at most, only 13% of the variance in dose frequency and showed, perhaps, the extent to which certain indirectly measured attitudes of nurses might influence narcotic administration. In this group of patients, their sex, diagnosis of cancer and perceived seriousness of the surgery only partially predicted the number of analgesic doses. The variance in dose frequency must be attributed to other variables not measured in this study. The failure to explain the major portion of the

variance makes it reasonable to assume that such clinical variables as those in the interaction between patient and nurse, administrative and instrumental problems, patient or nurse beliefs about analgesia and its risks or about pain, or problems in assessing pain in the patient, may be more important.

Because this study deals with narcotic administration by three schedules of administration, it is not intended to be an efficacy study because there are no data on the patient's response to the administered analgesic. While the results provide an insight into the pattern of narcotic administration post-operatively, they fail to illuminate many of the factors that could account for these patterns. Further research should be directed at identifying the factors in the relationship between patient and nurse that influence PRN medication administration, and perhaps other treatment decisions.

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RÉSUMÉ

Facteurs de prédiction de l'administration d'analgésiques narcotiques dans les 48 heures qui suivent une opération

Diverses variables démographiques, cliniques et thérapeutiques se rattachent à l'administration d'analgésiques narcotiques après une opération. Cette étude quantifie la contribution des diverses caractéristiques des patients, des procédures intra-opératives et la gestion des analgésiques post-opératoires par rapport à la fréquence des doses d'analgésiques administrées.

Deux cent quarante-huit patients subissant une chirurgie intra-abdominale élective qui ont reçu au hasard un analgésique sur les trois prescrits, ont été suivis de manière prospective pendant 48 heures après l'opération. On a procédé à des analyses de régression multiple en utilisant le groupe de traitement aux analgésiques comme covariant pour étudier l'effet collectif et l'ordre d'importance de certaines variables démographiques, cliniques et thérapeutiques sur le nombre de doses d'analgésiques administrées et sur la quantité totale d'analgésiques narcotiques administrés. Les analyses de régression multiple ont permis de ne prédire qu'un montant limité (13 %) de la variance dans la fréquence des doses. Ces résultats portent à croire que d'autres variables cliniques, notamment l'interaction entre le patient et le personnel infirmier, les problèmes d'ordre administratif et instrumental, les opinions du patient et(ou) du personnel infirmier sur les analgésiques, sur la douleur et(ou) l'évaluation de la douleur chez le patient post-opératoire, constituent sans doute des facteurs déterminants plus importants de la posologie et de la fréquence des analgésiques reçus après une opération.

COMING EVENTS

H.I.V. Community Update

September 11, 1991
Ambassador Hotel, Kingston, Ontario

The objective of this regional conference is to update community health professionals' and other persons' knowledge and understanding of H.I.V. infection and A.I.D.S.
For more information contact Queen's University Continuing Medical Education (613) 545 2540.

17th Annual Transcultural Nursing Society Conference

26-29 September, 1991
The Westin Hotel: Renaissance Centre

Theme: A new Approach to understand urban and rural health care concerns.
Contact: Prof. Madeleine Leninger
Wayne State University, College of Nursing, Room 146
5557 Cass Avenue, Detroit, MI 48202, U.S.A.
Tel: (313) 577 4392; FAX: (313) 577 4571

Call for Abstracts

First International Conference on Community Health Nursing Research
Edmonton Convention Centre

Fields of Interest: Health promotion; Illness & injury prevention
Deadline for receipt of abstracts: 15 September, 1992
Contact: Ms. Karen Mills, ICCHNR, Edmonton Board of Health, #500 10216 124 Street, Edmonton, AB, T5N 4A3, (403) 482 1965

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