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Effects of Demographic Characteristics on Preoperative Teaching Outcomes: A Meta-analysis

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L'éducation du patient fait partie intégrante de la pratique infirmière. Depuis les années 60, de nombreuses études pilotes et plusieurs méta-analyses ont évalué l'efficacité de l'éducation donnée aux patients se préparant à subir une chirurgie. Bien que ces études attestent de la valeur de l'éducation préopératoire pour le patient « moyen », elles consacrent peu d'attention à la représentativité de l'échantillon et à la généralisabilité des résultats. C'est pourquoi nous avons effectué une méta-analyse de 20 études dans le but de cerner les caractéristiques démographiques des patients ayant participé à celles-ci et de déterminer les variations relatives à la durée du séjour à l'hôpital et à la réponse au traitement de la douleur en fonction de l'âge, de l'origine ethnique, du sexe et du niveau de scolarité. Les résultats confirment les effets positifs modérés de l'éducation préopératoire. Toutefois, il faut souligner que les participants à ces études étaient pour la plupart des femmes de race blanche âgées de 41 à 60 ans et ayant un niveau de scolarité postsecondaire. Les résultats obtenus ne sont donc pas généralisables à l'ensemble des patients se préparant à subir une chirurgie. Il apparaît donc nécessaire de dispenser une éducation post-opératoire taillée sur mesure et évaluée en fonction de la pratique quotidienne, ainsi que d'entreprendre des études visant à examiner l'influence des caractéristiques démographiques, en particulier le niveau de scolarité et l'origine ethnique, sur les résultats découlant de l'éducation préopératoire.

Mots clés : éducation préopératoire, méta-analyse, caractéristiques démographiques

Patient education is an integral part of nursing practice. Since the 1960s many primary studies and several meta-analyses have been conducted to assess the effectiveness of education for patients undergoing surgery. Although these studies demonstrate that preoperative teaching is beneficial to the "average" patient, they have paid little attention to the representativeness of the sample and the generalizability of the results. Therefore, a meta-analysis of 20 studies was conducted to identify the demographic characteristics of patients who participated in preoperative teaching effectiveness studies, and to assess variation in length of hospital stay and pain outcomes in relation to age, ethnicity, gender, and education. The findings confirm the positive and moderate effects of preoperative teaching on these outcomes. However, the participants were primarily 41–60-year-old white females educated beyond the secondary level. Therefore, the findings are not generalizable to all patients undergoing surgery. This points to the need for preoperative teaching that is individually tailored and evaluated in everyday practice and for studies that examine the influence of demographic characteristics, particularly education and ethnicity, on the outcomes of preoperative teaching.

Keywords: preoperative teaching, postoperative outcomes, meta-analysis, demographic characteristics

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Patient education is an integral part of nursing practice. Although this topic has been addressed extensively in the nursing literature, research specifically on preoperative teaching commenced only in the 1960s. Many studies have been conducted since then to assess the effectiveness of preoperative patient education. In addition, several meta-analytic studies have confirmed the following outcomes: decreased fear and anxiety (Hathaway, 1986), increased patient satisfaction with care (Devine & Cook, 1986; Hathaway), improvement in physiological variables such as vital capacity and pulmonary function (Hathaway), decreased length of stay (Devine & Cook, 1986; Hathaway), and decreased pain and postoperative complications (Devine, 1992; Devine & Cook, 1986).

Although both the individual studies and the meta-analyses demonstrate that preoperative education, in general, is beneficial to the "average" patient, little attention appears to have been given in such studies to the representativeness of the sample and the generalizability of the results to all patients undergoing surgery. Patients seen in everyday practice vary in age, gender, and educational and ethnocultural background, and these demographic characteristics influence their responses to interventions such as preoperative education (Sidani & Braden, 1998). Therefore, the results of preoperative teaching effectiveness studies based on people with particular demographic characteristics may not be applicable, appropriate, or generalizable to all patients. In order to determine the target population to which the results of these studies can be generalized, the following research questions were explored: (1) *What were the ages, genders, levels of education, and ethnic backgrounds of patients who participated in studies of the effectiveness of preoperative education on the postoperative outcomes of length of hospital stay (LOS) and pain?* and (2) *What effects do the selected demographic characteristics have on these two postoperative outcomes?*

Literature Review

Preoperative teaching is defined as providing patients with information about the perioperative experience (Hathaway, 1986). Its effectiveness is measured by changes that are indicative of improvement in the patient's condition in the period following surgery (Devine, 1992). The most commonly measured postoperative outcomes are LOS and pain. LOS is defined as the "number of days the patient remained in hospital, starting the day following surgery and up to and including the day of discharge" (Spalding, 1995, p. 528). Pain is described as "an unpleas-

ant sensory and emotional experience associated with actual or potential tissue damage" (Merskey & Bogduk, 1994, p. 210).

Demographic characteristics are the personal attributes of patients that may influence the effectiveness of preoperative education in achieving the desired outcomes. Of the various demographic characteristics that influence the outcomes of health-related interventions, age, gender, level of education, and ethnicity were of interest in this meta-analysis. It has been suggested that age directly or indirectly affects intervention outcomes (Sidani & Braden, 1998). Brown (1992) found a statistically significant inverse relationship between age and knowledge outcomes among patients with diabetes receiving psychoeducational interventions. In terms of gender, health-care interventions based on studies with men exclusively may not be effective for women in general, women of different age groups, or women from different ethnic and cultural backgrounds. For example, Richardson, Evans, and Warner's (1994) study of the effect of written information on the perception of pain during electromyography found that providing information about the test "significantly decreased pain perception for women during the nerve conduction studies, but not during the needle examination" (p. 671). A similar effect was not observed in men. The study also found that women perceived the test as more painful than men.

Individuals vary in their learning needs, learning patterns, and educational levels. Stephens (1992) points out that a discrepancy exists between the reading level of the average adult, which is between grades 5 and 8, and the reading level of health-related printed material, which is between grades 8 and 12. Individuals also vary in their knowledge and comprehension of English; therefore, preoperative information delivered in English may not be equally effective for everyone. In addition, during the last two decades the diversity of the ethnic composition of the Canadian population has increased, requiring the adoption of culturally congruent care in nursing. Culture and ethnicity shape people's view of health and illness, health-seeking behaviours, use of health-care services, selection of and adherence to a treatment modality, and treatment expectations (Leininger, 1991). Further, there may be variations within ethnic and cultural groups due to factors such as age, gender, educational level, place of birth, and religious affiliation.

In terms of the possible effect of demographic characteristics on the outcomes of preoperative *psychoeducational* interventions, Mumford, Schlesinger, and Glass (1982) observe that patients cope with emotional and physical stress differently; they may benefit most from interven-

tions that complement their particular coping styles, which could explain the increased effectiveness of *psychoeducational* interventions in comparison to *education* alone. Psychoeducational interventions include both educational (e.g., preoperative teaching) and psychological interventions. Suls and Wan (1989) found that the confidence intervals for some comparisons included negative effects sizes (ES) and therefore concluded that *preoperative teaching* should not be considered universally helpful, despite the average positive ES. Devine and Cook (1986) examined the generalizability of the cost-related effects of preoperative *psychoeducational* interventions as indicated by LOS and incidence of medical complications in 50 studies. The 18–40-year-old group had an ES of +0.61 (SD = 0.34), the 41–50-year-old group an ES of +0.43 (SD = 0.34), and the 51–70-year-old group an ES of +0.63, but with a large SD of 0.67. These results demonstrate that the effectiveness of preoperative *psychoeducational* interventions can vary with the patient's age. In terms of the influence of gender, Devine and Cook (1986) found that the all-male group had an ES of 0.33 (SD = 0.30) and the all-female group an ES of 0.60 (SD = 0.40). The effectiveness of *psychoeducational* interventions clearly varied according to gender. However, none of the meta-analyses examined the impact of age, gender, education, and ethnicity on the outcomes of *preoperative education*.

Methods

Studies that evaluated the effects of *preoperative education* (as compared to psychoeducational interventions), were written in English, and were published between 1956 and 1997 were considered. Reference lists of previous meta-analyses that captured primary studies between 1956 and 1989 were examined manually for individual studies that could be included in this meta-analysis. A computerized search of the databases CINAHL, MEDLINE, and HEALTH STAR was carried out using a combination of the words *preoperative*, *education*, and *teaching* for the period 1989 to 1997. The second set of studies (those published between 1989 and 1997) were not examined in any known meta-analyses. The inclusion criteria were studies that: (a) examined the effects of preoperative teaching on postoperative outcomes of LOS and pain, (b) sampled adults undergoing surgery or invasive diagnostic procedures, (c) consisted of an experimental design that compared a preoperative teaching intervention group to a control group that received no preoperative education, and (d) used the same setting for the experimental and control groups.

Data analysis consisted of both descriptive and quantitative syntheses. For the descriptive synthesis, a table was used to code and extract data on publication information, study design, sample size, and quality of the study, as well as preoperative teaching, postoperative outcomes, and demographic characteristics. Quality was measured on the following bases: design, sampling method, presence of a control group, method of assignment to groups, response rate, attrition rate, and threats to internal validity (i.e., history, maturation, mortality, interactions with selection, and diffusion of the treatments [Burns & Grove, 2001]). The data obtained in this manner were categorized into percentages or frequencies. Measures of central tendency reported in each study were used to represent continuous variables reflecting its sample demographic characteristics. For categorical variables, the modal category with the largest percentage was used. With regard to the outcome variables, information that is needed to calculate ES, such as sample size, mean, and *SD* of the experimental and control groups, was extracted. When no information could be derived from the individual studies in order to calculate ES values, the direction of the outcome as reported in the individual studies was considered.

The quantitative synthesis consisted of a frequency count and statistical approach. The frequency count approach was used as a preliminary strategy in identifying patterns occurring as a result of the effects of the demographic characteristics on the outcomes of preoperative teaching. This approach permitted the inclusion of all the studies reviewed, including those that did not provide the information needed to calculate an ES. The procedure for this approach included a tabulation of the categories of each demographic variable against the categories of the statistical significance of each outcome variable. Comparisons of the frequency count across the cells in the table formed the basis of a preliminary strategy in identifying relationships between demographic characteristics and the outcomes of preoperative teaching (Cooper, 1984).

A meta-analytic technique based on the Fixed Effect Model, which provides a least-variant estimate of the ES parameter, was used to calculate the magnitude of the intervention effects (Hedges & Olkin, 1985). An ES was calculated for each study by taking the difference of the means of the outcome variable of the experimental and control groups and dividing it by the pooled *SD*. ES values obtained in this way were corrected for small sample bias, and weights were given to individual studies to minimize the variance of the resulting single ES estimate. The resulting ESs were linearly combined to produce a single estimate of the population ES parameter. A confidence interval for the ES parame-

ter was obtained using the above estimate together with its variance. Finally, a homogeneity test was performed to determine the validity of the assumption that all studies share a common population ES parameter. This was accomplished by calculating the Q-statistic, which is the weighted mean square deviation of the individual ESs from the population ES estimate. The value of the Q-statistic was then compared to the probability values of the chi-square distribution to determine whether the differences in the individual ESs could be explained by chance alone.

Results

Of the 141 studies considered, 20 met the criteria for the study. Twenty percent of the studies in the final sample had not been included in any of the previous meta-analyses. All studies were published in journals during the period 1970 to 1996 and had been conducted in major cities in the United States (75%), the United Kingdom (15%), and Canada (10%). The sample sizes ranged from 21 to 129 and represented a total of 1,260 adult patients. Most studies did not provide the response rates (75%) nor the attrition rates (70%). All studies used either an experimental or a quasi-experimental research design, and most (65%) of the studies used random assignment to treatment condition.

The majority of the studies reported the age (n = 16, 80%) and gender (n = 18, 90%) of the participants. In most (65%) of the studies the average age was in the range of 41–60 years, and the majority (60%) of the studies included more women than men. Only 30% (n = 6) of the studies reported participants' education, and the average education was above secondary level. The studies that reported race/ethnicity (n = 6, 30%) consisted of mostly white, English-speaking patients. Twenty-five percent (n = 5) of the studies excluded patients who were not proficient in English, could not understand consent forms, or could not read or write. The results of the frequency count indicated that the number of studies with significant findings did not differ substantially from the number of studies with non-significant findings across the age, gender, educational, and ethnic groups for both LOS and pain outcomes, implying that age and gender did not affect these outcomes. However, there was a tendency for younger age groups and groups with higher education to have non-significant effects on the LOS outcome. No clear pattern was noted between ethnicity and LOS outcome. In comparison, there was a tendency for non-significant pain outcomes to be associated with the all-male groups. No clear pattern was noted between level of education and pain outcome, but there was a tendency for white patients to have significant pain reduction. The results of the frequency

counts were confirmed by the homogeneity test when aggregated under each of the outcome variables.

Statistical techniques used in the quantitative analysis resulted in an ES of 0.46 for LOS outcome and 0.39 for pain outcome. The variances associated with the population estimate of the ES were 0.016 for LOS and 0.008 for pain, and the 95% confidence intervals were 0.206–0.708 and 0.220–0.570 respectively for LOS and pain. ES results were homogeneous across the studies.

Discussion

The findings of this meta-analysis confirm the continuing effectiveness of the preoperative teaching intervention for LOS and pain outcomes in adult patients. The ES of 0.46 obtained for LOS is consistent with that found by Devine and Cook (1983). Similarly, the ES of 0.39 obtained for pain is consistent with that reported by Devine (1992) and Devine and Cook (1986).

The fairly narrow variances associated with the population estimate of the ES for the outcomes as well as the 95% confidence intervals that did not include zero or negative values indicate that preoperative teaching does have favourable and reliable effects on these two outcomes. The homogeneity of the ES suggests that the ES values come from the same population and that any further subgrouping of the primary studies in relation to the demographic characteristics of the patients would be futile.

Implications

Further research is needed to examine how various demographic characteristics can, alone or in combination, affect various aspects of preoperative teaching. Further research is also needed to assess the cultural and linguistic appropriateness of instruments and scales that are commonly used in research. This issue has often been avoided by excluding from studies those patients who are not proficient in English, cannot understand the consent forms, or cannot read or write.

Most of the studies so far have been conducted in the United States, with a limited number being conducted in Canada. Various characteristics such as ethnicity, educational level, and socio-economic factors like poverty, cost of health care, or availability of insured services can influence these populations differently. Therefore, more Canadian studies examining preoperative teaching effectiveness are necessary.

Future research should recognize the importance of reporting details about response rate, attrition rate, and the characteristics of participants versus the characteristics of those who have declined to participate. Such information would aid in determining the representativeness of the sample and the population to which the results can be applied.

In conclusion, the findings of this study confirm the positive and moderate effects of preoperative teaching on the postoperative outcomes of LOS and pain. However, it is uncertain whether preoperative teaching is as effective in very young or very old patients and for those who have minimal education, for those not proficient in English, or for those from various ethnocultural groups. Thus, preoperative teaching should be individually tailored and evaluated in everyday practice.

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