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A Hospital-Level Analysis of the Work Environment and Workforce Health Indicators for Registered Nurses in Ontario's Acute-Care Hospitals

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Cette étude avait pour but d'explorer le rapport entre les indicateurs relatifs à l'environnement de travail en milieu hospitalier et les indicateurs regroupés de la santé et du bien-être pour les infirmières autorisées travaillant dans les hôpitaux de soins actifs en Ontario, au Canada. L'analyse de type écologique portait sur des données recueillies à partir d'un instrument d'auto-évaluation distribué aléatoirement en fonction d'un échantillonnage stratifié. On a eu recours à des modèles de régression linéaire multivariés pour étudier des facteurs comme l'épuisement professionnel, les douleurs musculo-squelettiques, l'évaluation personnelle de l'état de santé et l'absence en raison d'une maladie. L'unité d'analyse était l'hôpital (n = 160) et les réponses des infirmières ont été regroupées pour chacun des hôpitaux. Après avoir tenu compte des différences fondamentales entre les corps infirmiers, notamment l'âge moyen et le niveau d'éducation, on a constaté que des scores élevés (meilleurs) en ce qui a trait à l'environnement de travail correspondaient généralement à des scores élevés en ce qui a trait aux indicateurs de santé; par ailleurs, on a établi que le travail à temps plein correspondait, dans une plus grande proportion que le travail à temps partiel, à des indices de santé peu élevés (faibles). Compte tenu de la pénurie actuelle en matière de main d'œuvre, ces résultats pourraient éclairer les décisionnaires dans la tâche de recruter des infirmières et de maintenir les effectifs.

The purpose of this study was to explore the relationship between hospital-level indicators of the work environment and aggregated indicators of health and well-being amongst registered nurses working in acute-care hospitals in Ontario, Canada. This ecological analysis used data from a self-reported survey instrument randomly allocated to nurses using a stratified sampling approach. Multivariable linear regression models were

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used to examine hospital-level associations for burnout, musculoskeletal pain, self-rated general health, and absence due to illness. The unit of analysis was the hospital (n = 160), with individual nurse responses (n = 6,609) aggregated within hospitals. After controlling for basic differences in nurse workforces, including mean age and education, higher (better) work-environment scores were found to be generally associated with higher health-indicator scores, while a larger proportion of full-time than part-time nurses was found to be associated with lower (poorer) health scores. This study may provide direction for policy-makers in coping with the recruitment and retention of nursing staff in light of the current nursing shortage.

Introduction

During the 1990s the Canadian health-care system underwent major reform (Decter, 1997; Shamian & Lightstone, 1997). The main elements of the reform were downsizing of inpatient capacity in the hospital sector, reduced funding of the health-care system, and regionalization in nine of the 10 provinces (Ontario being the exception) and the three territories. Many hospitals underwent significant budget reductions.

Nurses experienced lay-offs in unprecedented numbers. Many nursing departments were dismantled and their nursing leaders absorbed into general health-services administration. The lay-offs eliminated most of the junior nursing positions in the hospital system. Most Canadian health-care organizations are unionized, thus the lay-offs were carried out according to seniority, with junior nurses usually being the first to be laid off. Many of the staff nurses who remained in the system were moved between units and between sites. These changes have resulted in an older (44 years of age on average) and highly dissatisfied nursing workforce (Burke & Greenglass, 2000). Many younger nurses have either left the country in search of full-time employment, joined the casual workforce (often working for more than one employer), or found non-nursing jobs.

In 1997 nurses had the highest prevalence of illness and days lost amongst all groups of workers in Canada, both within and outside of the health-care industry. Analysis of Canadian Labor Force Survey (Akyeampong & Usalcas, 1998) 1997 data indicates that nurses were more likely than members of any other occupation to suffer illness and disability (Canadian Institute for Health Information [CIHI], 2000). The data also suggest that although the prevalence of illness is declining amongst most groups of employees, it is continuing to rise amongst nurses.

This paper reports on the findings of an investigation into the relationship between the work environment and the health profile of nurses in 160 acute-care hospitals in Ontario. The analysis is based on data

obtained from the Ontario site of a large international study comprising Canada (Alberta, British Columbia, and Ontario), England, Scotland, Germany, and the United States. The aim of the international study was to examine the relationship, at the hospital level, between nurse and organizational characteristics, staffing, and patient outcomes while adjusting for case mix (Aiken et al., 2001).

The Ontario survey included the core survey of the international study and several additional measures not used in the four other countries or the two other Canadian sites (British Columbia and Alberta). The additional measures concerned the health profile of nurses.

Aiken et al. (2001) suggest that the management of hospital staffs is fraught with problems that need to be resolved in order to ensure an adequate nursing workforce in the future. Furthermore, in all but one of the five countries studied (Germany being the exception), 30–40% of nurses reported dissatisfaction with their current position — double the job-dissatisfaction rates typically found amongst other groups (National Opinion Research Center, 2000).

It is therefore important that we examine the possible relationship between work-environment factors and health indicators amongst workers, including nurses. Such analyses could generate useful insights into nursing practice for policy-makers, health-care executives, and nurses, in order to address the prevalence of illness and disability amongst nurses. If this phenomenon is left unchecked, its effects could go beyond the health of nurses, to the quality of nursing care and, ultimately, the health of patients.

Methodology

The focus of the international study was registered nurses working in acute-care hospitals in five countries, including three Canadian provinces (Aiken et al., 2001). In this paper we report on the findings regarding the work environment and the health of RNs working in acute-care hospitals in the province of Ontario.

Sample

Information was collected on a stratified random sample of subjects obtained from the 1998 College of Nurses of Ontario database. The focus of the main study was RNs working in acute-care hospitals. Thus nurses working in long-term-care facilities, specialty hospitals, private hospitals, and in the community were excluded. (Private hospitals were

not included in the study. These facilities do not provide typical acute-care services within the single-payer, government-funded health-care Canadian system.) A (stratified) random sample of up to 100 staff RNs was selected from each acute-care hospital in Ontario; when the staff comprised fewer than 100 RNs, all nurses were sampled. Administrators, consultants, nurse practitioners, and clinical specialists were excluded, as their perspective on issues was perceived as different from that of staff nurses, which is the focus of this paper.

A total of 11,179 nurses were selected. A survey and informed consent form were mailed to their home address. One week later, a reminder card was mailed. After 4 weeks, a new survey was mailed to those who had not yet responded. One week later, a further reminder card was mailed.

The overall response rate was 59% (6,609/11,179). The initial mailing of the survey represented 179 hospital sites. Hospitals with fewer than 10 nurses responding to the survey were excluded from the analysis because of the likelihood of instability in their hospital-level scores. Thus 160 hospitals (6,188 nurses) are represented in the analysis. A total of 19 primarily small hospitals were not included. Distribution of the participating hospitals by type (as designated by the Ontario Ministry of Health and Long-Term Care) was as follows: community hospitals, $N = 95$ (59.4%); small hospitals, $N = 49$ (30.6%); teaching hospitals, $N = 16$ (10.0%).

Measures

The core questionnaire used in the international study addressed several key domains: employment characteristics; nurses' work environment; nurse satisfaction; quality of nursing care; activities during last shift; and nurse demographics. Key measurement instruments in the core survey were the Revised Nursing Work Index (NWI-R) (Aiken & Patrician, 2000) and the Maslach Burnout Inventory (MBI) (Maslach, Jackson, & Leiter, 1996). In the Ontario version of the survey, questions on frequency of neck and back pain and self-rated general health were added, as well as either an organizational trust scale (Cook & Wall, 1980) or the Effort and Reward Imbalance (ERI) scale (Siegrist, 1996). Questionnaires with one or the other of these two scales were randomly distributed to half of the sample.

The hospital work environment reported in this study was measured using two of the above instruments: the NWI-R (core survey) is a nurse-specific measure of the work environment, while Siegrist's ERI

(Ontario survey) is a generic psychosocial measure of the work environment. The NWI-R contains three well-established subscales measuring the professional environment created by an organization: (1) *nurse autonomy* — five questions addressing supervisory support for nurses, ability to make and control patient-care decisions, not having to go against nursing judgement, and decision-making support; (2) *control over the practice setting* — seven questions addressing adequacy of support services, enough time to discuss nursing problems, enough RNs for quality patient care, enough staff to get work done, quality of nurse-manager leadership, opportunity for specialized work, and patient assignments that foster continuity of care; and (3) *nurse-physician relationship* — three questions addressing collaboration, teamwork, and quality of relationship between nurses and doctors. The NWI-R has been used extensively in the United States in relation to studies of "magnet" hospitals. According to the authors, when aggregated across all nurses in an institution, higher scores on the three NWI-R subscales indicate better work environments (Aiken & Patrician, 2000).

Some of the psychometric properties of the revised NWI-R have recently been published (Aiken & Patrician, 2000). Internal consistency values are high: Cronbach's alpha at 0.96 for the entire NWI-R, with aggregated subscale alphas of 0.84 to 0.91. Aspects of NWI-R validity have also been discussed, including face validity through the origin of the instrument, discriminate validity through its ability to differentiate between nurses who worked within a professional practice environment and those who did not, and ability to explain differences in nurse burnout. However, no formal (confirmatory) factor analysis results have been reported.

The ERI scale uses a total of 17 questions to address the perceived efforts and rewards ratio: *efforts* — six questions addressing the mental and physical demands of work, pressure to work overtime, work disruption, and time pressure; and *rewards* — 11 questions addressing respect, fairness, status, job prospects, job security, co-worker and supervisor support, and salary adequacy. After adjusting for the different number of items in the two scale components, the effort-reward ratio is calculated. As with the NWI-R scale — and since in this analysis we are interested in hospital-level differences only — individual nurse scores for each ERI item are pooled within each hospital prior to generating an effort:reward score. Consequently, a higher ERI score indicates a poorer work environment.

The psychometric properties of the ERI scale have been examined and found to be satisfactory (Hanson, Schaufeli, Vrijkotte, Plomp, &

Godaert, 2000). The internal consistency of the subscales used in our analysis was acceptable, with Cronbach's alpha values above 0.70. Using confirmatory factor analysis, the items also loaded correctly according to their suggested subscales, indicating good factorial validity for the component scales used in determining the ratio. The scales also demonstrated convergent validity by loading on a second order factor, health functioning (Hanson et al.).

Four hospital-level indicators of nurse health were considered for the analysis: the emotional exhaustion ("burnout") score from the MBI (core survey) (a higher score equals more burnout); frequency of musculoskeletal pain based on a combined neck/back pain score (1 = no pain; 5 = constant pain) (Ontario survey); self-rated general health (1 = excellent; 5 = poor) (core survey); and percentage of nursing staff who were absent at least 1 day in the preceding 3 months due to illness (Ontario survey). Higher values indicate lower workforce health scores for all four measures.

Analysis

The survey data were used to generate hospital-level measures by aggregating individual responses from nurses at each institution. Since all variables used in the analysis are expressed at the institutional level, and since nurses were randomly selected from within the hospital, inferences apply to the entire hospital nursing staff as opposed to any individual nurse. For individual questions, the sum of all responses was averaged to generate a profile of the hospital. Examples of this approach were questions related to nurse characteristics, such as age or duration of employment in the hospital/unit, and job characteristics, such as percentage of nurses working full-time or percentage with a university degree. For composite instruments, such as the NWI-R and ERI scales, the scores for individual items were averaged within each institution to generate scores for hospital-based items, which were then used to generate scale scores. The validity of this type of aggregated analysis for the NWI-R is described elsewhere (Aiken & Patrician, 2000).

Group differences were tested using analysis of variance (ANOVA). To determine the relative importance of the different possible explanatory variables, multivariable models were examined, controlling for the effects of several factors simultaneously, thereby allowing for assessment of the independent contribution of each model term. Separate regression models were constructed for each of the four outcomes listed in Table 3. To help ensure comparability of the different models, a fixed set of explanatory variables was tested as a block of covariates rather

than using a stepwise model-building procedure. Since the main aim of this analysis was to examine the impact of the hospital work environment on nurse health indicators, we controlled for differences amongst institutions in the demographics of the nursing workforce, including mean nurse age, mean years of experience on the current unit, mean years in nursing, and proportion of nurses with a nursing degree (BScN). While some of these characteristics, most notably age, are undoubtedly associated with health in their own right, they were not the focus of this paper and are thus treated primarily as possible confounders in our analyses. The regression models also included terms for type of hospital (based on Ontario Ministry of Health and Long-Term Care criteria: C = community hospital, S = small hospital, T = teaching hospital) and proportion of nurses working full-time.

All regressions were weighted using the number of nurses sampled from each hospital, thus allowing for appropriate representation of data from each hospital. In addition, since scales with different scoring ranges were used in the survey, standardized beta coefficients are presented so that the relative importance of the different covariates can be determined (i.e., the original scores were re-scaled to the same reference base so that a one-unit increase in a regression coefficient means proportionately the same thing for each model term). (Only those hospitals represented by responses from at least 10 nurses were included in the analysis.) All computer analyses were conducted using SAS Version 8.1.

Results

Descriptive Analysis

Descriptive information on the workforce of the participating hospitals is found in Table 1, which compares the three hospital types (community, small, and teaching) on distribution of the basic characteristics used later in the analysis. The general characteristics did not differ substantially for the three hospital types, although nurses in teaching hospitals were slightly younger, with correspondingly fewer years of experience either in their current hospital/unit or overall as an RN. However, teaching hospitals reported fewer part-time staff and had a substantially greater proportion of staff trained at the BScN level than the other two types.

With regard to the key covariates in this study, the nurse-specific work environment scales did show some differences across hospital types, as shown in Table 2. In general, teaching hospitals reported higher levels of autonomy, control over practice, and nurse-physician

Table 1 *Mean Values for Workforce Characteristics*

Population Descriptor	Mean Value (*sd*) by Hospital Type			
	Small ($N = 49$)	Community ($N = 95$)	Teaching ($N = 16$)	Combined Hospital Sample (mean) ($N = 160$)
Mean age of nurses (years)	44.4 (3.6)	44.8 (2.2)	43.6 (2.1)*	44.6 (2.7)
Years worked on current unit	3.7 (0.6)	3.4 (0.4)	3.3 (0.3)**	3.5 (0.4)
Years worked as RN at current hospital	15.6 (3.1)	15.1 (2.4)	13.5 (2.6)**	15.1 (2.7)
Years worked as RN	19.9 (3.6)	19.9 (2.2)	18.3 (2.1)*	19.7 (2.7)
Percentage of nurses working part-time	63 (14)	56 (13)	46 (12)***	57 (14)
Percentage of nurses with a BScN or greater	12 (8)	16 (8)	24 (9)***	16 (9)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 2 *Mean Values for Hospital Work Environment Measures*

Variable	Mean Value (*sd*) by Hospital Type			
	Small ($N = 49$)	Community ($N = 95$)	Teaching ($N = 16$)	Combined Hospital Value ($N = 160$)
Effort-reward imbalance score (higher is worse)	0.68 (0.09)	0.67 (0.07)	0.69 (0.04)	0.68 (0.04)
NWI-R nurse autonomy (higher is better)	12.97 (1.34)	12.73 (0. 73)	13.13 (0.81)*	12.40 (1.00)
NWI-R control over practice setting (higher is better)	16.27 (2.21)	16.54 (1.06)	17.84 (1.34)*	16.68 (1.54)
NWI-R nurse-physician relations (higher is better)	8.79 (0.94)	8.40 (0.56)*	8.73 (0.54)	8.55 (0.75)

* At least one statistically different mean value across the three hospital types: $p < 0.05$.

relations than the other hospitals, although small hospitals showed equivalence with teaching hospitals on the latter subscale. In contrast to the nursing-specific measures of the work environment, there were no strong differences across institutions on the ERI scale.

The health outcomes examined in this study did not differ greatly across hospital types (see Table 3). It should be noted, however, that teaching hospitals were at or near the lowest mean health rating in all four of the outcomes examined.

Table 3 *Mean Values for Nurse Health Indicators*

Variable	Mean Value (*sd*) by Hospital Type			
	Small ($N = 49$)	Community ($N = 95$)	Teaching ($N = 16$)	Combined Hospital Value ($N = 160$)
General health (1 = excellent; 5 = poor)	1.89 (0.22)	1.85 (0.13)	1.80 (0.17)	1.86 (0.17)
Emotional exhaustion ("burnout") (higher is worse)	21.0 (4.42)	22.0 (2.84)	22.2 (2.79)	21.7 (3.41)
Combined back/ neck pain rating (1 = no pain; 5 = constant pain)	2.67 (0.38)	2.60 (0.24)	2.60 (0.23)	2.62 (0.29)
Percentage of nurses who were absent at least 1 day in preceding 3 months due to illness	0.38 (0.15)	0.41 (0.12)	0.49 (0.10)*	0.41 (0.13)

* At least one statistically different mean value across the three hospital types: $p < 0.05$.

Multivariable Regression Results

The results of the multiple regression analyses are shown in Table 4. For emotional exhaustion, the model explains a substantial portion of the difference amongst hospitals, as evidenced by its model r-square value of almost 0.6. In that model, the work environment factors are the most important terms, with control over practice and effort-reward imbalance scores appearing to have a strong effect on mean nurse burnout

Table 4 *Multivariable Linear Regression Results for Hospital-Level Indicators of Nurse Health*

Model Terms	Standardized Regression Coefficients			
	Emotional Exhaustion ("Burnout")	Neck/Back Pain	General Health	Absence Due to Illness
Merged (yes)	-0.0246	0.0324	0.0836	0.0630
Hospital type: Community Teaching Small	 Ref 0.0939 -0.1412*	 Ref 0.0461 0.0709	 Ref -0.1216 0.1372	 Ref 0.0408 0.0083
Percentage of nurses full-time	0.1659**	0.1319	0.2177**	0.3979***
NWI-R nurse autonomy	-0.1059	-0.2574*	0.0898	0.1155
NWI-R control over practice setting	-0.4573***	-0.0048	-0.2951*	-0.1647
NWI-R nurse-physician relations	-0.0515	0.1037	0.0254	-0.0885
ERI score	0.2742**	0.1766[a]	0.1373	0.0636
Model R-square	0.590	0.160	0.222	0.356
Model F-statistic	16.17	2.14	3.2	6.22
Model *p*-value	<0.0001	0.0148	0.0003	<0.0001

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] – borderline significance, $p = 0.053$.
Ref = reference category.
Models were also adjusted for age, years on current unit, years at current hospital, years as an RN, and education level (i.e., proportion of nurses in the hospital with a nursing degree). Since the beta coefficients shown are all standardized, the largest coefficient found in each column can be assumed to have the strongest association with outcome amongst the model terms.

levels. Nurses in small hospitals were somewhat less likely to show burnout. In addition, as the proportion of nurses working full-time increases, the level of burnout also increases.

The musculoskeletal pain model explained the least variance of the four outcomes examined, accounting for only 16% of the differences observed across hospital types — perhaps reflecting the (unmeasured) importance of other factors for this outcome, especially the physical demands of work. It is also possible that there is narrow range (i.e., limited variance) in exposure to the demands of work across all hospital

types, hence the lack of explanatory power for a model examining factors only at the hospital level. Only nurse autonomy was significantly associated with pain, while the mean ERI score was of borderline significance ($p = 0.0533$). The latter variable is the only scale to include a question on the physical demands of work.

For both the general health and absence due to illness models, the most important explanatory variable was percentage of full-time nurses. The NWI-R subscale for control over practice was associated with general health but not with absence due to illness ($p = 0.1453$). Nurse-physician relations were not associated with health indicators in any of the models.

Discussion

The findings of this study raise important questions and shed light on some of the likely key factors in nurses' health in Ontario acute-care hospitals. Based on the literature, one might expect that hospitals with greater nurse autonomy, better control over practice on the part of nurses, and better nurse-physician relationships would show better overall health indicators. While this assumption has preliminary support from analysis of this data set at the individual nurse level (Kerr et al., submitted; Shamian & Villeneuve, 2000), our findings of the analysis at the hospital level present a possibly more complex picture.

Based on the descriptive analysis we can infer that, of the three hospital types, nurses in teaching hospitals report the highest scores for the NWI-R subscales, although the differences are small. Despite this finding, however, teaching hospitals also had statistically significantly higher rates of missed days of work due to illness in the preceding 3 months, as well as tending towards the lowest scores on the other health outcomes examined. This apparent contradiction may be due in part to fundamental differences in nursing work and in the make-up of the nursing workforce amongst the three hospital types, a notion supported by our multivariable regression findings (i.e., little or no significant effect for hospital type after controlling for other factors). If a sufficiently large sample of institutions were available, an analysis of the relationship between health outcomes and the work environment scales stratified within the different hospital types could help elaborate this finding. Similar matched analyses elsewhere have substantiated the posited relationship between burnout and the NWI-R scales (Aiken, Sloane, Lake, Sochalski, & Weber, 1999).

One of the issues arising from our analysis that will need further study is our finding of an increased health risk for full-time employment. In this and other analyses of the survey data (National Opinion Research Center, 2000), there is a consistent indication that full-time nurses experience more sickness, burnout, and job dissatisfaction than part-time nurses. In our study, teaching hospitals reported a statistically significant higher level of full-time nurses than community and small hospitals. It is possible that full-time work is a stronger predictor of illness than overall professional working conditions (e.g., NWI-R, autonomy, control over practice, and relationship with physicians). It is also possible that the potential mediating effects of a positive work environment, as expressed by either the NWI-R or the ERI, can be overshadowed when the workload is too heavy. This hypothesis is supported by our multivariate analyses, which indicated that the NWI-R control over practice subscale, perhaps the core of the NWI-R measure, did have a relatively consistent and positive effect on the health outcomes examined, once the proportion of full-time nurses was accounted for. For both burnout and general health, control over practice was the hospital variable with the strongest association with health. It is possible that this scale is serving as a proxy workload indicator, given that most of the questions directly assess the availability of adequate resources — for example, enough staff to get work done, enough time and opportunity to discuss care, enough nurses to provide quality care, adequate support services, and patient assignments that foster continuity of care. Workload and adequacy of resources are often raised as nursing concerns in the post-reorganization workplace, and our analysis lends some empirical support to these concerns.

The link between the work environment and nurse health is also supported by the results for the other key exposure measure in our study, the ERI model. Siegrist (1996) argues that workers are at increased health risk when the efforts they expend at work are not adequately balanced by the rewards of work. The ERI has only recently been used in studies of musculoskeletal outcomes and has not, to our knowledge, been used previously in multi-site studies of burnout or general health. Nor has the model been presented previously aggregated at the institutional level. It is possible that creating a hospital-level score for ERI has masked or diluted the strength of the true association for this variable with the health outcomes examined. There was also a substantial degree of correlation between the ERI and NWI-R control scores (r = -0.47), indicating possible overlap of the explanatory power of the scales, which may have diluted the strength of associations when both are in the model. Further work is planned with this

data set to better explore the relative contributions of the different variables examined, using hierarchical multiple regression analysis that can adjust for the complex structure of the data set (i.e., nurses within units within hospitals).

While our results indicate that certain hospital-level characteristics may influence nurse health, there are important caveats about the strength of these inferences. Our analysis used aggregation of individual-level (nurse) data to determine hospital scores for both outcomes and covariates. Use of aggregate data may underestimate the true variance for these variables and thereby potentially inflate our observed correlations. However, given the misclassification that may occur when individual-level data are aggregated to the institutional level, it is not clear that such a bias would have a powerful effect on our study. In addition, we are drawing inferences on the health of nurses based on a cross-sectional survey design. While such designs are helpful for generating research hypotheses, they are inherently limited in their ability to establish causality. Thus any inferences drawn from our results should be viewed in light of this uncertainty and should be further tested, especially using longitudinal study designs. Further work is also warranted with regard to full-time versus part-time work, as our results indicate this may be a strong marker of ill health.

Any attempt to generalize these findings to other settings must take into account the fact that the data were collected only from acute-care hospitals, and in a province where hospitals are stand-alone organizations and not regionalized as in other Canadian provinces.

Conclusions

Increased workload is the leading employment concern amongst Canadian nurses (Baumann et al., 2001). In this study, full-time work was found to be associated with burnout, poor general health, and loss of control over practice.

As we enter an era of international nursing shortages, health-care policy-makers and decision-makers are seeking ways to develop human resources policies that will ensure the production and retention of adequate numbers of health-care providers, including nurses. With the most serious nursing shortage in modern history beckoning, it is paramount that we produce the knowledge to assist human resources planners and policy-makers. Nurses in Canada choose to engage in the labour market under specific conditions. Over half of all nurses work part-time, either by choice or because of job availability. Nurses are

reporting working conditions that are not conducive to job retention, job satisfaction, or good health. Based on the findings of this study, full-time work increases the health risk of nurses in the hospital setting.

Canada has the lowest rate of full-time nurses amongst the five countries that participated in the international study (Aiken et al., 2001). Today, only 50% of Canadian nurses are employed full-time (CIHI, 2001). In order to stabilize the nursing workforce, it is essential that the number of full-time nurses be increased. Yet the present study found that full-time work appears to be related to a higher prevalence of illness amongst nurses than part-time work.

It is essential that the findings of this study be acted upon. They suggest that workload and factors related to control over practice are strongly associated with ill health, burnout, job satisfaction, and other workforce health factors. Hospitals must take measures to calibrate workload and work environments and thus ensure a healthier workforce. Once employment environments have been made worker-friendly, we should not see a higher prevalence of ill health amongst full-time nurses.

For policy-makers there are several challenges. It is not sufficient to merely produce nurses: if a serious attempt is not made to retain nurses in the workplace, and in Canada, we will continue to witness the revolving-door phenomenon. With nurses showing the highest incidence of illness and days lost (Akyeampong & Usalcas, 1998), and considering the relationship between full-time work and prevalence of illness, governments and employers will have to come together to find constructive solutions and turn the tide.

Policy-makers need to examine their role in a number of areas. Each country should have a mechanism for monitoring the health profile and working conditions of nurses. Hospitals should be responsible for creating and reinforcing work environments that are conducive to maintaining a healthy nursing workforce. Health and safety committees should be able to develop and implement policies that will lead to healthier workplaces. Nurses' workloads and nurse-patient ratios should be decided within the local organizational setting; if there are no mechanisms in place to deal with these issues, legislation is likely to emerge, as it has recently in California (California Nurses Association, 1999). Funding for health-care organizations should stipulate that equipment be provided to help reduce nurse injury. Lastly, accreditation standards should have clear indicators for measuring the quality of not only patient care but also the workplace; accreditation should be tied to excellence both in patient care and in the workplace.

In conclusion, a growing number of research studies are attempting to identify ways to ensure good nursing resource management. But policy-makers, health-care organizations, and health-care professionals — including nurses — must act promptly, as the shortage of nurses will rapidly lead to a shortage of nursing care. A sustainable health-care system depends on adequate nursing services.

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