

Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study

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Summary

Background Austerity measures and health-system redesign to minimise hospital expenditures risk adversely affecting patient outcomes. The RN4CAST study was designed to inform decision making about nursing, one of the largest components of hospital operating expenses. We aimed to assess whether differences in patient to nurse ratios and nurses' educational qualifications in nine of the 12 RN4CAST countries with similar patient discharge data were associated with variation in hospital mortality after common surgical procedures.

Methods For this observational study, we obtained discharge data for 422 730 patients aged 50 years or older who underwent common surgeries in 300 hospitals in nine European countries. Administrative data were coded with a standard protocol (variants of the ninth or tenth versions of the International Classification of Diseases) to estimate 30 day in-hospital mortality by use of risk adjustment measures including age, sex, admission type, 43 dummy variables suggesting surgery type, and 17 dummy variables suggesting comorbidities present at admission. Surveys of 26516 nurses practising in study hospitals were used to measure nurse staffing and nurse education. We used generalised estimating equations to assess the effects of nursing factors on the likelihood of surgical patients dying within 30 days of admission, before and after adjusting for other hospital and patient characteristics.

Findings An increase in a nurses' workload by one patient increased the likelihood of an inpatient dying within 30 days of admission by 7% (odds ratio 1.068, 95% CI 1.031–1.106), and every 10% increase in bachelor's degree days of admission by 7% (odds ratio 1.068, 95% CI 1.031–1.106), and every 10% increase in bachelor's degree days of admission by 7% (odds ratio 1.068, 95% CI 1.031–1.106). These associations imply that nurses were associated with a decrease in this likelihood by 7% (0.929, 0.886–0.973). These associations imply that patients in hospitals in which 60% of nurses had bachelor's degrees and nurses cared for an average of six patients would have almost 30% lower mortality than patients in hospitals in which only 30% of nurses had bachelor's degrees and nurses cared for an average of eight patients.

Interpretation Nurse staffing cuts to save money might adversely affect patient outcomes. An increased emphasis on bachelor's education for nurses could reduce preventable hospital deaths.

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Introduction

Constraint of health expenditure growth is an important policy objective in Europe despite concerns about adverse outcomes for quality and safety of health care.^{1,2} Hospitals are a target for spending reductions. Health-system reforms have shifted resources to provide more care in community settings while shortening hospital length of stay and reducing inpatient beds, resulting in increased care intensity for inpatients. The possible combination of fewer trained staff in hospitals and intensive patient interventions raises concerns about whether quality of care might worsen. Findings of the European Surgical Outcomes Study³ across 28 countries recently showed higher than expected hospital surgical mortality and substantial between country variation in hospital outcomes.

Nursing is a so-called soft target because savings can be made quickly by reduction of nurse staffing whereas savings through improved efficiency are difficult to achieve. The consequences of trying to do more with less are shown in England's Francis Report,⁴ which discusses how nurses were criticised for failing to prevent poor care after nurse staffing was reduced to meet financial targets. Similarly, results of the Keogh review⁵ of 14 hospital trusts in England showed that inadequate nurse staffing was an important factor in persistently high mortality rates. Austerity measures in Ireland and Spain have been described as adversely affecting hospital staffing too.^{6,7}

Research that could potentially guide policies and practices on safe hospital nurse staffing in Europe has been scarce. Jarmann and colleagues⁸ reported an



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improvement of hospital care in Europe in the context of scarce resources and health-system reforms.

Methods

Study setting

Data for this observational study were from administrative sources on hospital patients and characteristics of hospitals, and surveys of 26 516 bedside care professional nurses done in 2009–10 in 300 hospitals in nine European countries (Belgium, England, Finland, Ireland, the Netherlands, Norway, Spain, Sweden, and Switzerland). Similar patient discharge data consistent with the patient mortality protocol were not available for three RN4CAST countries (Germany, Poland, and Greece). The study included most adult acute care hospitals in Sweden, Norway, and Ireland, and geographically representative samples of hospitals in the other countries.²²

The European study protocol received ethical approval by the lead university, Catholic University of Leuven, Belgium. Each grantee organisation in the nine participating countries received ethical approval at the institutional level to do nurse surveys and analyse administrative data for patient outcomes. We also obtained country level approvals to acquire and analyse patient outcomes data.

Outcomes

We obtained patient mortality data for postoperative patients discharged from study hospitals in the year 2007 to 2009. Our analyses included patients aged 50 years or older with a hospital stay of at least 2 days who underwent common general, orthopaedic, or vascular surgery, and for whom complete data were available for comorbidities present on admission, surgery type, discharge status, and other variables used for risk adjustment. We used the procedures published by Silber and colleagues²³ to define common surgeries and comorbidities (appendix). We selected common surgeries for study because almost all acute hospitals undertake them, risk adjustment procedures for surgical patients have been well validated, and risk-related comorbidities can be more accurately distinguished for surgical patients than for medical patients because they are present at admission by contrast with complications arising in the hospital. We coded data in all countries with a standard protocol by use of variants of the ninth or tenth version of the International Classification of Diseases.²⁴ Researchers are not able to validate coding in administrative hospital discharge files. Countries can have validation protocols for administrative data but this information is not available. Findings of studies in Europe show that routinely collected administrative data predict risk of hospital death with discrimination similar to that obtained from clinical databases.²⁵ We restricted

association between large proportions of auxiliary nurses (which implies a low overall mix of nursing skill) and high mortality in hospitals in England. Rafferty and colleagues²⁶ noted that low hospital mortality in England after common surgeries was associated with nurses each caring for few patients. Research in Belgium²⁷ found hospital mortality after cardiac surgery was significantly lower in hospitals with lower patient to nurse staffing ratios and in hospitals with a higher proportion of nurses with bachelor's education than in hospitals with higher staffing ratios and fewer nurses with bachelor's education. Likewise, data from a Swiss study²⁸ suggested significantly increased surgical mortality associated with inadequate nurse staffing and poor nurse work environments. This nascent but growing scientific literature about nursing outcomes in Europe is complemented by research from North America showing that improved hospital nurse staffing is associated with low mortality.²⁹ Additionally, growing evidence exists that bachelor's education for nurses is associated with low hospital mortality.^{30–32}

Research into nursing has had little policy traction in Europe compared with the USA where almost half the 50 states have implemented or are considering hospital nurse staffing legislation.^{33,34} On the basis of findings showing improved outcomes for patients, the Institute of Medicine recommended that 80% of nurses in the USA have a bachelor's degree by 2020,³⁵ and hospitals have responded with preferential hiring of bachelor's nurses. European decision makers might be unclear about the applicability of research done in individual countries in Europe or North America to Europe more generally. Specifically, scientific evidence is needed to inform the continuing European Union policy debate about harmonisation of professional qualifications for nurses.³⁶ RN4CAST, funded by the European Commission, was designed to provide scientific evidence for decision makers in Europe about how to get the best value for nursing workforce investments, and to guide workforce planning to produce a nurse workforce for the future that would meet population health needs.³⁷ Investigators of the study of 488 hospitals in 12 European countries noted substantial variation between countries with regards to patient to nurse workloads and the percentage of nurses qualified at the bachelor's level.³⁸ These variations in nursing resources are important predictors of patients' satisfaction with their care and in nurses' assessments of quality and safety of care.³⁹

We aimed to assess whether differences in patient-to-nurse workloads and nurses' educational qualifications in nine of the 12 RN4CAST countries with similar patient discharge data are associated with variation in hospital mortality after common surgical procedures. The nine countries are representative of variation in Europe with respect to organisation, financing, and resources given to health services. The study's findings provide previously unavailable evidence to guide important decisions about

See Online for appendix

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hospitals to those with 100 or more targeted patients. The primary outcome measure was whether patients died in the hospital within 30 days of admission. Risk adjustment variables included patient age, sex, admission type (emergency or elective), 43 dummy variables suggesting surgery type, and 17 dummy variables suggesting comorbidities present at admission, which are included in the Charlson index.²⁸

Statistical analyses

We estimated associations between nurse staffing and nurses' education and 30 day inpatient mortality for patients before and after adjusting for additional hospital characteristics and risk-adjusting for differences in patient characteristics. Hospital characteristics included country, bed size, teaching status, and technology; we defined high technology hospitals as those that undertook open heart surgery or organ transplantation. We included the hospital nurse work environment, measured by the Practice Environment Scale of the Nursing Work Index, as a control variable like in previous studies of nursing and mortality.²⁹ Patient characteristics included age, sex, admission type, type of surgery (with 43 dummy variables for the specific surgery types), and presence of 17 comorbidities (appendix). Because individual patient outcomes were modelled with a combination of hospital and patient characteristics, we estimated the effects of different characteristics with population average models using a generalised estimating approach and random intercept models using hierarchical linear modelling. Both approaches took into account patients being nested within hospitals, and in both types of models we included dummy variables to allow for unmeasured differences across countries. Because the results were almost identical, and the estimated effects of nursing characteristics were the same in terms of their size and importance, we show only the generalised estimating results. We tested for the effects on mortality of an interaction between nurse staffing and education, which was not significant and is not included in the results. All statistical analyses were done with SAS (version 9.2).

In the RN4CAST study, nurse staffing for each hospital was calculated from survey data by dividing the number of patients by the number of nurses that each nurse reported were present on their ward on their last shift, and then averaging ratios across all nurse respondents in each hospital. Low ratios suggested more favourable staffing. Collection of data for hospital nurse staffing directly from nurses avoided differences in administrative reporting methods across countries and ensured that only nurses in inpatient care roles are counted. We measured nurse education by calculating the percentage of all nurses in each hospital that reported that the

Table 1: Hospitals sampled in nine European countries with patient discharge data, numbers of surgical patients discharged, and numbers of patient deaths (RN4CAST data)

Only hospitals with more than 100 surgical patient discharges were included in the analyses. Data shown are for discharged patients for whom information about 30 day mortality, age, sex, type of surgery, and comorbidities were complete. Data were missing for those characteristics for less than 4% of all patients.

	Number of hospitals	Mean discharges per hospital (range)	Deaths/discharges (%)
Belgium	59	1493 (413–4794)	1017/88 078 (1.2%)
England	30	2603 (868–6583)	1084/78 045 (1.4%)
Finland	25	1516 (175–3683)	303/27 867 (1.1%)
Ireland	27	738 (103–1997)	292/19 822 (1.5%)
Netherlands	22	1419 (181–2994)	466/31 216 (1.5%)
Norway	28	1468 (432–4430)	518/35 195 (1.5%)
Spain	16	1382 (186–3034)	283/21 520 (1.3%)
Sweden	62	1304 (295–4654)	828/80 800 (1.0%)
Switzerland	31	1308 (158–3812)	590/40 187 (1.5%)
Total	300	1308 (103–6583)	5381/422 730 (1.3%)

Role of the funding source
The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

We obtained mortality data for 422730 patients; the number of hospitals and surgical discharges varied across countries (table 1). The percentage of surgical patients who died in the hospital within 30 days of admission was 1.3% across the nine countries combined, and was lowest in Sweden and highest in the Netherlands (table 1). Response rates for surveys of nurses ranged from less than 40% (2990 of 7741) in England, to nearly 84% (2804 of 3340) in Spain, and averaged 62% (29251 of 47160) across the nine countries. Differences in both nurse staffing and nurse education were large both between

Discussion

Our findings show that an increase in nurses' workload is associated with a decrease in inpatient hospital deaths, and increases the likelihood of inpatient hospital deaths, and an increase in nurses with a bachelor's degree is associated with a decrease in inpatient hospital deaths (panel). Findings of the RN4CAST study showed more

30%)—ie, $1/1.068 \times 1/1.068 \times 0.929 \times 0.929 \times 0.929 = 0.703$. nurse education across three intervals (from 60% to 80% to six patients per nurse) and the OR associated with eight to six patients per nurse) and the OR associated with applying (and multiplying) the reciprocal of the OR reduction (reduction in mortality by a factor of 0.70) by the nurses had bachelor's degrees and nurses cared for an average of eight patients. We worked out this 30% mortality than patients in hospitals in which only 30% for an average of six patients would have almost 30% lower 60% of the nurses had bachelor's degrees and nurses cared for an average of six patients in hospitals in which these associations suggest that patients in hospitals in which the percent of bachelor's degree nurses in a hospital is associated with a 7% decrease in this likelihood. These within 30 days of admission, whereas each 10% increase in 7% increase in the likelihood of a surgical patient dying each increase of one patient per nurse is associated with a with mortality (table 4). The odds ratios (ORs) suggest that staffing and nurse education were significantly associated status and technology) in the adjusted model, both nurse patients and characteristics of the hospitals (teaching adjusted model). After we considered severity of illness of the full set of potentially confounding factors (in the fully adjusted model) and for differences in mortality (in the partly adjusted model) and for differences in mortality adjustment for differences across countries in mortality nursing factors (staffing and education) on mortality after Table 4 shows results of modelling the effects of the two

canine. chronic pulmonary disease, metastatic carcinoma, and comorbidities were diabetes without complications, 10 underwent vascular surgeries. The most common general surgeries, and slightly less than one in ten underwent surgeries, whereas roughly four in ten underwent

Table 4: Partly and fully adjusted odds ratios showing the effects of nurse staffing and nurse education on 30 day inpatient mortality

Partly adjusted models	OR (95% CI)	p value	Fully adjusted model		
			Staffing	Education	
	1.005 (0.965–1.046)	0.816	1.000 (0.959–1.044)	0.929 (0.886–0.973)	0.002
	1.068 (1.031–1.106)	0.0002			

The partly adjusted model estimates the effects of nurse staffing and nurse education separately while controlling for unmeasured differences across countries. The fully adjusted model estimates the effects of nurse staffing and nurse education simultaneously, controlling for unmeasured differences across countries and for the hospital characteristics (bed size, teaching status, technology, and work environment), and patient characteristics (age, sex, admission type, type of surgery, and comorbidities present on admission). OR=odds ratio.

Table 3: Characteristics of surgical patients (n=422 730) in the study hospitals

Number (%)	
189 815 (45%)	Men
141 584 (34%)	Emergency admissions
5381 (1.3%)	Inpatient deaths within 30 days of admission
162 974 (39%)	Surgical categories
220 301 (52%)	Orthopaedic surgery
39 455 (9%)	Vascular surgery
15 297 (4%)	Comorbidities
	Cancer
7400 (2%)	Cerebrovascular disease
10 274 (2%)	Congestive heart failure
28 373 (7%)	Chronic pulmonary disease
5744 (1%)	Dementia
6478 (2%)	Diabetes with complications
35 450 (8%)	Diabetes without complications
50 (0%)	AIDS/HIV
17 911 (4%)	Metastatic carcinoma
12 002 (3%)	Myocardial infarction
5953 (1%)	Mild liver disease
1354 (0%)	Moderate or severe liver disease
2043 (1%)	Paraplegia and hemiplegia
2323 (1%)	Peptic ulcer disease
12 452 (3%)	Peripheral vascular disease
10 085 (2%)	Renal disease
6962 (2%)	Connective tissue disease or rheumatic disease

Table 2: Nurse staffing and education in nine European countries

Country	Nurse staffing (patients to nurse)		Nurse education (% of nurses with bachelor's degrees)	
	Mean (SD)	Range	Mean (SD)	Range
Belgium	10.8 (2.0)	7.5–15.9	55% (15)	26–86%
England	8.8 (1.5)	5.5–11.5	28% (9)	10–49%
Finland	7.6 (1.4)	5.3–10.6	50% (10)	36–71%
Ireland	6.9 (1.0)	5.4–8.9	58% (12)	35–81%
Netherlands	7.0 (0.8)	5.1–8.1	31% (12)	16–68%
Norway	5.2 (0.8)	3.4–6.7	100% (0)	100–100%
Spain	12.7 (2.0)	9.5–17.9	100% (0)	100–100%
Sweden	7.6 (1.1)	5.4–9.8	54% (12)	27–76%
Switzerland	7.8 (1.3)	4.6–9.8	10% (10)	0–39%
Total	8.3 (2.4)	3.4–17.9	52% (27)	0–100%

Means, SDs, and ranges are estimated from hospital data—eg, the 59 hospitals in Belgium have a mean patient-to-nurse ratio of 10.8, and the patient-to-nurse ratio ranges across those 59 hospitals from 7.5 to 15.9. Similarly, the 31 hospitals in Switzerland have, on average, 10% bachelor's nurses, and the percent of bachelor's nurses ranges across those 31 hospitals from 0% to 39%.

countries and between hospitals within each country (table 2). In Spain and Norway, all nurses had bachelor's degrees. The mean age of the patient sample was 68 years (SD=10); table 3 shows other patient characteristics. Of

Additional research in Europe is needed to establish whether our multicountry findings can be replicated for high mortality surgeries and for medical patients; and whether in Europe, like in the USA, nursing is related to a range of adverse outcomes that contribute to high costs. Longitudinal studies of panels of hospitals would be especially valuable to help to establish causal associations between changes in nursing resources and outcomes for patients. Comparative effectiveness research is needed to identify what workforce investments return the greatest value, and under what circumstances. Research beyond simple mortality outcomes would be welcome to help to establish standards of care by which performance of health-care organisations could be more fully assessed. In a context of widespread health-system redesign and reforms, increased funding for studies of health workforce investments could result in high-value health care.

In summary, educational qualifications of nurses and patient-to-nurse staffing ratios seem to have a role in the outcomes of hospital patients in Europe. Previous findings from RNACAST show that patients are more likely to express satisfaction with hospital care when nurses care for fewer patients each.²⁸ To add to these findings, our data suggest that evidence-based investments in nursing are associated with reduction in hospital deaths.

Contributors

LHA, WS, LB, MM, PG, RB, and MTM-CT designed the literature search. LHA, WS, DMS, KVDH, AMR, PG, MM, RB, AS, and CT designed the study. LHA, WS, DMS, KVDH, AMR, RB, PG, MD, JK, MK, MTM-CT, AMR, RS, AS, CT, and TVA collected data. LHA, DMS, LB, MM, WS, and TVA analysed data. All of the authors contributed to data interpretation, writing, and

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Conflicts of interest

We declare that we have no conflicts of interest.

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3.2.2.4. Prevedere le esigenze del personale sanitario per la pianificazione efficace all'interno dell'Unione

Questa azione intende stabilire una piattaforma che consenta agli Stati membri di collaborare sulla previsione delle esigenze del personale sanitario e sui metodi di pianificazione del personale, al fine di individuare soluzioni al problema della carenza del personale sanitario in Europa. L'azione è stata annunciata nella comunicazione COM(2010) 0682 definitivo della Commissione, del 23 novembre 2010. «Un'agenda per nuove competenze e per l'occupazione; contributo europeo verso la piena occupazione (1)». Contribuirà direttamente alla realizzazione degli obiettivi della seconda priorità definita nella comunicazione, vale a dire dare ai cittadini gli strumenti per acquisire le competenze necessarie per l'esercizio di una professione. Gli Stati membri hanno inoltre richiesto l'attuazione di tale piattaforma nelle conclusioni del Consiglio «Investire nel personale sanitario di domani in Europa; il campo d'applicazione in materia d'innovazione e di collabora-

zione» adottata il 7 dicembre 2010 (2).

Strategie e meccanismi di previsione completi e integrati aiuterebbero gli Stati membri a valutare il numero e il tipo di personale sanitario di cui il loro sistema sanitario ha bisogno. Una previsione e una pianificazione adeguate contribuirebbero a garantire la sostenibilità dei sistemi sanitari e a rispondere alle problematiche attuali e future, tra le quali l'invecchiamento del personale e dei pazienti, le dimensioni dei servizi di gestione dei pazienti che soffrono di malattie croniche, la salute mentale, l'assistenza medica e sociale di lunga durata, l'evoluzione del personale sanitario e l'aumento della sua mobilità transfrontaliera. Un'azione a livello dell'Unione può inoltre apportare valore aggiunto individuando le competenze e attitudini richieste in futuro, contribuendo a dotare il personale sanitario delle qualifiche necessarie e determinando i fattori essenziali per un ambiente di lavoro soddisfacente.

Questa azione ha lo scopo di: a) fornire informazioni e scambiare buone prassi sui metodi di pianificazione utilizzati; b) elaborare una base di dati comprendente le migliori prassi e gli orientamenti per il miglioramento della modellizzazione e sarà creata (2015) una piattaforma permanente a livello dell'Unione; c) stimare le esigenze future in termini di capacità e competenze e di ripartizione del personale sanitario. Una relazione elencherà i diversi metodi utilizzati nell'Unione e stabilirà gli orientamenti destinati agli utilizzatori riguardanti la stima delle esigenze future (2013); c) formulare consigli sui mezzi per rafforzare le capacità di pianificazione del personale negli Stati membri (2014). Questa azione deve consentire di identificare, negli Stati membri, esperti nella pianificazione del personale che potranno aiutare le autorità competenti di cooperazione tra il paese di origine e il paese ospitante in grado di configurare soluzioni reciprocamente vantaggiose in termini di capacità di formazione e di mobilità circolare (2014-2015); e) fornire informazioni sulle tendenze in materia di mobilità dei professionisti della salute negli Stati membri (2013-2015). Tale collaborazione è già stata avviata in vari progetti di ricerca e di innovazione come PROMETHUS (3) (HEALTH PRO-fessional Mobility in The European Union Study) e (RN4CAST) (4) (Nurse Forecasting: Human Resources Planning in Nursing) ma deve essere ulteriormente rafforzata. La piattaforma europea persegue anche questo obiettivo. L'azione congiunta dovrebbe basarsi sui progetti PROMETHUS, RN4CAST e (MoHProl) (5) (Mobility for Health Professionals) e sfruttare i loro risultati e realizzazioni. L'azione contribuirà all'attuazione del «Codice di prassi mondiale dell'OMS per il reclutamento dei professionisti della sanità, in particolare quelli che provengono da paesi in via di sviluppo che devono affrontare gravi penurie di personale sanitario, invitando gli Stati membri ad adottare misure efficaci per formare, finalizzare e sostenere un personale sanitario adeguato, sulla base di una pianificazione delle risorse umane basata su elementi fattuali (punto 5.4 del Codice). Questa azione comprenderà anche un modulo su come mantenere nel tempo tale collaborazione dopo la conclusione dell'azione congiunta.

[Azione congiunta] Importo indicativo: 3 000 000 EUR

3.2.3. Studiare i determinanti sanitari per promuovere e migliorare la salute fisica e mentale e adottare misure relative a fattori essenziali quali l'alimentazione e l'attività fisica nonché ai determinanti che comportano dipendenza, come il fumo e l'alcool (punto 2.2.1 dell'allegato alla decisione relativa al programma)

3.2.3.1. Salute mentale e benessere

Questa azione congiunta è destinata a stabilire una procedura di lavoro strutturata sulla salute mentale in grado di coinvolgere gli Stati membri, le parti interessate nel settore della sanità ed altri settori, nonché organizzazioni internazionali, in particolare l'OMS e l'OCSE. L'azione congiunta si baserà sulle conferenze tematiche organizzate nel 2009-2011 nel quadro del «Patto europeo sulla salute mentale e il benessere» creato sotto la Presidenza slovena nel 2008. Le conclusioni del Consiglio adottate nel giugno 2011 concernenti questo Patto (il Patto europeo per la salute mentale e il benessere: risultati e azione futura» (6)), invitano gli Stati membri e la Commissione ad adottare un'azione congiunta sulla salute mentale e il benessere nel quadro del programma in materia di salute.

(1) <http://eur-lex.europa.eu/lexUriServ/lexUriServ.do?uri=COM:2010:0682:FIN:EN:PDF>
(2) 3053ª sessione del Consiglio: Occupazione, politica sociale, salute e consumatori.
(3) <http://www.euro.who.int/home/prc/Ucets/observatory/activities/research-studies-and-projects/prometheus>
(4) <http://www.mh-eas.eu/en/index.php>
(5) <http://www.mohprol.eu/LIVE/>
(6) 3095ª sessione del Consiglio: Occupazione, politica sociale, salute e consumatori.

PROJECT SYNOPSES

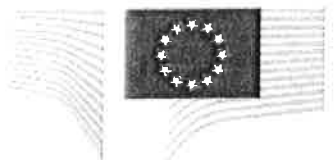
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- Objectives
- Projects
- Contact corner
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The Registered Nurse Forecasting (RN4CAST) study shows that improved patient-to-nurse staffing ratios, sound nursing work environments and a better educated nurse workforce are associated with improved nurse wellbeing and better patient outcomes, including higher patient satisfaction and lower patient mortality.

The RN4CAST research consortium brings together researchers from twelve European countries (Belgium, Finland, Germany, Greece, Ireland, Norway, Poland, Spain, Sweden, Switzerland, The Netherlands and England), the US and three international cooperating partner countries from the European Union (Botswana, China, and South Africa).

Findings show that hospital quality, safety, and staff retention problems are common in all countries that participated to this study. These problems are associated with between-organizational features of nursing care. An important finding of the study is that almost every country under study had one or more hospitals that nurses ranked as having good work environments. Agreement between nurses and patients as to which hospitals provided good care is shown repeatedly in all countries. Our findings suggest that it is feasible for policy makers and human resources managers to replicate the success of US initiatives in a larger share of hospitals in every country.

Similar evidence led countries like the US and Australia to take several high-profile initiatives with regard to achieving safe nurse staffing and improved work environments, such as mandated safe nurse staffing ratios and the Magnet Hospital Accreditation Programme for excellence in nurse work environments. In the US, by these measures, nursing has become an attractive career path, and the nursing shortage, which was close to 1 million nurses in 2000, has been reverted.

The RN4CAST consortium to date has published close to 40 articles in international peer-reviewed journals, and through a number of past and future high-profile dissemination activities and continued stakeholder engagement, RN4CAST paves the way for European and national policy-makers and hospital human resources managers to embrace these findings in both evidence-based practices and workforce planning methods.

Our policy synthesis indicates that such well-thought out initiatives are necessary to face the European nursing workforce crisis. Significant improvements in work environments are considered a relatively low cost lever and effective approach to achieving the most value for investments in nurse staffing.

Problem:

Current health workforce planning methods have a poor record of accurately predicting future workforce needs and of informing policy interventions that avoid cyclical shortages. A significant point for improvement is to recognize the need

Project web-site : <http://www.RN4CAST.eu>

Keywords : Patient Safety; Nursing Staff; Hospitals, General/manpower/standards; Health Planning/*methods; Patient Satisfaction; Education; Nursing, Baccalaureate; Workplace/standards; Burnout, Professional/epidemiology; Health Policy; Health Services Research; Cross-Sectional Studies; Europe/epidemiology; Questionnaires.

Starting date : 01/01/2009

Duration : 36 months

EC contribution : € 2.999.988.00

Contract/Grant agreement number : 223468

RN4CAST Nurse Forecasting: Human Resources Planning in Nursing



YOUR FEEDBACK

to take into account the dynamics between nursing system delivery strategies and quality and safety of healthcare.

Aim:

The objective of RN4CAST is to study the dynamics between hospital nurse staffing, skill mix, educational composition, and quality of the nurse work environment on the one hand and hospital mortality, failure to rescue, quality of care, and patient satisfaction with hospital care on the other hand. The project aims to refine current forecasting models based on these nursing workforce dynamics and develop scenarios on how these models affect policy making for making the health workforce attractive and highly performing.

Expected Results:

All 12 countries representing differently organized and financed national health care systems have hospital quality, safety, and staff retention problems associated with organizational behaviours related to nursing. The quality of the hospital nurse practice environment and hospital nurse staffing were significantly associated with nurse wellbeing and patient satisfaction, hospital nurse staffing and the proportion of nurses with bachelor's education are associated with significantly fewer deaths after common surgery.

Potential applications:

The RN4CAST project is addressing policymakers at the international, national and organisational level. On the international level, a stakeholder group was established to advise the project team in how RN4CAST could impact policy making on a global European level. This international group includes representatives from OECD, WHO, the European Observation on Health Systems and Policies, the European Hospital and Healthcare Federation (HOPE), the European Health Management Association (EHMA), the European Academy of Nursing Science (EANS), and the European Federation of Nurses (EFN).

Concrete examples in which RN4CAST can give necessary input are the EU-initiative towards a joint action on health workforce planning, resulting from the Belgian Presidency in 2010, and the revision of directive 2005/36/EC on the recognition of professional qualifications, in evaluating the impact of nursing qualification on the quality and safety of patient care.

On the national level, stakeholder groups were established to link the findings to national policy making. In some countries, this has led to specific actions (on national or regional levels) to promote the nursing profession to young talents or to the reorganisation of nursing care. On the organisational level, all hospitals in the study received feedback in which their performance on nursing and patient outcomes was benchmarked (internationally and nationally).

A set of best-practice hospitals where nurses like to work and patients are satisfied with their hospital stay creates learning opportunities and incentives for other hospitals on successful nursing system delivery strategies.

The RN4CAST project makes a strong significant scientific contribution to nursing workforce planning. It will shift the main focus of nursing workforce planning from rather simple projections in demand and supply of labour to a new focus on patient safety and quality. For this reason, many countries have expressed their interest in replicating the study.

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