**Patient Safety, Satisfaction, and Quality of Hospital Care: Cross-Sectional Surveys of Nurses and Patients in 12 Countries in Europe and the United States**

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**[Report Word Count (excluding Abstract) =4026 words]**

**ABSTRACT**

**Objective:** Cost containment is exerting pressures on the hospital nurse workforce that may conflict with quality and safety improvement. Europe is an ideal laboratory for determining how to realign organisational behaviors to achieve good patient and workforce outcomes in a context of finite resources.

**Design:** Cross-sectional surveys of patients and nurses.

**Setting:** Nurses were surveyed in 488 general acute care hospitals in 12 European countries and 617 general acute care hospitals in the United States. Patients were surveyed in a subset of 210 of the European hospitals and 430 of the United States hospitals.

**Participants:** 33,659 nurses and 11,318 patients in Europe and 27,509 nurses and over 120,000 patients in the United States.

**Measurements:** Hospital staffing, nurse work environments, burnout, dissatisfaction, intentions to leave, patient safety, quality of care, patient satisfaction overall and with nursing care and willingness to recommend their hospitals.

**Results:** The percentage of nurses reporting poor or fair quality of patient care varied substantially by country from 11% (Ireland) to 47% (Greece) as did the percentage that gave their hospital a poor or failing safety grade (4% in Switzerland to 18% in Poland). High nurse burnout ranged from 10% (Netherlands) to 78% (Greece), job dissatisfaction from 11% (Netherlands) to 56% (Greece), and intent to leave from 14% (United States) to 49% (Finland and Greece). Percent of patients rating their hospitals highly varied considerably across countries from 35% (Spain) to 61% (Finland and Ireland), as did the percentage of patients that were willing to recommend their hospital (53% in Greece to 78% in Switzerland). Better work environments and lower patient-to-nurse ratios were associated with higher care quality and higher patient satisfaction. After adjusting for hospital and nurse characteristics, nurses in European hospitals with better work environments were half as likely to report poor or fair care quality (adjusted odds ratio 0.56, 95% confidence interval, 0.51 to 0.61) and to give their hospitals poor or failing grades on patient safety (adjusted odds ratio 0.50, 0.44 to 0.56). Each additional patient per nurse increased the odds on nurses reporting poor or fair quality car (adjusted odds ratios 1.11, 1.07 to 1.15) and poor or failing safety grades e (adjusted odds ratio 1.10, 1.05 to 1.16). Patients in hospitals with better work environments were more likely to rate their hospital highly (adjusted odds ratio 1.16, 1.03 to 1.32) and to recommend their hospital (adjusted odds ratio 1.41, 1.22 to 1.62), while patients in hospitals with higher patient-to-nurse ratios were less likely to rate their hospital highly (adjusted odds ratio 0.94, 0.91 to 0.97) or recommend their hospital (adjusted odds ratio 0.95, 0.91 to 0.98). Findings were similar in the United States. Nurses and patients agreed on which hospitals provided good care and could be recommended.

**Conclusions:** Hospital care quality deficits were common in all countries. Improving hospital work environments may be a relatively low cost lever to produce safer and higher quality hospital care and higher patient satisfaction.

**[Abstract Word Count = 487 words]**

**What is known about the topic:**

Human capital accounts for a substantial portion of health expenditures. Measures to contain increasing healthcare costs globally are exerting pressures on the hospital nurse workforce that may, although good evidence is lacking, have negative consequences for quality of care.

**What this paper adds:**

Hospitals with good work environments and better professional nurse staffing have more satisfied patients and nurses, and evidence of better quality and safety of care. Improving hospital work environments shows promise as an affordable organisational strategy to improve patient outcomes and retention of qualified nurses at the bedside.

In the face of sustained upward pressure on health expenditures from ageing populations, rising public expectations, and the introduction of new technology, European countries have been implementing a wide range of cost-containment strategies. From one perspective they have been successful. Although expenditures, expressed as a percentage of Gross Domestic Product, have been rising in European countries, the increase has been at a much slower rate than in the United States. The Netherlands, the highest spending European country in 2009, spends only 12.0% of their Gross Domestic Product on health, compared with the American figure of 17.4%. In many European countries the figure is much less, for example, Finland at 9.2% and the United Kingdom at 9.8%.1,2 The precise measures taken by individual countries to contain rising costs vary but many involve extracting greater “efficiency” from health assets, and in particular hospitals. One target of these efforts regards patients. Average length of stay has fallen significantly since 1980, typically by about 50%. Patient throughput has increased markedly in the midst of a greatly reduced number of beds. Coupled with advances in medical science that have enabled more active treatment of those with multiple co-morbidities, hospitalised patients, on average, require more intensive management.[3](#_ENREF_1) Another target relates to those providing care. In some countries, a focus on skill-mix has led to substitution of professional nurses by health care assistants who may have minimal training.[4](#_ENREF_2) This possible combination of fewer trained staff and more intensive interventions raises concerns about whether, in a context of constrained expenditures, there may be a trade off with quality.

Over a decade ago, two landmark reports — The World Health Report 20005 and the Institute of Medicine’s *Crossing the Quality Chasm*6 — called for realignment of incentives to balance the often competing goals of cost containment and quality improvement. Both reports concluded that responsiveness to citizens’ expectations was a valued and desired outcome of health system performance. Efforts to measure patient satisfaction have thus increased,7 and in some countries incentives have been adopted to foster patient satisfaction and patient-centred care.8,9 Research confirms that features of the hospital work environment, from better patient-to-nurse staffing ratios to nurse involvement in decision-making and positive doctor-nurse relations, are associated with improved patient outcomes including mortality and patient satisfaction.9-13 This is likely due to the important role of nurses in the surveillance system in hospitals. This body of research, mostly conducted in the United States, has been translated into practice and public policies in America through, for example, the minimum hospital nurse staffing mandates enacted in California14 and the increase of hospitals with Magnet accreditation for excellence in nurse work environments.15 But there is little evidence of uptake of these research findings and evidence-based best practices in Europe, even though a few country-specific studies have reported similar findings.16-19

Yet Europe offers an ideal laboratory to examine this issue. Within the broad trends described above, there is considerable diversity, both in the resources committed and the measures taken to contain costs. Is the same association between the hospital work environment, nurse staffing, and patient satisfaction seen in all countries? Have some countries been able to provide substantially better hospital work environments and greater patient satisfaction than others? If so, why? We report here the first findings of the largest ever study of hospital work environments and patient safety, satisfaction, and quality of care in European hospitals as reported by both nurses and patients. We include survey data from 12 countries in Europe and to situate these findings within previous research, from four large states in the United States. We hypothesize that in hospitals where the organisational context of care is good — that is, where hospital nurse staffing and nurse work environments are better — patients benefit and nurse workforce stability is enhanced.

**Methods**

**Hospital, nurse, and patient samples**: This cross-sectional study is of 1105 general acute hospitals — 488 in 12 European countries (Belgium, England, Finland, Germany, Greece, Ireland, Netherlands, Norway, Poland, Spain, Sweden, and Switzerland), and 617 in California, Pennsylvania, Florida, and New Jersey in the United States. Included in the study are 61168 professional bedside care nurses from the participating hospitals and more than 130000 patients cared for in them.12,20 European data include surveys of 33659 nurses undertaken in 2009-10 in 488 study hospitals and 11318 patients in a subset of 210 of these hospitals. United States data are from a 2006-07 survey of 27509 nurses in 617 participating hospitals and patient satisfaction data are from over 120000 patients in 430 of these hospitals. The same nurse and patient survey instruments were used in all countries. The processes of translation, piloting and subsequent validation of survey instruments were rigorous.21-22 In Europe, a key informant in each hospital was surveyed to obtain information on hospital characteristics; in the United States these data were obtained from the American Hospital Association Annual Survey. Ethical approval was obtained by all 13 participating universities.

Geographically representative samples of at least 30 hospitals were recruited in each country, except in Ireland and Norway, where all hospitals were recruited, and in Sweden, where nearly all hospitals were included by virtue of sampling all medical-surgical nurses who were members of the Swedish Nursing Association, and the four states in the United States, where nearly all hospitals were included as a result of sampling nurses from current state licensure lists. In all European countries except Sweden, adult medical and surgical wards were randomly sampled and all nurses providing direct patient care in these wards were surveyed; only fully-qualified professional nurses by the standards of each country were included. The patient survey was a one-day census in which all patients able to participate and who understood one of the questionnaire languages were surveyed. In Belgium, Finland, Greece, Poland, and Switzerland, nurses and patients on the same wards were surveyed, and in Spain, Germany, and Ireland, patients from subsets of wards and hospitals were surveyed. Due to funding constraints, England, Netherlands, Norway, and Sweden did not participate in the patient satisfaction survey. United States patient satisfaction data are from the Centers for Medicare and Medicaid Services (CMS) Hospital Compare website; submission of patient satisfaction data by United States hospitals was voluntary for the years studied and thus available on a subset of hospitals.9,23

In Sweden, all acute care hospitals were represented in the study. In the other countries of Europe, participation by the groups of sampled hospitals was 64% (380/598), resulting in 486 distinct hospital facilities. In the United States roughly 74% (617/834) of the hospitals had sufficient numbers of nurse respondent to be included in the study. Nurse response rates in Europe among nurses averaged 62% (33731/54140), and the response rates for patients averaged 73% (11336/15527). In the United States the nurse response rate was 39%; a non-respondent survey with intensive follow-up achieving a 91% (1176/1296) response rate revealed no response bias.12 Patient response rates were not reported for United States hospitals in public use data sources. Table 1 summarises the scale of the analysis — the number of hospitals and nurses surveyed in each of the 12 European countries and the United States. Table 2 provides data on the hospitals, nurses and patients in the 8 European countries and the United States that collected patient surveys. A full discussion of the samples and survey instruments can be found elsewhere, but it should be noted that the nurse and patient samples differed in two important ways.12,20 The hospital nurses surveyed in Europe all worked on medical-surgical units, while the nurses surveyed in the United States included all nurses across all unit types. Further, while the patients were surveyed in Europe while they were still in the hospital, the patients were surveyed in the United States after being discharged. Item non-response was very low (less than 5%) for both patients and nurses for virtually every survey question in all countries.

**Key measures:** Nurse staffing was calculated for each hospital from nurse surveys as a ratio of patients to nurses on the ward on each nurse’s last shift, averaged across all direct inpatient care nurses in the sampled wards. Lower ratios reflect more favourable staffing. Primary data on nurse staffing avoids differences in administrative reporting methods across countries and restricts staffing measures to nurses providing direct inpatient care. Nurse was defined as a fully qualified professional nurse by the standards of each country.

Nurse work environment was measured using the Practice Environment Scale of the Nursing Work Index-Revised (PES-NWI), an internationally validated measure.12,13,24,25 The Practice Environment Scale of the Nursing Work Index-Revised measures modifiable organisational behaviors including managerial support for nursing, nurse participation in hospital affairs, doctor-nurse relations, and promotion of care quality. Subscales of the Practice Environment Scale of the Nursing Work Index-Revised were used to derive a three-category measure differentiating hospitals with lowest (worst) quartile, middle 50%, and highest (best) quartile work environment scores. These quartiles were established separately for European and American hospitals.

Nurse burnout was measured with the Emotional Exhaustion subscale of the Maslach Burnout Inventory,[26](#_ENREF_3) an instrument with established reliability and validity in international research.[22](#_ENREF_3)Other nurse outcomes and nurse-reported measures were derived from survey items, as in prior studies of United States hospitals10 to contrast between nurses who were dissatisfied (vs. satisfied) with their jobs; who intended to leave their job in the next year (vs. those who did not); who reported that the quality of care on their ward was fair or poor (vs. good or excellent); who were less than confident (vs. confident) that patients could manage their own care when discharged; and who were less than confident (vs. confident) that management would resolve patient care problems.

Using an item derived from the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient Safety Culture,27 nurses gave their ward an overall grade on patient safety, allowing us to compare nurses that gave poor or failing grades with those who gave excellent, very good, or acceptable grades. Nurses in Europe were also asked whether they would recommend their hospitals to family and friends.

Patient satisfaction was measured with the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) instrument in Europe and the United States.2[3](#_ENREF_3) Patients rated their hospitals on a scale from zero to 10 (best) — we contrasted those who reported 9 or 10 with those reporting less than 9, and patients indicated whether they would recommend their hospital to family and friends, an item also collected from nurses. A composite measure of satisfaction with nursing was derived from three items asking patients whether nurses always 1) treated them with respect, 2) listened carefully, and 3) explained things in a clear manner.

**Analytic strategy:** Although our units of *observation* were primarily individuals (patients and nurses), our units of *analysis* are hospitals. We control for hospital characteristics including size, teaching status, and technology (open heart surgery and/or organ transplantation defined high technology hospitals). In analyzing nurse outcomes, we adjusted regression estimates (odds ratios) at the hospital-level for between-hospital (and between-country) differences in the composition of nurses — their age, sex, full-time employment status, and specialty — by a multi-level model structure in which nurses are nested within hospitals and countries. In analyzing patient outcomes with patient-level data in Europe, similar adjustments were made using a multi-level model in which patients are nested within hospitals and countries. Odds ratios for United States hospitals were estimated "about" the mean odds ratio using coefficients from linear regression models as individual data are not available. Robust logistic regression with clustering provided the same result as hierarchical modeling and the results are more straightforward to interpret.

**Results**

Table 3 shows the difference in nurse workloads across hospitals in Europe and the United States. In European countries, the average patient-to-nurse ratio across hospitals (and across all shifts) ranges from 5.4 in Norway to 13.0 in Germany, and the average ratio of patient-to-all-care-staff (including professional nurses or registered nurses and non- registered nurses) ranges from 3.3 in Norway to 10.5 in Germany. The lower (more favourable) staffing ratio in the United States than in any of the European countries except Norway is likely due, at least in part, to the inclusion of nurses other than medical-surgical nurses in the United States sample.

Table 4 shows that a substantial proportion of nurses in every country report quality of care deficits and high nurse burnout, job dissatisfaction, and intent to leave current positions. Greece was particularly high on nurse burnout, dissatisfaction, and intent to leave. Nearly half of Greek nurses reported working on wards that they characterised as providing “poor” or “fair” quality of care and 17% (61/358) gave their hospitals a poor or failing safety grade. In the Netherlands, nurse burnout, dissatisfaction, and intent to leave were lower but still reflected adverse outcomes for between 10% (211/2061) to 19% (418/2197) of nurses; while only 6% (123/2187) of nurses gave their wards a poor or failing safety grade, and 35% (756/2185) rated care on their wards as fair or poor. The percentage of burned out and dissatisfied nurses in the United States was near the European median, but the percentage of United States nurses intending to leave their jobs in the next year was lower than in all European countries.

As shown in Table 5, the percentage of patients who gave high overall ratings to their hospital ranged from 35% (166/469) in Spain to nearly 60% in the United States (*n* not available), Switzerland (587/976), Finland (1128/1862), and Ireland (171/282). High patient ratings are associated with the propensity to “definitely” recommend the hospital. Variability in what both nurses and patients experience within hospitals is, in general, even greater *within* countries than it is *between* countries, but the *relationships between indicators across hospitals* are quite similar. Figure 1 is a graphic example with a scatterplot for each country in which both nurses and patients reported whether they would recommend their hospital. Each point in the scatterplot is a hospital. The proportions of nurses and patients who would recommend their hospitals within countries differ, but the relationship depicted — agreement between nurses and patients as to which hospitals provided good care — is shown repeatedly in different countries.

In Table 6 we estimate the effects of practice environments and staffing on nurse outcomes and quality. Two models are shown for each combination of outcome and “effect” (practice environment or staffing): 1) robust logistic regression models which estimate the effects of nurse staffing and the work environment separately without controls with the within-country slopes fixed to be equivalent across Europe; and 2) multivariate models (also with robust standard errors) which estimate the joint effects of nurse staffing and the practice environment after controlling for across-hospital differences in characteristics of nurses, differences in structural characteristics of hospitals, and unmeasured differences in outcomes across countries. In Europe and the United States, a better work environment has pronounced negative effects on every negatively-scaled outcome, with and without nurse, hospital, and country controls. After adjusting for hospital and nurse characteristics, nurses in hospitals with better work environments were half as likely to report poor or fair care quality (in Europe, the adjusted odds ratio was 0.56, 95% confidence interval 0.51 to 0.61; in the United States the adjusted odds ratio was 0.54, 0.51 to 0.58) and to give their hospitals poor or failing grades on patient safety (in Europe, the adjusted odds ratio was 0.50, 0.44 to 0.56; in the United States the adjusted odds ratio was 0.55, 0.50 to 0.61). Each additional patient per nurse increased the odds on nurses reporting poor or fair quality care (the adjusted odds ratios were 1.11, 1.07 to 1.15, in Europe and 1.06, 1.03 to 1.10, in the United States) and poor or failing safety grades (the adjusted odds ratios were 1.10, 1.05 to 1.16, in Europe and 1.05, 1.00 to 1.10 in the United States). Nurse outcomes (high burnout, dissatisfaction, and intent to leave) are similarly associated with staffing and the work environment, and the work environment effect is generally stronger than the specific staffing effect. Similarities are evident among countries at all levels of health expenditure. Better work environments have the anticipated effect on every outcome, as do higher nurse workloads on most of them.

Table 7 shows the results of using similar robust logistic regression models that allow for the clustering of patients within hospitals and estimate the separate effects of the different nursing factors and nurse characteristics on 1) the odds of patients rating their hospital highly (9 or 10 vs. <9), 2) the odds of patients indicating that they would definitely recommend their hospital, and 3) the odds of patients responding that nurses always treated them with courtesy and respect, listened to them carefully, and explained things in a clear manner. The work environment has a sizable and positive effect on all three positively scaled patient measures in all countries. Patients in hospitals with better work environments were more likely to rate their hospital highly both in Europe (adjusted odds ratio 1.16, 95%, 1.03 to 1.32) and the United States (adjusted odds ratio 1.18, 1.13 to 1.23) and to recommend their hospital (adjusted odds ratio 1.20, 1.05 to 1.37, in Europe and 1.23, 1.17 to 1.29 in the United States), while patients in hospitals with higher patient-to-nurse ratios were less likely to rate their hospital highly both in Europe (adjusted odds ratio 0.94, 0.91 to 0.97) and the United States (adjusted odds ratio 0.96, 0.94 to 0.98) and to recommend their hospital (adjusted odds ratio 0.95, 0.91 to 0.98, in Europe and 0.95, 0.92 to 0.97 in the United States). Table 7 also shows that the odds of patients rating their hospital highly, recommending their hospital, and responding favourably about nurses are lower in hospitals that have higher percentages of nurses reporting only fair or poor quality care and poor or failing safety grades. Patients exhibit less satisfaction in hospitals with higher percentages of burned out or dissatisfied nurses, and in hospitals where more nurses lack confidence in management.

**Discussion**

**Principal Findings**

Despite differences in how healthcare is organised, financed, and resourced, cross-sectional data suggests that all 13 countries face problems of hospital quality, safety, and nurse burnout and dissatisfaction. While nurse shortages have been tempered to some extent by the global economic downturn, nurses’ reports of their intentions to leave their jobs in hospitals may portend trouble for the future, especially in Europe where a substantial share of nurses, from 19% (418/2197) in the Netherlands to 49% (177/358; 546/1111) in Finland and Greece, say they intend to leave. In all countries, nurse staffing and the quality of the hospital work environment — managerial support for nursing care, good doctor-nurse relations, nurse participation in decision-making, and organisational priorities on care quality — were significantly associated with patient satisfaction, quality and safety of care, and nurse workforce outcomes. That is, hospitals with superior work environments and better nurse staffing had better outcomes for patients and nurses alike. While we cannot be sure of causality because the data are cross-sectional, the hospital work environment is associated with outcomes in each country.

We show patients’ ratings of hospitals are similar to the nurses’ ratings, and that whether patients rate their hospital as excellent and whether patients would recommend their hospital to others is associated significantly with nurses’ ratings of their hospital work environment and their reports of nurse staffing. A general failure of hospital management is suggested by the majority of nurses in every country reporting a lack of confidence that hospital management will solve identified patient care problems. Management’s skepticism that nurses’ complaints about care quality reflect objective clinical observations might need to be tempered by our findings showing that nurses’ assessments concur with those made independently by patients. Our findings support the conclusion reached by the World Alliance for Patient Safety that organisational behaviors are important in promoting patient safety.28

**Differences in Quality of Care Assessments Among Countries**

Differences in quality of care assessments were noted among countries. Nurses’ ratings of quality and job satisfaction is worst in Greece, whose health system has been experiencing severe economic difficulties and where there have been widespread protests about the government’s austerity measures. There have also been austerity protests in Spain, which ranks third worst on quality. Germany, ranking second worst, has not faced protests but nursing workload is believed to have increased following the introduction of case-based payment. At the other end of the spectrum, nurses in Ireland and Finland report high levels of quality, although both countries have also suffered considerable economic downturns, while the performance of Norway’s well-resourced health system is where one might expect it to be.

There is no clear association of the views of nurses and patients with several plausible country-level correlates, such as nurses per capita or health expenditure as a percentage of Gross Domestic Product. Perhaps these national-level indicators do not reflect differences in hospital-level investments that our study suggests impact quality, such as better work environments and nurse staffing. The United States, for example, has fewer nurses per capita than most Organisation for Economic Co-operation and Development (OECD) countries29 but comparatively more nurses per hospitalised patient as evidenced in this study. Several high-profile initiatives have occurred in the United States recently with regard to achieving safe nurse staffing and improved work environments. Over 20 states in the United States have enacted or are considering nurse staffing legislation,[14](#_ENREF_3) and Magnet accreditation promoting improved work environments has grown to almost 400 (7%) of hospitals. Similar activity is less apparent in Europe. One National Health Service trust in England achieved Magnet status in the past but management was not supportive of retaining its designation.19 Magnet accreditation is international with recognised hospitals in Australia, New Zealand, and Singapore, among others, but there is not a single Magnet hospital in Europe or the equivalent recognition of nursing excellence.

**Potential Limitations**

A primary limitation of the study includes its reliance on cross-sectional data and the attendant problem with establishing causality, although the consistency in results across countries make them compelling. Also, while we used similar instruments to solicit information from nurses and patients in all countries, language differences might produce some differences in response that could affect our results. However, rigorous methods were used to verify the accuracy of translations and Content Validity Indexing was used to confirm the applicability of concepts across cultures and languages.20 Further, while we can link patients and nurses to the same hospitals to investigate how nursing characteristics affect patient and nurse outcomes across hospitals, we cannot link individual patients and nurses. Also, while the similarity in nurse and patient sampling in the different European countries makes comparisons across those countries reasonable, differences between the United States and the European countries should only be made cautiously, if at all, since they may be attributable to the fact that the sample of hospital nurses in the United States was broader (and included non-Medical-Surgical nurses) and the surveying of patients there was done after discharge, rather than before.

**Conclusions and Policy Implications**

Our findings provide new evidence from a large study of multiple countries that organisational behavior may be a promising area of both national and international focus to improve hospital care safety and quality as well as the retention of a qualified and committed nurse workforce. Improving the hospital work environment can be a relatively low-cost lever on improved healthcare. Indeed, our research in the United States shows that investments in better nurse staffing do not have their expected results on improving patient outcomes unless hospitals have a good work environment.12 There are best practices like Magnet Recognition that are associated with successful organisational transformations.15,19 Our findings suggest that the associations between nursing and quality and safety of hospital care are remarkably similar across Europe and in the United States, even if the aggregate levels of each measure vary among countries. Thus, innovations that are successful in improving work environments and quality of care in any of these countries may be effective elsewhere. Almost every country had one or more hospitals that nurses ranked as having good work environments, suggesting that it is feasible to replicate this success in a larger share of hospitals in every country. Improving work environments may hold significant promise for improving care and retaining a qualified and committed nurse workforce.

**Words:4026**

**Footnotes**

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Ethical approval: The European study protocol was reviewed and approved by the lead university, Catholic University of Leuven, Belgium.  Additionally, each grantee organisation in each of the 12 participating countries received ethical approval at the institutional level to conduct patient and nurse surveys. Country-level approvals were also obtained in order to acquire patient outcomes data. Data from the United States were collected under a protocol reviewed and approved by the University of Pennsylvania Institutional Review Board.

Data Sharing: No additional data available

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**Table 1. Hospitals and Nurses Surveyed in 12 European Countries and the United States**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Hospitals and Nurses Surveyed** | | | | | |
|  | **Number of -** | | **Nurses Per Hospital -** | | | |
| **Country** | **Hospitals** | **Nurses** | **Mean** | **(SD)** | **Min** | **Max** |
| Belgium | 67 | 3186 | 48 | 21 | 8 | 101 |
| England | 46 | 2918 | 63 | 26 | 6 | 126 |
| Finland | 32 | 1131 | 35 | 15 | 7 | 64 |
| Germany | 49 | 1508 | 31 | 17 | 6 | 67 |
| Greece | 24 | 367 | 15 | 7 | 5 | 32 |
| Ireland | 30 | 1406 | 47 | 14 | 19 | 82 |
| Netherlands | 28 | 2217 | 79 | 41 | 15 | 161 |
| Norway | 35 | 3752 | 107 | 65 | 25 | 245 |
| Poland | 30 | 2605 | 87 | 15 | 55 | 117 |
| Spain | 33 | 2804 | 85 | 37 | 45 | 167 |
| Sweden | 79 | 10133 | 128 | 108 | 11 | 467 |
| Switzerland | 35 | 1632 | 47 | 17 | 17 | 95 |
| *All European* | *488* | *33659* | *65* | *--* | *5* | *467* |
| United States | 617 | 27509 | 45 | 38 | 10 | 282 |
| ***Total*** | ***1105*** | ***61168*** | ***63*** | ***--*** | ***5*** | ***467*** |

**Table 2. Patients Surveyed in 8 European Countries and the United States with Corresponding Numbers of Hospitals and Nurses.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Hospitals with Patient Surveys** | | | | |
| **Country** | **Total**  **Hospitals** | **Total Patients** | **Patients per Hospital** | **Total Nurses** | **Nurses per Hospital** |
| Belgium | 60 | 2623 | 44 | 2866 | 48 |
| Finland | 32 | 1947 | 61 | 1131 | 35 |
| Germany | 12 | 244 | 20 | 504 | 42 |
| Greece | 17 | 616 | 36 | 269 | 16 |
| Ireland | 10 | 285 | 29 | 486 | 49 |
| Poland | 30 | 4136 | 138 | 2605 | 87 |
| Spain | 15 | 470 | 31 | 1181 | 79 |
| Switzerland | 34 | 997 | 29 | 1593 | 47 |
| *All European* | *210* | *11318* | *49* | *10635* | *50* |
| United States | 430 | -- | -- | 21001 | 49 |
| ***Total*** | ***640*** | ***--*** | ***--*** | ***31636*** | ***51*** |

**NOTES:** Four European countries (Sweden, England, Netherlands, Norway) did not undertake patient surveys. United States patient data are from the Hospital Compare web site and are already aggregated by hospital.

**Table 3. Nurse Staffing in 12 European Countries and the United States**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Nurse Staffing Ratio of -** | | | | |  |
| **Country** | | **Patients/RNs** | | **Patients/Total Staff** | |  |
|  | | **Mean** | **SD** | **Mean** | **SD** | **N** | |
| Belgium | | 10.7 | 2.2 | 7.9 | 1.7 | 67 | |
| England | | 8.6 | 1.5 | 4.8 | 0.6 | 46 | |
| Finland | | 8.3 | 2.2 | 5.3 | 0.8 | 32 | |
| Germany | | 13.0 | 2.3 | 10.5 | 1.6 | 49 | |
| Greece | | 10.2 | 2.8 | 6.2 | 2.1 | 24 | |
| Ireland | | 6.9 | 1.0 | 5.0 | 0.8 | 30 | |
| Netherlands | | 7.0 | 0.8 | 5.0 | 0.7 | 28 | |
| Norway | | 5.4 | 1.0 | 3.3 | 0.5 | 35 | |
| Poland | | 10.5 | 1.9 | 7.1 | 1.4 | 30 | |
| Spain | | 12.6 | 1.9 | 6.8 | 1.0 | 33 | |
| Sweden | | 7.7 | 1.1 | 4.2 | 0.6 | 79 | |
| Switzerland | | 7.9 | 1.5 | 5.0 | 1.0 | 35 | |
| United States | | 5.3 | 1.4 | 3.6 | 2.0 | 617 | |

Note: RN refers to professional registered nurses. Total staff equals RNs plus lesser trained care personnel. N = number of hospitals.

**Table 4. Nurse Outcomes in 12 European Countries and the United States**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Nurse Reports – Number and Percent (in Parentheses) of Nurses Who -** | | | | | | | | | | | | | |
| **Country** | **Report**  **poor or fair ward quality** | | **Report**  **poor or failing safety grade** | | **Are burned out** | | **Are dissatisfied with their job** | | **Intend to leave** | | **Are not confident patients can manage care** | | **Are not confident that management resolves patient problems** | |
| Belgium | 886/3167 | (28) | 199/3150 | ( 6) | 730/2938 | ( 25) | 680/3159 | ( 22) | 934/3164 | ( 30) | 1921/3153 | ( 61) | 2518/3134 | ( 80) |
| England | 540/2899 | ( 19) | 191/2895 | ( 7) | 1138/2699 | ( 42) | 1136/2904 | ( 39) | 1261/2896 | ( 44) | 981/2901 | ( 34) | 1856/2893 | ( 64) |
| Finland | 141/1099 | ( 13) | 76/1095 | ( 7) | 232/1047 | ( 22) | 300/1114 | ( 27) | 546/1111 | ( 49) | 441/1098 | ( 40) | 890/1094 | ( 81) |
| Germany | 526/1507 | ( 35) | 94/1506 | ( 6) | 431/1430 | ( 30) | 561/1505 | ( 37) | 539/1498 | ( 36) | 473/1505 | ( 31) | 879/1504 | ( 58) |
| Greece | 170/361 | ( 47) | 61/358 | ( 17) | 246/315 | ( 78) | 199/358 | ( 56) | 177/358 | ( 49) | 231/358 | ( 65) | 311/356 | ( 87) |
| Ireland | 152/1389 | ( 11) | 117/1385 | ( 8) | 536/1293 | ( 41) | 581/1383 | ( 42) | 612/1380 | ( 44) | 588/1385 | ( 42) | 872/1381 | ( 63) |
| Netherlands | 756/2185 | ( 35) | 123/2187 | ( 6) | 211/2061 | ( 10) | 240/2188 | ( 11) | 418/2197 | ( 19) | 889/2195 | ( 41) | 1781/2200 | ( 81) |
| Norway | 468/3732 | ( 13) | 199/3712 | ( 5) | 823/3501 | ( 24) | 773/3729 | ( 21) | 942/3712 | ( 25) | 2097/3710 | ( 57) | 2739/3698 | ( 74) |
| Poland | 683/2581 | ( 26) | 463/2579 | ( 18) | 929/2321 | ( 40) | 663/2584 | ( 26) | 1056/2387 | ( 44) | 1890/2571 | ( 74) | 2196/2571 | ( 85) |
| Spain | 897/2794 | ( 32) | 173/2784 | ( 6) | 787/2670 | ( 29) | 1053/2786 | ( 38) | 740/2774 | ( 27) | 1554/2779 | ( 56) | 2370/2767 | ( 86) |
| Sweden | 2750/10051 | ( 27) | 1117/10035 | ( 11) | 2788/9477 | ( 29) | 2251/10027 | ( 22) | 3418/10013 | ( 34) | 2833/9995 | ( 28) | 7308/9988 | ( 73) |
| Switzerland | 324/1604 | ( 20) | 71/1606 | ( 4) | 228/1563 | ( 15) | 338/1610 | ( 21) | 447/1623 | ( 28) | 564/1612 | ( 35) | 1216/1612 | ( 75) |
| United States | 4196/26316 | (16) | 1628/26772 | (6) | 9122/27163 | (34) | 6692/26935 | (25) | 3767/27232 | (14) | 11449/25110 | (46) | 15240/26717 | (57) |

**Table 5. Patient Outcomes in 12 European Countries and the United States**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Patient Reports – Number and Percentage (in Parentheses) of Patients Who** | | | | | | | | | |
| **Country** | **Rate hospital**  **9 or 10** | | **Would definitely recommend hospital** | | **Say nurses always treat them with respect** | | **Say nurses always listen carefully to them** | | **Say nurses always explain things in a way they could understand** | |
| **Belgium** | 1179/2510 | ( 47) | 1483/2461 | ( 60) | 1980/2612 | ( 76) | 1515/2612 | ( 58) | 1389/2603 | ( 53) |
| **Finland** | 1128/1862 | ( 61) | 1246/1851 | ( 67) | 1399/1927 | ( 73) | 1116/1916 | ( 58) | 1158/1919 | ( 60) |
| **Germany** | 116/240 | ( 48) | 161/243 | ( 66) | 181/241 | ( 75) | 125/240 | ( 52) | 121/242 | ( 50) |
| **Greece** | 253/597 | ( 42) | 325/613 | ( 53) | 462/616 | ( 75) | 402/614 | ( 65) | 240/614 | ( 39) |
| **Ireland** | 171/282 | ( 61) | 206/278 | ( 74) | 244/284 | ( 86) | 197/281 | ( 70) | 188/284 | ( 66) |
| **Poland** | 2182/3979 | ( 55) | 2287/4028 | ( 57) | 3135/4112 | ( 76) | 2864/4116 | ( 70) | 2693/4103 | ( 66) |
| **Spain** | 166/469 | ( 35) | 243/438 | ( 55) | 354/463 | ( 76) | 298/464 | ( 64) | 284/465 | ( 61) |
| **Switzerland** | 587/976 | ( 60) | 761/980 | ( 78) | 842/988 | ( 85) | 693/987 | ( 70) | 690/984 | ( 70) |
| **United States** | -- | (59) | -- | (64) | -- |  | -- |  | -- |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 6. Odds Ratios Indicating the Effects of Nurse Staffing and the Nurse Work Environment on Nurse Outcomes and Nurse Reported Quality of Care in Hospitals in Europe and the United States, with Confidence Intervals** | | | | | | | | | |
|  |  | **Europe** | | | | **United States** | | | |
|  |  | **Odds Ratios from Models in Which Effects Are -** | | | | **Odds Ratios from Models in Which Effects Are -** | | | |
|  |  | **Unadjusted** | | **Adjusted** | | **Unadjusted** | | **Adjusted** | |
| **Outcome** | **Effect** | **OR** | **[95% CI]** | **OR** | **[95% CI]** | **OR** | **[95% CI]** | **OR** | **[95% CI]** |
| **Poor/Fair Unit Quality** | **Practice Environment** | 0.58 | (0.53 to 0.63) | 0.56 | (0.51 to 0.61) | 0.52 | (0.49 to 0.56) | 0.54 | (0.51 to 0.58) |
|  | **Staffing** | 1.11 | (1.08 to 1.13) | 1.11 | (1.07 to 1.15) | 1.2 | (1.16 to 1.25) | 1.06 | (1.03 to 1.1) |
| **Poor/Failing Safety Grade** | **Practice Environment** | 0.5 | (0.43 to 0.57) | 0.5 | (0.44 to 0.56) | 0.53 | (0.48 to 0.59) | 0.55 | (0.5 to 0.61) |
|  | **Staffing** | 1.04 | (1.01 to 1.08) | 1.1 | (1.05 to 1.16) | 1.18 | (1.12 to 1.23) | 1.05 | (1 to 1.1) |
| **High Burnout** | **Practice Environment** | 0.69 | (0.63 to 0.76) | 0.67 | (0.61 to 0.73) | 0.69 | (0.66 to 0.73) | 0.71 | (0.68 to 0.75) |
|  | **Staffing** | 1.06 | (1.04 to 1.08) | 1.05 | (1.02 to 1.09) | 1.12 | (1.08 to 1.15) | 1.03 | (1 to 1.06) |
| **Job Dissatisfaction** | **Practice Environment** | 0.63 | (0.57 to 0.69) | 0.52 | (0.47 to 0.57) | 0.58 | (0.55 to 0.61) | 0.6 | (0.57 to 0.64) |
|  | **Staffing** | 1.1 | (1.08 to 1.12) | 1.07 | (1.04 to 1.11) | 1.17 | (1.13 to 1.21) | 1.06 | (1.03 to 1.09) |
| **Intent to Leave** | **Practice Environment** | 0.72 | (0.66 to 0.79) | 0.61 | (0.56 to 0.67) | 0.7 | (0.65 to 0.76) | 0.69 | (0.64 to 0.75) |
|  | **Staffing** | 1.04 | (1.01 to 1.06) | 1.05 | (1.02 to 1.09) | 1.1 | (1.05 to 1.15) | 1.03 | (0.98 to 1.08) |
| **Not Confident patients can manage care** | **Practice Environment** | 0.62 | (0.56 to 0.69) | 0.73 | (0.69 to 0.78) | 0.71 | (0.67 to 0.75) | 0.72 | (0.68 to 0.77) |
|  | **Staffing** | 1.08 | (1.05 to 1.11) | 1.03 | (1 to 1.05) | 1.1 | (1.06 to 1.13) | 1.04 | (1.01 to 1.07) |
| **Not Confident Mgmt. resolves patient problems** | **Practice Environment** | 0.5 | (0.46 to 0.54) | 0.53 | (0.48 to 0.58) | 0.56 | (0.53 to 0.59) | 0.56 | (0.54 to 0.59) |
|  | **Staffing** | 1.04 | (1.01 to 1.07) | 1.02 | (0.98 to 1.06) | 1.12 | (1.09 to 1.17) | 1.01 | (0.98 to 1.03) |

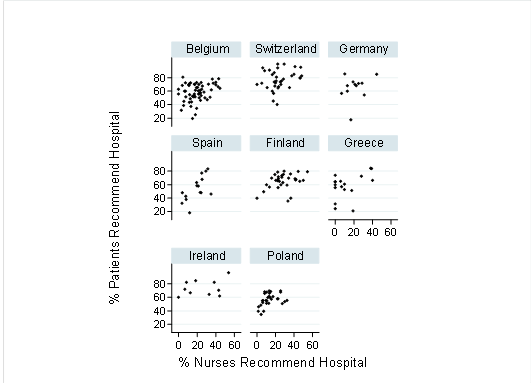
NOTES: Huber-White Cluster correction used for standard errors. Controls include hospital characteristics (teaching status, high technology, bed size), nurse characteristics (age, sex, and full time employment status), specialty of unit, and country.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 7. Unadjusted and Adjusted Odds Ratios Indicating the Effects of Nursing Factors and Nurse Characteristics on Patient Outcomes in Europe and the United States** | | | | | | | | | | | | |
|  | **Rating Hospital 9 or 10** | | | | **Definitely Recommending Hospital** | | | | **Favourable Nurse Communication** | | | |
|  | **Unadjusted** | | **Adjusted** | | **Unadjusted** | | **Adjusted** | | **Unadjusted** | | **Adjusted** | |
| **Factors** | **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** |
| **Europe** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Patient-to-Nurse Ratio** | 0.91 | (0.88 to 0.94) | 0.94 | (0.91 to 0.97) | 0.9 | (0.87 to 0.93) | 0.95 | (0.91 to 0.98) | 0.98 | (0.95 to 1.01) | 0.99 | (0.96 to 1.02) |
| **Nurse Work Environment** | 1.24 | (1.11 to 1.38) | 1.16 | (1.03 to 1.32) | 1.41 | (1.22 to 1.62) | 1.2 | (1.05 to 1.37) | 1.05 | (0.93 to 1.19) | 1.11 | (1 to 1.23) |
| **10 Percent Increase in Nurses That -** |  |  |  |  |  |  |  |  |  |  |  |  |
| **- Report Hospital Care is Fair or Poor** | 0.83 | (0.8 to 0.87) | 0.88 | (0.84 to 0.92) | 0.85 | (0.8 to 0.89) | 0.87 | (0.82 to 0.92) | 0.93 | (0.88 to 0.97) | 0.94 | (0.9 to 0.98) |
| **- Report Patient Safety Grade is Poor/Failing** | 0.9 | (0.83 to 0.98) | 0.85 | (0.77 to 0.94) | 0.79 | (0.73 to 0.86) | 0.85 | (0.76 to 0.94) | 1.06 | (0.99 to 1.13) | 0.93 | (0.87 to 0.99) |
| **-Have High Burnout** | 0.92 | (0.89 to 0.96) | 0.93 | (0.88 to 0.97) | 0.89 | (0.85 to 0.94) | 0.94 | (0.89 to 1) | 0.97 | (0.93 to 1.01) | 0.95 | (0.91 to 1) |
| **-Are Dissatisfied with Job** | 0.9 | (0.86 to 0.94) | 0.92 | (0.87 to 0.96) | 0.91 | (0.86 to 0.97) | 0.91 | (0.87 to 0.96) | 0.92 | (0.88 to 0.96) | 0.95 | (0.91 to 0.98) |
| **-Intend to Leave** | 0.98 | (0.93 to 1.04) | 0.91 | (0.85 to 0.98) | 0.93 | (0.87 to 0.98) | 0.92 | (0.86 to 0.98) | 0.95 | (0.91 to 1) | 0.95 | (0.91 to 0.99) |
| **- Lack Confidence Mgmt. Can Resolve Problems** | 0.97 | (0.92 to 1.02) | 0.96 | (0.9 to 1.02) | 0.91 | (0.85 to 0.97) | 0.95 | (0.89 to 1.01) | 0.99 | (0.93 to 1.05) | 0.95 | (0.9 to 0.99) |
| **- Lack Confidence Patients Can Manage Care** | 0.93 | (0.89 to 0.97) | 0.91 | (0.85 to 0.97) | 0.86 | (0.82 to 0.89) | 0.91 | (0.86 to 0.98) | 1.03 | (0.98 to 1.07) | 0.92 | (0.87 to 0.97) |
| **United States** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Patient-to-Nurse Ratio** | 0.95 | (0.93 to 0.97) | 0.96 | (0.94 to 0.98) | 0.93 | (0.91 to 0.96) | 0.95 | (0.92 to 0.97) | 1 | (0.98 to 1.02) | 1 | (0.98 to 1.02) |
| **Nurse Work Environment** | 1.23 | (1.18 to 1.29) | 1.18 | (1.13 to 1.23) | 1.3 | (1.23 to 1.37) | 1.23 | (1.17 to 1.29) | 1.1 | (1.05 to 1.14) | 1.06 | (1.02 to 1.1) |
| **10 Percent increase in Nurses That-** |  |  |  |  |  |  |  |  |  |  |  |  |
| **- Report Hospital Care is Fair or Poor** | 0.85 | (0.83 to 0.88) | 0.88 | (0.86 to 0.9) | 0.84 | (0.81 to 0.87) | 0.87 | (0.84 to 0.89) | 0.9 | (0.87 to 0.92) | 0.93 | (0.9 to 0.95) |
| **- Report Patient Safety Grade is Poor/Failing** | 0.79 | (0.75 to 0.84) | 0.84 | (0.79 to 0.88) | 0.77 | (0.72 to 0.82) | 0.83 | (0.78 to 0.88) | 0.86 | (0.81 to 0.9) | 0.9 | (0.86 to 0.94) |
| **-Have High Burnout** | 0.92 | (0.89 to 0.94) | 0.93 | (0.91 to 0.96) | 0.91 | (0.88 to 0.94) | 0.93 | (0.9 to 0.96) | 0.97 | (0.94 to 0.99) | 0.98 | (0.96 to 1.01) |
| **-Are Dissatisfied with Job** | 0.89 | (0.86 to 0.91) | 0.91 | (0.89 to 0.94) | 0.86 | (0.84 to 0.89) | 0.89 | (0.86 to 0.92) | 0.95 | (0.93 to 0.98) | 0.97 | (0.95 to 1) |
| **-Intend to Leave** | 0.88 | (0.85 to 0.91) | 0.92 | (0.89 to 0.95) | 0.87 | (0.83 to 0.91) | 0.91 | (0.88 to 0.95) | 0.9 | (0.87 to 0.93) | 0.95 | (0.92 to 0.98) |
| **- Lack Confidence Mgmt. Can Resolve Problems** | 0.91 | (0.89 to 0.93) | 0.92 | (0.9 to 0.94) | 0.89 | (0.87 to 0.92) | 0.91 | (0.88 to 0.93) | 0.96 | (0.94 to 0.98) | 0.97 | (0.95 to 0.98) |
| **-Lack Confidence Patients Can Manage Care** | 0.88 | (0.86 to 0.9) | 0.9 | (0.88 to 0.92) | 0.87 | (0.84 to 0.89) | 0.89 | (0.87 to 0.91) | 0.93 | (0.91 to 0.95) | 0.95 | (0.93 to 0.97) |

NOTES: Controls include hospital characteristics (teaching status, high technology, bed size). Odds ratios for United States hospitals were estimated “about” the mean odds ratio using coefficients from linear regression models as individual data are not available.

**Figure 1. Percent Patients Recommending Each Hospital by**

**Nurses Recommending Each Hospital**



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Appendix Table 1: Response Rates for the Nurse and Patient Surveys for the European Samples** | | | | | | | | |
|  | **Nurse survey** | | |  | **Patient survey** | | | |
| **Country** | **Distributed** | **Retrieved** | **Response Rate** |  | **Distributed** | **Retrieved** | | **Response Rate** |
| **Belgium** | 4421 | 3186 | 72.1 |  | 3870 | | 2623 | 67.8 |
| **England** | 7741 | 29901 | 38.6 |  |  | |  |  |
| **Finland** | 2450 | 1131 | 46.2 |  | 3752 | | 1947 | 51.9 |
| **Germany** | 3628 | 1508 | 41.6 |  | 390 | | 2622 | 67.2 |
| **Greece** | 675 | 367 | 54.4 |  | 1334 | | 616 | 46.2 |
| **Ireland** | 2495 | 1406 | 56.4 |  | 307 | | 285 | 92.8 |
| **Netherlands** | 3228 | 2217 | 68.7 |  |  | |  |  |
| **Norway** | 6600 | 3752 | 56.9 |  |  | |  |  |
| **Poland** | 2677 | 2605 | 97.3 |  | 4416 | | 4136 | 93.7 |
| **Spain** | 3340 | 2804 | 84.0 |  | N/A | | 470 |  |
| **Sweden** | 14624 | 10133 | 69.3 |  |  | |  |  |
| **Switzerland** | 2261 | 1632 | 72.2 |  | 1458 | | 997 | 68.4 |
| Total | 54140 | 33731 | 62.3 |  | 15527 | | 11336 | 73.03 |
| 1. Includes nurses with missing hospital identifiers excluded from analysis 2. Includes patient from hospitals without nurse data excluded from analysis 3. Calculated without Spain. | | | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Appendix Table 2: Hospital Response Rates in European Countries** | | | | | | |
| **Country** | **Eligible hospitals** | **Target number of hospitals** | **Number of hospitals invited** | **Number of hospitals in general study** | **Number of hospitals in patient survey** | **Response rate** |
| **Belgium** | 104 | 30 | 104 | 56\* | 51 | 53.85 |
| **England** | 135 | 32 | 62 | 32\* | - | 51.61 |
| **Finland** | 49 | 34 | 34 | 32\* | 32 | 94.12 |
| **Germany** | 1104 | 31 | 100 | 49 | 13 | 49.00 |
| **Greece** | 110 | 29 | 57 | 24 | 17 | 42.11 |
| **Ireland** | 33 | 33 | 33 | 30 | 10 | 90.91 |
| **Netherlands** | 65 | 30 | 62 | 23\* | - | 37.10 |
| **Norway** | 36 | 36 | 36 | 35 | - | 97.22 |
| **Poland** | 195 | 30 | 32 | 30 | 30 | 93.75 |
| **Spain** | 185 | 34 | 37 | 33 | 13 | 89.19 |
| **Sweden** | N/A | N/A | N/A | 79 | - |  |
| **Switzerland** | 88 | 35 | 41 | 35 | 34 | 85.37 |
| **Total** | 2104 | 354 | 598 | 459 | 200 | 63.55\*\* |

\*Counts include multiple facility hospital groups and may differ from counts of individual hospitals in sample.

\*\* Rate calculated without Sweden.