Rationing of Nursing Care:
Associations with Patient Safety and Quality of Hospital Care

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Rationing of Nursing Care:
Associations with Patient Safety and Quality of Hospital Care

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Summary

Ongoing developments in healthcare, such as economic and demographic changes, technological and medical advances, contribute to continuous cost increases. Cost cutting-strategies include, reductions in lengths of stay and smaller personnel budgets, which have limited the number of nurses, leading to shortfalls in their supply, particularly in hospitals. Yet, as a parallel development, average inpatient acuity and complexity have increased, along with the intensity of nursing services required.

Faced with escalating need and dwindling resources, nurses are forced to ration their attention across their patients, minimizing or omitting certain tasks, thereby increasing the risk of negative patient outcomes. Internationally, studies have shown significant relationships between decreased nurse practice environment quality, nurse staffing levels and skill mixes, and increased numbers of adverse events or outcomes (medication errors, falls, nosocomial infections, pressure scores, "failure-to-rescue" events, and mortality rates). Furthermore, certain features of negative nurse practice environments show significant associations with job dissatisfaction, burnout, work-related injuries and staff turnover.

Despite indications that prioritizing and rationing of nursing care due to scarce nursing resources are prominent issues, the associations between rationing and patient and nurse outcomes had not, until very recently, been systematically studied. As a result, no concise definition, conceptual framework or measurement instrument were available on the topic. Filling these gaps was the aim of the Rationing of Nursing Care in Switzerland Study (RICH Nursing Study) and with it of this research program. This make up the Swiss component of the International Hospital Outcomes Study (the IHOS), an international study of the organization of nursing care in hospitals and its impact on patient outcomes.

The aims of this research program were (1) to develop a conceptual framework of implicit rationing of nursing care and an instrument to measure it as an empirical factor; (2) to evaluate the psychometric properties of the newly developed instrument; (3) to explore the association between implicit rationing of nursing care in Swiss acute care hospitals and patient outcomes, with consideration for major organisational variables; (4) to describe the levels of implicit rationing of nursing care in a sample of Swiss acute care hospitals and to identify clinically meaningful thresholds of rationing; and (5) to compare sharp-device injury rates among hospital staff nurses in four Western countries (IHOS study).

The research program consists of a literature review and four cross- sectional studies to address the aforementioned gaps and to achieve its other aims. Three of these studies incorporate data from the RICH Nursing Study; one incorporates data of the IHOS study.

As first steps, a definition of implicit rationing of nursing care, a conceptual framework and the Basel Extent of Rationing of Nursing Care (BERNCA) Instrument were developed. The new framework builds upon the conceptual framework of the IHOS study along with empirical findings on decision-making and prioritization of nursing care. It describes the associations between rationing of nursing care, the known organisational system factors (indicated to be significant correlates of outcomes) and patient and nurse outcomes. Several of the presumed associations are explored. The newly developed BERNCA instrument includes 20 questions on necessary nursing tasks indicated in the literature and / or the clinical experience of the research team as those most likely omitted during nursing resource shortfalls.

The first study was conducted to evaluate the validity and reliability of the BERNCA instrument. Cross-sectional data of a convenience sample of 957 nurses working in five Swiss acute care hospitals of the RICH Nursing Study were used to test the psychometric properties of the instrument, along lines of evidence suggested in *Standards for educational and psychological testing* (Association American Educational Research Association, American Psychological Association, National Council on Measurement in Education). This testing provided initial evidence of the instrument's validity and reliability. Evidence based on test content was established by 20 nursing experts of the German speaking area of Switzerland, confirming that the BERNCA represented the domain of implicit rationing of nursing care. The evidence based internal structure was confirmed with explanatory factor analysis, which showed one dominant factor accounting for 42% of the total item variance and stable to very stable factor loadings for all twenty items (loadings > 0.5). Cronbach`s alpha of 0.92 and average inter-item correlations of 0.39 (range: 0.19 - 0.63) indicated that the instrument's internal consistency was moderate to strong. Evidence based on relations with other variables was confirmed for the related construct quality of the nurse work environment, particularly the underlying dimension 'perceived adequacy of staffing and skill mix', which were moderately skewed correlated with rationing (r=-0.46). The relation with the concept of the patient-to-nurse ratio was only partly confirmed, as this construct showed only very low, though significant, associations with rationing (r= -0.14).

The second study focused on the relationship between implicit rationing of nursing care and selected patient outcomes in Swiss acute care hospitals, adjusting for major organizational variables. A cross-sectional multicenter design was used, including data from convenience samples of 1338 working nurses and 779 hospitalized patients of eight Swiss acute care hospitals (5 German, 3 French) of the RICH Nursing Study. Rationing was measured with the new BERNCA instrument. Data on the quality of the nurse work environment, patient-to-nurse staffing ratio, frequency of adverse events and complications were measured by nurse reports, using questionnaires from the IHOS battery. Patient-reported satisfaction with care and health were measured with two specially developed questions. Given the natural clustering of the data, the effects of implicit rationing of nursing care and organizational characteristics (the two nurse work environment dimensions: Resources, Collaboration; patient-to-nurse staffing ratio) on the selected patient outcomes were assessed using multilevel multivariate regression analyses, with the unit included as a random effect. Although average rationing level was low (slightly below rarely), in both the unadjusted and adjusted models, implicit rationing of nursing care was the only factor significantly related with all six studied patient outcomes.

In the full models, a 0.5 unit increase in rationing scores was associated with moderate to high increases in the odds of nurses reporting that medication errors (OR 1.68), falls (OR2.81), nosocomial infections (OR 1.61), critical incidents (OR 1.10), and pressure ulcers (1.15) had occurred regularly over the past year. Further, it was marginally, though significantly, related with a 37% decrease in the odds ratio of patients reporting high satisfaction with the care they had received. Of the other major organisational variables, only ‘adequacy of nursing resources and autonomy’ was significantly related with five of the six patient outcomes in the unadjusted models. Apart from a marginally-significant association with nosocomial infections, none of these were sustained in the adjusted models. Likewise, the patient-to-nurse staffing ratio was not significantly associated with any of the studied patient outcomes. These results indicate that implicit rationing of nursing care is an important factor – one which is directly linked with patient outcomes, and which may partially explain the affects of patient–to-nurse staffing ratios and nurse work environment factors on the studied outcomes. These points merit further study.

The third study was conducted to identify clinically meaningful rationing thresholds. Given the demonstrated significant association between rationing and patient outcomes, in view of quality of patient care and patient safety, it is important to know the levels when rationing begins to impair the studied patient outcomes. This study again used cross sectional multicenter nurse (n=1138) and patient survey data (n=779) from the RICH Nursing Study. For the definition of

the thresholds, the BERNCA scores were recoded into 6 levels: 0, 0.5, 1.0, 1.5, 2.0, ≥ 2.5. Due to the skewed distribution of the adverse event measures, two separate dichotomization approaches were used to gain a fuller understanding of the underlying patterns. In the first, responses corresponding to "ever" (i.e., 'rarely', 'sometimes', or 'often') were contrasted with reports of 'never'. In the second dichotomization, responses corresponding to "regularly" (i.e., 'sometimes' or 'often') were contrasted of those implying "infrequently or less" (i.e., 'rarely' or 'never'). Using the first dichotomization approach, a rationing level of '0.5' was significantly associated with high increases in the odds-ratio of nurses reporting nosocomial infections and pressure ulcers (OR 2.38, 3.80) along with low patient satisfaction with care (OR 0.43). A level of '1' was significantly linked with increases in the odds-ratio of nurses reporting critical incidents and medication errors (OR 2.50, 4.62), and a level of '2' with nurses reporting patient falls (OR 5.35). Using the second dichotomization, the same pattern was revealed, but the identified thresholds associated with elevated risk of frequent adverse events were approximately one half point higher. Regardless of the dichotomization, results showed that five of the six studied patient outcomes were negatively affected even by very low rationing levels (very rarely, rarely). Therefore, with regard to quality of patient care and safety, it is recommended that hospitals avoid rationing as far as feasible.

The fourth study was conducted to evaluate rates and risk factors for sharp-device injuries in medical-surgical hospital nurses across 4 countries. Cross-sectional data from the IHOS study regarding 34,318 nurses working in 1998-1999 in acute care hospitals in the United States (Pennsylvania), Canada (Alberta, British Columbia, and Ontario), the United Kingdom (England and Scotland) and Germany were used. Injury incidence, risky procedures and use of safety-engineered equipment were collected with validated questionnaires. The retrospectively-reported needlestick injuries of the previous year for medical-surgical unit nurses ranged from 146 injuries per 1000 full-time equivalent (FTE) positions in the US sample to 488 per 1000 FTEs in Germany. Very high rates of sharp-device injury (255 and 569 injuries per 1000 FTEs per year, respectively) were observed among nurses working in operating room/ perioperative care in the U.S. and Canada. These differences in injury rates may be due to the considerably lower use of safety-engineered sharps in Germany and Canada than in the United States.

The results of this research program contributed to evidence regarding organisational system factors associated with patient outcomes. First, for the new empirical factor implicit rationing of nursing care, used in accordance with the conceptual framework outlined above, the BERNCA instrument provides a reliable and valid measurement of this factor in acute care hospitals.

Second, the program's results highlight the importance of the newly-identified organizational system factor of implicit rationing of nursing care with regard to patient health and safety, which appears to be directly linked to patient outcomes, as well as to reflect processes in acute care nursing and conditions on the front lines of care delivery. Third, the identified clinically meaningful threshold levels provide parameters for clinicians, administrators and policy makers to track negative effects of low resources, or difficulties in allocating those resources, on patient outcomes. Whenever rationing exceeds tolerable levels, interventions can be launched. Further, the threshold levels can be used to determine the minimum staffing and skill mix levels necessary to achieve desired patient outcomes. Fourth, the high sharps injury rates in the last year in certain groups of hospital staff nurses across the four participating countries, which seems to be affected by the adoption of safety devices, indicate the need for a wider dissemination of safe technology, as well as the introduction and stronger enforcement of occupational safety and health regulations.

Future research on implicit rationing of nursing care is needed to confirm the results of this research program in other countries and acute care settings with different patient acuity and complexity levels. This research should incorporate prospectively collected longitudinal data on staffing and outcomes, which are sensitive to nursing care and enable the linking of rationing, patient acuity and complexity levels with precise nurse staffing measures at the unit level, while allowing causal inferences about the identified associations and interrelations. Furthermore, given the demonstrated relevance of the new empirical factor of rationing of nursing care to the quality of patient care and safety and the need for knowledge about the underlying processes, further studies, with, for example, mixed method approaches, are needed to develop a deeper understanding of the decision making, clinical judgement and triage strategies nurses use to prioritize the care and to distribute scarce resources among their patients.

Zusammenfassung

Aktuelle Entwicklungen im Gesundheitswesen wie die ökonomischen und demographischen Veränderungen, der technologische und der medizinische Fortschritt tragen zu kontinuierlich ansteigenden Kosten bei. Kosteneinsparungsstrategien, die unter anderem kürzere Spitalaufenthalte und kleinere Personalbudgets beinhalten, haben zu einer Reduktion der Anzahl Pflegender und insbesondere in den Spitälern zu einem Mangel an verfügbaren Pflegeleistungen geführt. Gleichzeitig sind der durchschnittliche Schweregrad und die Komplexität der Erkrankung der stationären Patienten angestiegen, was mit einem gestiegenen Pflegebedarf einhergeht.
Dieser gestiegene Pflegebedarf und die abnehmenden Ressourcen zwingen Pflegepersonen, die ihren Patienten entgegen gebrachte Aufmerksamkeit zu rationieren und bestimmte pflegerische Massnahmen zu reduzieren oder ganz auszulassen. Dadurch steigt das Risiko für negative Patientenergebnisse zu erhalten an. Internationale Studien haben signifikante Zusammenhänge zwischen einer tieferen Anzahl an Pflegepersonen und Fachkompetenz in Pflegeteams, einer schlechteren Arbeitsumgebungsqualität, und einer höheren Anzahl an potentiell für die Patienten nachteiligen Ereignissen (Medikamentenfehler, Stürze, nosokomiale Infektionen, Dekubitalulcera, Failure-to-Rescue und Mortalitätsraten) gezeigt. Im Weiteren zeigten diese Studien signifikante Zusammenhänge zwischen bestimmten negativen Merkmalen in der Arbeitsumgebung der Pflegepersonen und der Arbeitsunzufriedenheit, Burnout, arbeitsbedingten Verletzungen und Fluktuation beim Pflegepersonal.

Trotz Anhaltspunkte dafür, dass aufgrund knapper Ressourcen, Prioritätensetzung und Rationierung von Pflege eine vordergründige Thematik sind, wurden die Zusammenhänge zwischen der Rationierung von Pflege und den Ergebnissen bei Patienten und Pflegepersonen bisher noch nicht systematisch untersucht. Demzufolge war keine präzise Definition, kein konzeptueller Rahmen und kein Messinstrument zu dieser Thematik verfügbar. Das Ziel der Rationing of Nursing Care in Switzerland Study (RICH Nursing Study) und dieses Forschungsprogramms war es diese Lücke zu schliessen. Die RICH Nursing Studie entspricht dem Schweizer Zweig der International Hospital Outcomes Study (IHOS), einer internationalen Studie, die die Zusammenhänge zwischen Organisation der Pflege in Spitälern und deren Auswirkungen auf die Patientenergebnisse untersucht.

Die Ziele dieses Forschungsprogramms waren es (1) einen konzeptuellen Rahmen von impliziter Rationierung von Pflege und ein Instrument, um die implizite Rationierung messen zu können, zu entwickeln; (2) die psychometrischen Eigenschaften dieses neu entwickelten Instruments zu überprüfen; (3) die Zusammenhänge zwischen der impliziten Rationierung von Pflege in

Schweizer Akutspitälern und den Patientenergebnissen, unter Berücksichtigung bedeutender organisatorischer Variablen zu untersuchen; (4) das Ausmass an impliziter Rationierung von Pflege in einer Stichprobe von Schweizer Akutspitälern zu beschreiben und einen klinisch bedeutungsvollen Grenzwert für die Rationierung zu definieren; und (5) die durch scharfe Gegenstände verursachten Verletzungsraten beim Pflegepersonal in vier westeuropäischen Ländern (IHOS Studie) zu vergleichen.

Um die oben genannten Lücken anzugehen und die angestrebten Ziele zu erreichen, besteht das Forschungsprogramm aus einer Literaturanalyse und vier Querschnittsstudien In drei dieser Studien werden Daten der RICH Nursing Studie und in einer Studie Daten der IHOS Studie verwendet.
Als erste Schritte wurden eine Definition der impliziten Rationierung von Pflege, ein konzeptueller Rahmen und das Basel Extent of Rationing of Nursing Care (BERNCA) Instrument entwickelt. Der neue konzeptuelle Rahmen baut auf dem konzeptuellen Rahmen der IHOS Studie, sowie auf empirische Ergebnisse zur Entscheidungsfindung und Prioritätensetzung in der Pflege auf. Er beschreibt die Zusammenhänge zwischen der Rationierung von Pflege, bekannten organisatorischen Systemfaktoren (die nachweislich signifikant mit den Ergebnissen korrelieren), Hintergrundvariablen und den Ergebnissen von Patienten und Pflegefachpersonen. Mehrere der angenommen Zusammenhänge wurden in diesem Forschungsprogramm untersucht. Das neu entwickelte BERNCA Instrument enthält 20 Fragen zu notwendigen pflegerischen Massnahmen, die gemäss der vorhandenen Evidenz und / oder den klinischen Erfahrungen des Forschungsteams bei einem Mangel an pflegerischen Ressourcen am ehesten eingeschränkt oder ausgelassen werden.

Die erste Studie wurde durchgeführt um die Validität und Reliabilität des BERNCA Instruments zu überprüfen. In dieser wurden Querschnittsdaten einer Gelegenheitsstichprobe von 957 Pflegefachpersonen aus den fünf Schweizer Akutspitälern der deutschsprachigen Schweiz der RICH Nursing Studie verwendet. Die psychometrischen Eigenschaften des Instruments wurden entlang einer Reihe von Evidenzen, wie sie in den *Standards for educational and psychological testing* (American Educational Research Association) American Psychological Association, National Council on Measurement in Education) beschrieben werden, getestet.
Diese Überprüfung bestätigt die initiale Validität und Reliabilität des Instrumentes. Die Evidenz bezogen auf den Inhalt wurde von 20 Pflegexpertinnen / Experten aus der Deutschschweiz bestätigt, die bestätigten, dass das BERNCA Instrument die Domäne der impliziten Rationierung

von Pflege repräsentiert. Die Evidenz basierend auf die interne Struktur wurde mittels einer erklärenden Faktoranalyse bestätigt. Diese zeigte einen dominierenden Faktor, der 42 % der Gesamtvarianz erklärte und bei alle zwanzig Items stabile Faktorladungen von > 0.5 aufwies. Der gemessene Cronbach`s Alpha Wert von 0.92 und die durchschnittliche Inter- item Korrelation von 0.39 (Reichweite: 0.19 - 0.63) zeigen, dass das Instrument eine mässig bis starke interne Konsistenz aufweist. Die Evidenz basierend auf die Relation zu anderen Variablen, wurde für das mit der Rationierung in Beziehung stehende Konzept ‚Arbeitsumgebung des Pflegepersonals', insbesondere für der diesem Konzept zugrundeliegende Dimension 'wahrgenommene Adäquatheit der Stellenbesetzung und Fachkompetenz' bestätigt. Diese korrelierte wie angenommen moderat mit der Rationierung (r=-0.46). Die Beziehung zwischen der Rationierung und dem Konzept Stellenbesetzungslevel - Anzahl Patienten / pro Pflegeperson- wurde nur teilweise bestätigt, da diese beiden Konstrukte zwar signifikant, jedoch nur sehr tief miteinander korrelierten (r= -0.14).

Die zweite Studie untersuchte die Zusammenhänge zwischen der impliziten Rationierung von Pflege und ausgewählten Patientenergebnissen, unter Berücksichtigung von bedeutenden organisatorischen Variablen. Es wurde ein Multicenter - Querschnittsstudien Design angewandt. In diese Studie eingeschlossen wurden Daten der RICH Nursing Studie von Gelegenheitsstichproben von 1338 Pflegefachpersonen und 779 Patienten, die in acht schweizerischen Akutspitälern (5 Deutsch, 3 Französisch) arbeiteten, respektive betreut wurden. Die Rationierung wurde mit dem neuen BERNCA Instrument gemessen. Daten zur Qualität der Arbeitsumgebung des Pflegepersonals, der Anzahl zu betreuender Patienten pro Pflegefachperson, der Häufigkeit des Vorkommens von ungünstigen Ereignissen und Komplikationen bei Patienten, wurden durch die Befragung der Pflegepersonen mit Fragebogen aus der IHOS Studie eingeschätzt. Die von den Patienten berichtete Patientenzufriedenheit mit der Pflege und die Gesundheit wurden mit zwei speziell hierfür entwickelten Fragen gemessen. Aufgrund der natürlich vorgegebenen Gruppierung der Daten wurde unter Anwendung multivariater Regressionsanalysen die Auswirkungen der Rationierung von Pflege, organisatorische Charakteristika (die zwei Dimensionen der Arbeitsumgebung des Pflegepersonals: 1) Ressourcen, 2) Zusammenarbeit; Stellenbesetzungslevel - Anzahl Patienten pro Pflegeperson) auf ausgewählte Patientenergebnisse untersucht. Dabei wurde die Abteilung als zufälliger Effekt eingeschlossen.
Obwohl der gemessene durchschnittliche Rationierungswert niedrig war (etwas weniger als selten), war die implizite Rationierung von Pflege der einzige Faktor, der mit allen sechs untersuchten Patientenergebnissen signifikant verbunden war, sowohl in den nichtregulierten

Einzelmodellen, als auch in den regulierten Endmodellen. In den Endmodellen führte ein Anstieg des Rationierungsniveaus um 0.5 Einheiten zu mässigen bis hohen Zunahmen der Odds Ratios der von den Pflegepersonen berichteten, manchmal bis oft im letzten Jahr vorgekommenen Medikamentenfehler (OR 1.68), Stürze (OR 2.81), nosokomiale Infektionen (OR 1.61), kritische Zwischenfälle (OR 1.10) und Dekubitalulcera (OR 1.15). Im Weiteren war diese Zunahme des Rationierungsniveaus, wenn auch nur marginal signifikant, so doch mit einer 37% Abnahme in der Odds-Ratio der von Patienten berichteten Zufriedenheit mit der erhaltenden Pflege assoziiert. Von den anderen bedeutenden organisatorischen Variablen war nur die von den Pflegepersonen wahrgenommene ‚Angemessenheit der Ressourcen und Fachkompetenz', signifikant mit fünf der sechs untersuchten Patientenergebnisse in den Einzelmodellen verbunden. In den Endmodellen zeigten sich diese Zusammenhänge nicht mehr, ausgenommen einer geringfügigen signifikanten Assoziation zu den nosokomialen Infektionen. Ebenfalls war die Anzahl zu betreuender Patienten pro Pflegeperson mit keinem der untersuchten Patientenergebnisse signifikant verbunden. All dies weist daraufhin, dass die Rationierung von Pflege ein wichtiger Faktor ist, welcher zum einen direkt mit den Patientenergebnissen zusammen zu hängen scheint und zum anderen teilweise die Wirkung der Anzahl zu betreuender Patienten pro Pflegeperson und der Arbeitsumgebungsfaktoren, in denen Pflegepersonen arbeiten, auf die Patientenergebnisse mit zu erklären scheint. Diese Punkte müssen noch weiter untersucht werden.

Die dritte Studie wurde durchgeführt um die klinisch bedeutungsvollen Rationierungsgrenzwerte zu identifizieren. Aufgrund der gezeigten signifikanten Assoziation zwischen der Rationierung und den Patientenergebnissen ist es bezüglich der Betreuungsqualität der Patienten und der Patientensicherheit wichtig zu wissen, ab welchem Niveau sich die Rationierung beginnt negativ auf die untersuchten Patientenergebnisse auszuwirken. In dieser Studie wurden wiederum Querschnittsstudien-Multicenter Befragungsdaten von Pflegepersonen (n=1138) und Patienten (n=779) der RICH Nursing Studie verwendet. Für die Definierung der Grenzwerts, wurde der BERNCA Score von 4 auf 6 Graduierungsstufen umkodiert: 0, 0.5, 1.0, 1.5, 2.0, ≥ 2.5.

Aufgrund der schiefen Verteilung der Daten zu den vorgekommenen potentiell nachteiligen Ereignissen bei Patienten und um ein umfassenderes Verständnis der zugrunde liegenden Muster der Rationierung zu erwerben wurden zwei verschiedene Dichotomisierungsansätze zur Einteilung der Daten in zwei Gruppen angewandt. Im ersten Dichotomisierungsansatz wurden die Antworten, welche "zumindest ein" vorgekommenes Ereignis enthielten ('selten', 'manchmal' oder 'oft') kontrastiert mit 'nie' vorgekommen. Bei der zweiten Dichotomisierung wurden die

Antworten die ein "regelmässiges" Vorkommen ('manchmal' oder 'oft') enthielten kontrastiert mit denen, die "selten oder weniger" ('selten' oder 'nie') enthielten. Bei der Anwendung des ersten Dichotomisierungsansatzes hing ein Rationierungswert von 0.5 signifikant mit hohen Anstiegen in der Odds-Ratio der durch die Pflegepersonen berichteten nosokomialen Infektionen und Dekubitalulcera (OR 2.38, 3.80), sowie einer tieferen Patientenzufriedenheit mit der Pflege (OR 0.43) zusammen. Ein Wert von '1' war signifikant verbunden mit Anstiegen in der Odds-Ratio der von den Pflegepersonen berichteten kritischen Zwischenfälle und Medikamentenfehlern (OR 2.50, 4.62), und ein Wert von '2' mit den rapportierten Stürzen (OR 5.35). Bei der Anwendung der zweiten Dichotomisierung zeigte sich das gleiche Muster. Jedoch lag das mit den identifizierten Grenzwerten verbundene erhöhte Risiko für ungünstige Ereignisse ungefähr einen halben Punkt höher. Ungeachtet des Dichotomisierungsansatzes zeigten die Ergebnisse, dass fünf der sechs untersuchten Patientenergebnisse schon bei niedrigen Rationierungsniveaus (sehr selten, selten) negativ beeinflusst wurden. Hinsichtlich der Pflegequalität und Patientensicherheit ist es deshalb zu empfehlen, Rationierung in Spitälern soweit wie möglich zu vermeiden.

Die vierte Studie wurde durchgeführt, um die Verletzungsraten mit scharfen Gegenständen und deren Risikofaktoren bei Pflegepersonen von chirurgischen und medizinischen Stationen in vier Ländern zu untersuchen. Hierzu wurden Querschnittsdaten der IHOS Studie von 34,318 Pflegepersonen, die 1998-1999 in Akutspitälern in den Vereinigten Staaten (Pennsylvania), Kanada, (Alberta, British Columbia, und Ontario), Grossbritannien (England und Schottland) und Deutschland arbeiteten, verwendet. Mit validierten Fragebögen wurden Daten zu den Inzidenzraten dieser Verletzungen, zu diesbezüglich gefährlichen Praktiken und zur Verwendung von sicherheitstechnischen Materialien gesammelt. Die rückblickend gemeldeten Nadelstichverletzungen im letzten Jahr für medizinisch-chirurgische Pflegepersonen schwankten zwischen 146 Verletzungen pro 1000 Vollzeitstellen (Full-Time Equivalent (FTE) in der Stichprobe aus den USA und 488 pro 1000 FTEs in jener aus Deutschland. Sehr hohe Verletzungsraten mit scharfen Gegenständen (255 beziehungsweise 569 Verletzungen per 1000 FTEs per Jahr) wurden bei Pflegepersonen, die in den USA und Kanada im Operationssaal und in der präoperativen Pflege arbeiteten, beobachtet. Die Unterschiede in den Verletzungsraten sind möglicherweise auf die deutlich seltenere Verwendung von spezifisch prophylaktisch sicherheitstechnisch konstruierten „scharfen" Arbeitsgegenständen in Deutschland und Kanada, verglichen mit den USA, zurückzuführen.

Die Ergebnisse dieses Forschungsprogramms erweitern die vorhandene Evidenz zu Systemfaktoren, die signifikant mit den Patientenergebnissen assoziiert sind. Erstens, das BERNCA Instrument ist ein reliables und valides Messinstrument, welches für Messungen des neuen empirischen Faktors ‚implizite Rationierung von Pflege' in Übereinstimmung mit dem vorangehend beschriebenen konzeptuellen Rahmen in Akutspitälern benutzt werden kann.

Zweitens, die Ergebnisse dieses Programms zeigen die Bedeutung dieses neu identifizierten organisatorischen Systemfaktors, implizite Rationierung von Pflege, hinsichtlich der Gesundheit und Sicherheit der Patienten auf, indem er einerseits direkt mit den Patientenergebnissen verbunden zu sein scheint, und er andererseits Prozesse in der Akutpflege und Geschehnisse in der direkten Pflege am Patientenbett abzubilden scheint. Drittens, die identifizierten klinisch bedeutungsvollen Rationierungsgrenzwerte stellen Richtgrössen für das klinische Personal, für Führungskräfte und für Politiker zur Verfügung. Auf diese Weise können sie negative Auswirkungen von knappen Ressourcen oder von Schwierigkeiten in deren Verteilung auf die Patientenergebnisse nachgehen und entsprechend reagieren, wenn die Rationierungswerte das tolerierbare Niveau überschreiten. Im Weiteren können diese Grenzwerte benutzt werden, um die minimalen Stellenbesetzungs- und Fachkompetenzniveaus festzulegen, die notwendig sind um die erwünschte Patientenergebnisse zu erreichen. Viertens, zeigen die hohen Verletzungsraten mit scharfen Gegenständen im letzten Jahr in den vier beteiligten Ländern bei gewissen Gruppen von Pflegepersonen, was durch den Einsatz von Sicherheitstechnologien zur Vorbeugung von Verletzungen mit scharfen Gegenstände mit beeinflusst zu sein scheint, einen Bedarf für einer weitere Verbreitung dieser Technologien, sowie eine bessere Durchsetzung der Verwendung eben solcher Technologien und Gesundheitsvorschriften.

Weitere Studien zur impliziten Rationierung von Pflege sind notwendig, um die Ergebnisse dieses Forschungsprogramms in anderen Ländern und anderen Akutpflegebereichen mit unterschiedlichem Schwere- und Komplexitätsgraden der Patienten zu bestätigen. Diese Studien sollten prospektiv gesammelte, longitudinale Daten zu Stellenbesetzung und pflegesensitiven Patientenergebnissen einschliessen, die es ermöglichen die Rationierung, die Schwere- und Komplexitätsgrade der Patienten mit präzisen Stellenbesetzungsdaten des Pflegepersonals auf Ebene der Abteilung zu verbinden, und kausale Schlussfolgerungen zu den identifizierten Zusammenhängen zu ziehen. Aufgrund der nachgewiesenen Bedeutung des neuen empirischen Systemfaktors Rationierung von Pflege für die Behandlungsqualität und die Patientensicherheit, und eines bestehenden Bedarfs an mehr Wissen zu den der Rationierung zugrundeliegenden Prozessen, sollten zukünftige Studien auch mit einen Mixed-Method Ansatz (qualitativ und

quantitativ gesammelte Daten) durchgeführt werden. Dies ermöglicht es ein tieferes Verständnis der Entscheidungs-, klinischen Urteilsfindungs- und Triagestrategien zu erlangen, die Pflegepersonen anwenden um Prioritäten bei der täglichen Pflege zu setzen und um die knappen Ressourcen unter ihren Patienten zu verteilen.

Introduction

On the basis of nurse reports indicating the occurrence of implicit rationing of nursing care in Swiss hospitals, the Swiss Federal Office of Public Health asked the Institute of Nursing Science of the University of Basel to conduct the Rationing of Nursing Care in Switzerland Study (RICH Nursing Study). The resulting study is an extension of the International Hospital Outcomes Study (IHOS), an international study of the organization of nursing care in hospitals and its impact on patient outcomes [1-3]. The IHOS study is led by the Center for Health Outcomes and Policy Research at the University of Pennsylvania (USA). The RICH Nursing study, and with it the research program of this dissertation, extended the IHOS research protocol by developing a new empirical measure of implicit rationing of nursing care.

This thesis is comprised of ten chapters. Chapters 3 and 5-9 have been published or submitted as individual articles. Therefore, some repetition in the description of the background and methodology could not be avoided.

The first three chapters describe the thesis' background, its aims, and the available evidence on effects of cost saving strategies and changes in staffing levels and skill mixes on patient and nurse outcomes.

- **Chapter 1** gives a literature based overview of relevant developments in the healthcare system, including cost saving strategies, reductions of nursing resources, and their effects on patient and nurse outcomes
- **Chapter 2** describes the aims of this research program
- **Chapter 3** is a literature review and analysis, examining the available evidence on the effects of cost saving strategies and changes in staffing levels and skill mix in the inpatient care setting on selected patient and nurse outcomes.

Chapters 4 and 5 explore the first two aims of this research program – *to develop a conceptual framework of implicit rationing of nursing care, as well as an instrument to measure it as an empirical factor, and to evaluate the psychometric properties of the newly developed instrument*.

- **Chapter 4** presents the definition and conceptual framework of implicit rationing of nursing care, upon which the proposed measurement tool was based.
- **Chapter 5** explores the development of the Basel Extent of Rationing of Nursing Care (BERNCA) instrument and its validity and reliability along lines of evidence suggested in *Standards for educational and psychological testing*.

The central aim of this research program, '*to explore the association between implicit rationing of nursing care in Swiss acute care hospitals and patient outcomes, with consideration for major organisational variables',* and the related aim, '*to examine the levels of rationing in Swiss acute care hospitals, identifying clinically meaningful rationing thresholds for selected patient outcomes using a standardized rationing tool'* are explored in chapters 5 and 6.

- **Chapter 6** explores the associations between implicit rationing of nursing care and its relationships with patient outcomes as a new empirical factor, as well as with major organisational system factors.
- **Chapter 7** discusses the identified clinically meaningful rationing thresholds and their implications for clinical nursing practice.
- **Chapter 8** Discusses the mechanism of implicit rationing of nursing care, the occurrence of rationing in Swiss acute care hospitals and its consequences.
- **Chapter 9** explores the additional aim of this research program – '*to compare sharp-device injuries rates among hospital staff nurses across four Western countries*' using data from the IHOS study.
- To conclude**, Chapter 10** discusses the findings of the program as a whole, identifying related methodological issues, implications for research and clinical practice, and possible future steps to explore the causes, processes and effects of the rationing of nursing care.

Chapter 1

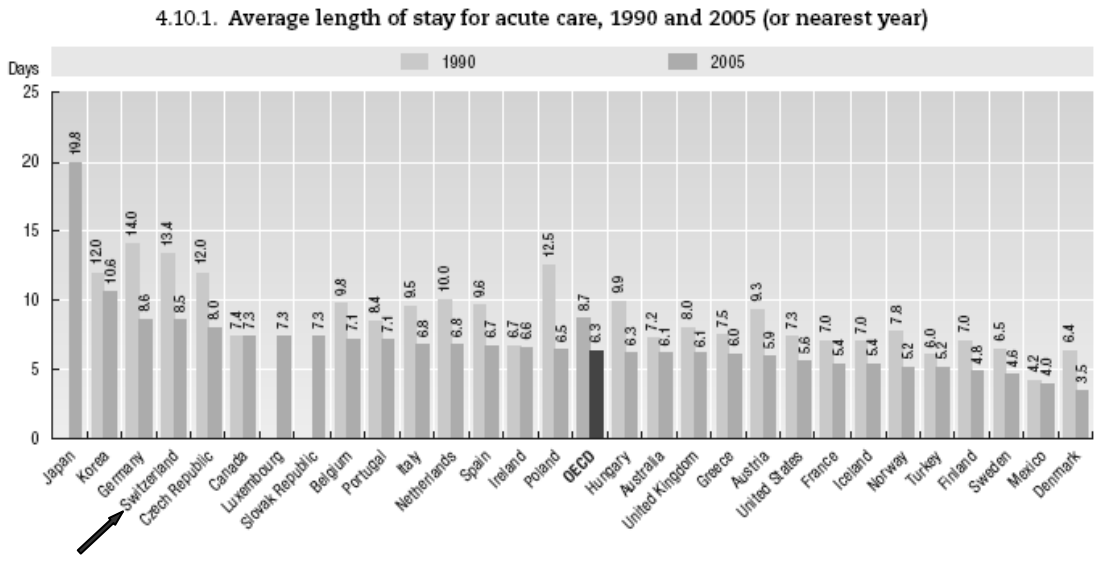
1 Cost saving strategies, nursing resources and effects on patient and nurse outcomes

1.1 Developments in the healthcare system

Advances in science and technology, population aging, and increased public demand have contributed globally to rising healthcare costs. In Switzerland, for example, these costs increased from 8.3% of the Gross Domestic Product (GPD) in 1990 to approximately 11.4% in 2005 (51.7 Billion Swiss Francs) This places Switzerland second in the Organization for Economic Co-operation and Development (OECD) regarding healthcare expenditures, followed by Germany (10.9 %) and France (10.5 %). Only the U.S., devoting 15.3% of its GDP to healthcare, spends a greater percentage [4].

To contain the growth of public healthcare expenditures, costs saving strategies have been implemented at national, regional, and local levels. These typically include the following processes: a) hospital budget cuts; b) changes in hospital utilization (e. g. reductions: in length of hospital stay, in numbers of acute care beds, staff numbers and/or skill mix, substitution of outpatient for inpatient care) c) efforts to maximize the cost-effectiveness of medical practices (e.g. managed care) [5-16]. For example, the average length of stay in Swiss acute care hospitals was reduced from 13.4 days in 1990 to 8.5 days in 2005. However, this is still higher than the averages either of the US (5.6 days) or the OECD (6.3 days) (figure 1) [17-19].

Figure 1: OECD data average length of stay for acute care, 1990 and 2005

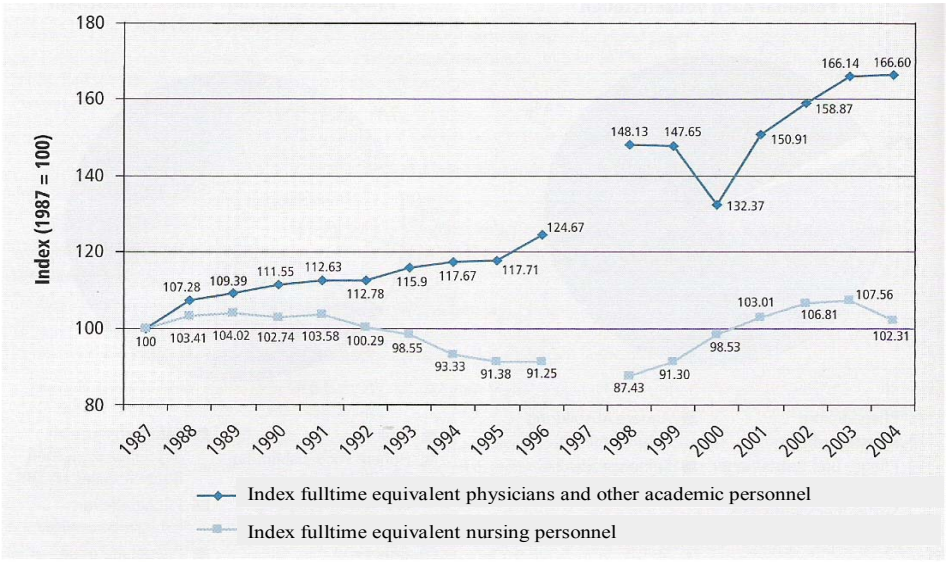


These developments in the healthcare system have affected both nurse and physician densities, and have limited the number of nurses, leading to shortfalls, particularly in hospitals. Parallel the average acuity of hospital in-patients have increased, along with the intensity of nursing services they require. As OECD figures show, between 1990 and 2005, the physician densities in 30 OECD countries grew at an average rate of 1.6% per year, while the nursing density rose at an average rate of 1.1% throughout (Figure 2, 3) [19].

It is important to consider that nurses in public and private settings, self-employed nurses, graduate nurses, fully qualified nurses (with post-secondary education in nursing), and vocational/associate/auxiliary/practical nurses are counted as a single group in these data. It is also significant that half of OECD countries include midwives in this mix and some even count non-practising nurses, although the OECD definitions exclude them [19].

Specific data on the development of medical professional resources (nurses, physicians) in hospitals clarify the situation. Data from Switzerland show that from 1987 to 2004 the number of physicians per 100 hospitalised patients increased by approximately 65% (to some extent a result of the legal reduction of their working hours), while the number of nurses remained relatively constant (Figure 4) [20].

Figure 4: Development of physicians and nurses in Switzerland 1987 – 2004



Development of the number of physicians and nurses per 100 hospitalized patient 19987 – 2004
Sources: Hospital statistic H+ 1987 - 1996, standard tables 1998 - 2004 Swiss Federal Office of Statistics

Figure 2: Growth in practicing physician density per 1000 populations, 1975-1990 and 1990-2005 (OECD data)

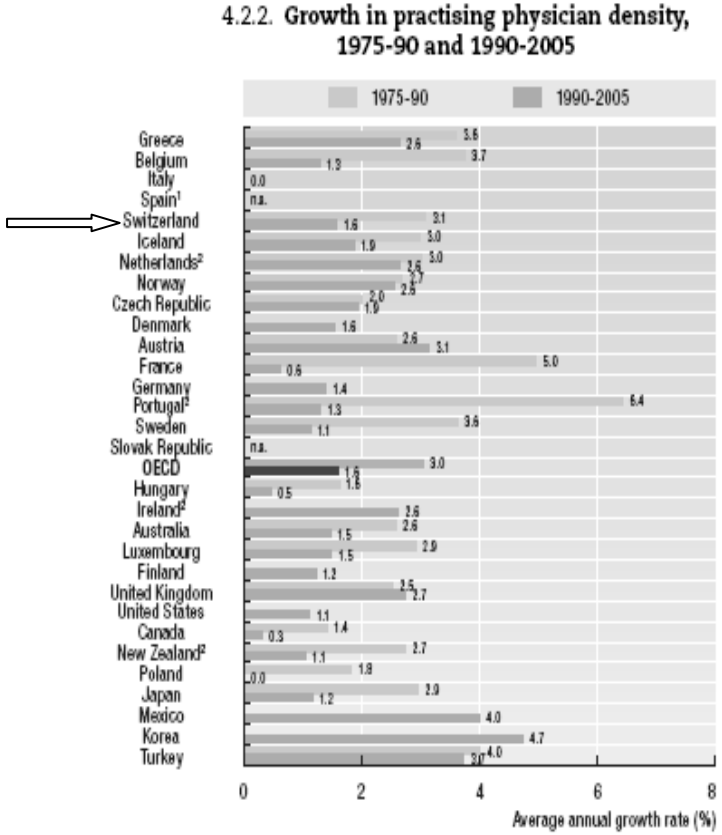
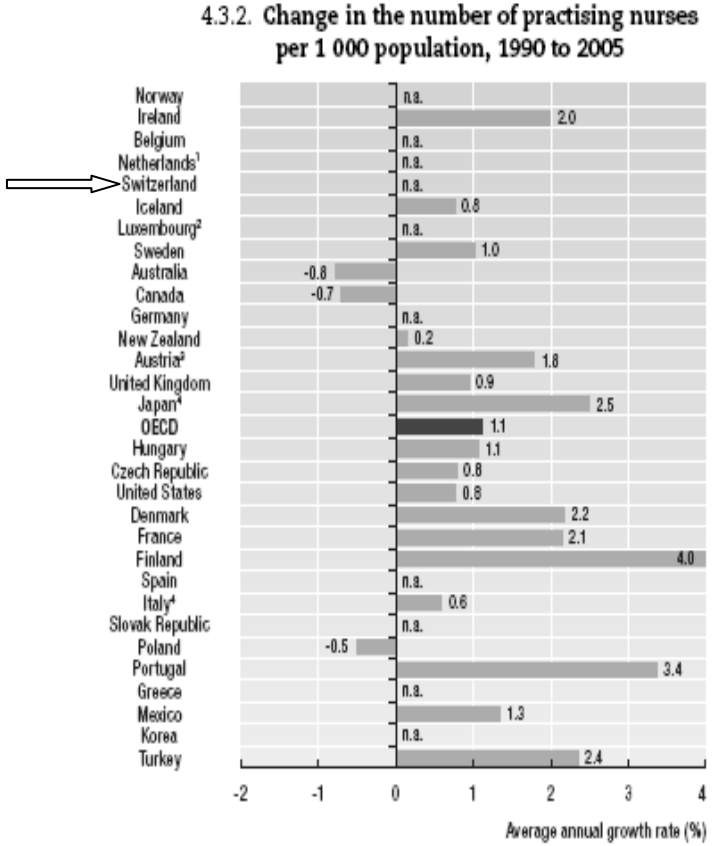


Figure 3: Changes in the number of practicing nurses per 1000 populations, 1990 to 2005 (OECD data)



A similar trend is shown in Germany, were for example, between 1995 and 2005 a reduction of approximately 48,000 full time equivalent nursing positions in hospitals – a procedural decline of 13.5% have occurred. Over the same period, nurse trainees declined from 88,800 to 72,300 (20%), nursing assistants from 32,000 to 18,000 and auxiliary staff from 33,600 to 19,500. Consequently, the remaining nurses' combined overtime hours increased between 2004 and 2006 from 745,000 to 850,000 (13%), an amount equal to approximately 592 full time nursing positions [10].

Through the described health care system developments, especially the shifting of services and reductions in the length of hospital stay, the long term care and outpatient care scenarios are also affected. Corresponding data from these settings are unavailable.

1.2 Rationalization and rationing of health care services

The combination of cost containment strategies and scarce resources are making rationalization and rationing of healthcare services, inclusive nursing service, increasingly prominent topics of healthcare debate [5, 21]. In general, rationing of health care services is defined as *the limitation of resources, including money, allocated to medical care, such that not all necessary care is provided to all patients as often as recommended, but that these limited resources are distributed fairly* [21]. This contrasts with the concept of rationalization, which refers to *optimizing the use of personnel and material resources without withholding necessary medical or nursing interventions* [22, 23]. The majority of the rationing definitions in use distinguish between implicit and explicit rationing of healthcare services. *Explicit rationing* involves the distribution of scarce resources (therapeutic, medical, technical, or financial) in accordance with legal regulations and guidelines. These specify who is responsible for allocation decisions, which medical processes and procedures are provided to all patients, and which criteria are used to allocate necessary interventions or procedures to patients. The Oregon Health Plan[1] is an example of explicit rationing within one healthcare program [24, 25]. *Implicit rationing,* on the other hand, involves the distribution of scarce resources *without* such legal regulations, guidelines or criteria. Here, the individual physician or nurse treating the patient bears the responsibility for the allocation of resources [22, 23]. However, some authors have noted that the dividing lines between absolutely scarce and non-scarce resources, explicitly and implicitly withheld resources and necessary and

[1] The Oregon plan consist 17 diagnosis / treatment categories of health problems. The categories are ranked according to 13 criteria, including life expectancy, quality of life, cost effectiveness of a treatment, and the number people who would benefit. The priorities of the different treatments are based on the decision whether the treatments prevent death and lead to full recovery (ranked first), maternity care (ranked second), or would prevent death without full recovery (ranked third).

beneficial resources are not as sharp as some frameworks may imply, and recommend the use of broader rationing definitions, which are not limited it to explicit mechanisms, absolutely scarce resources or necessary health care services [26]. Although several definitions of rationing of healthcare and medical care are available, no specific definition of rationing of nursing care has yet appeared in the literature.

1.3 Effects of cost containment strategies on nursing and patient care

The described decrease in nursing staff levels, dilution of skill mixes and/or the non-adaptation of staffing levels to increased patient acuity and complexity have led to a deficit of nursing resources in relation to patient care needs. As nurses' scope of action is so wide, this imbalance often leaves nurses in a position of prioritizing necessary care across the patients on a shift load – i.e., implicitly rationing nursing care. There are indications that such prioritization and rationing are very common reactions to scarcities of nursing staff or other key resources.

International evidence on prioritizing and scares nursing resources

As shown in the IHOS Study, only 30-40% of the 43,329 participating nurses` from 700 hospitals in the United States, Canada, England, Scotland and Germany in 1998 -1999 reported that there were enough registered nurses to perform all required nursing tasks and to provide high quality care. Further, 10 to 54% of the nurses across tasks and countries reported that, on their most recent shift, they had omitted a number of nursing activities such as oral hygiene, skin care, patient and family teaching, and comforting / talking with patients [3].

In another study, 64% of 2,510 nurses surveyed in acute care hospitals in the United Kingdom felt overworked and reported regularly having too little time to perform essential nursing tasks such as addressing patients` anxieties, fears and concerns (19.7% all the time, 51.9% sometimes), treating their symptoms and conditions (15.4% all the time, 33.1% sometimes), and providing patients and relatives with necessary information (9% all the time, 50.7% sometimes) [27].

In a recent German survey of 263 nursing hospital directors and administrators, 91% and 92%, respectively, acknowledged concurrent increases in patient care needs, nursing workloads and the time needed for coordination, administration and documentation. Many respondents reported that, in their institutions the following clinical activities of care were not performed as often as recommended: changes of the position of immobile patients (73%), necessary mobilisation (31%), daily sponge baths (14%) and following the patient's own speed during food intake (33%) were regularly (rarely to often). Furthermore, they were aware that nurses could not react

quickly enough to patient calls (25%) or monitor patients adequately (34%), and that sufficient care could not be guaranteed (30%) [10].

In a qualitative study on omitted nursing care, the results showed certain similarities to those of quantitative studies. Using a semi-structured interview design, registered nurses (107 RNs), licensed practical nurse (15 LPNs), and nursing assistants (51 NAs) working in medical and surgical units in two US hospitals were interviewed in 25 focus groups. The following nine care aspects were extracted from the interviews as missed regularly (i.e., missed non-occasionally or in an emergency or crisis situation): ambulating of patients, turning of patients, feeding (delayed or missed), patient education, discharge planning, emotional support, hygiene, intake and output documentation and surveillance. Among the reasons given for missing care, seven themes were identified: insufficient staff (inadequate staff-to-patient ratio, absence of budgeted staff members, unexpectedly heavy work demands); time required for a nursing intervention (priorities assigned to nursing interventions were influenced by the length of time necessary to complete them); poor allocation of staff resources (i.e., too few staff of a particularly category, patient assignments based on numbers rather than workload requirements); "it's not my job" syndrome (delegation of work to another staff category); ineffective delegation; habit (tasks omitted once become easier to omit the following day); and denial e.g., not ensuring that delegated care had been completed) [28].

National data on prioritizing and scarce nursing resources

Two recent Swiss surveys and several personal reports indicate similar trends as those emerging from the international evidence. In a survey of 1,954 nurses, 30% indicated that, due to insufficient time and resources, they at least occasionally had to limit necessary nursing care and could only ensure keeping patients warm, well-fed, and clean. Time pressure primarily affected the area of comfort and communication, followed by feeding and elimination functions, personal hygiene, dressing and mobilization. Furthermore, the nurses indicated that, under such circumstances, they commonly had insufficient time to monitor disoriented or confused patients carefully enough to ensure their safety and therefore restrained them and / or administered sedatives as protective measures. A time utilization analysis of 830 nurses showed an additional time requirement of 22 minutes per nurse per patient day to offer patients appropriate care – a figure equal to 320 additionally full time nursing positions [29].

In another survey 20 administrative leaders in Swiss acute care hospitals acknowledged that the lack of qualified nursing personnel, particularly in specialized fields, was linked on a short term basis with the omission of necessary nursing therapies and discussions with patients (including

providing patients with relevant information), closing of beds and increases in error rates, and on a long-term basis with decreases in care quality [30]. Other data indicated that nurses had insufficient time to provide protective measures such as regularly changing the positions of patients who were immobile or restricted in their movement, or accompanying patients who walked unsteadily [29, 31, 32]. As a result, risks increased that pressure ulcers would develop or patients would fall, possibly leading to fractures. Other nurses reported that they had insufficient time either to carry out an activating sponge bath for hemiplegic patients or to mobilize them adequately. As a result of such omissions, the rehabilitation time of such patients can be prolonged [33].

In summary, increasing evidence indicates that prioritization and, with this, related implicit rationing of nursing care (such as the withholding of preventive measures or adequate monitoring of patients) are common in nursing as reactions to shortages of nursing staff or any other key resources. The question arises as to the consequences of these developments regarding patient and nurse outcomes, patient safety and quality of hospital care.

1.4 Relationships between system factors and quality and safety of patient care

The developments in nurse staffing levels, particularly cut to nursing staff, have led to heavier workloads and to doubts regarding the adequacy of staffing levels in hospitals. The importance of nurse staffing on patient outcomes was for the first time articulated in 1996, in the report of the Institute of Medicine (IOM). That report further showed that no evidence was previously available on this relationship [34]. Further reports of the IOM specifically reported that ‘To err is human’ (1998), estimating that preventable medical errors were responsible for between 44,000 and 98,000 patient deaths per year, while raising disturbing questions about the quality and safety of patient care in hospitals [35, 36].

Following the IOM reports, several studies were conducted to investigate the affects of system factors such as the characteristics of the work environment, staffing and skill mix on quality and safety of patient care, nurse job satisfaction and burnout. The majority of these studies built upon the evidence developed during the magnet hospital research [37], which indicated that specific characteristics of the nurse work environment in the magnet hospitals, designated as “Essentials of Magnetism” (e.g., good nurse-physician relationships and communication, supportive nurse manager-supervisor, nurse autonomy and accountability, adequate nurse staffing), contributed to the high quality of care provided in these hospitals and, therefore, to their superior patient and nurse outcomes [38-40]. A growing base of evidence indicated significant relationships between

low nurse staffing and skill mix levels and higher numbers of patient falls [41], urinary tract infections [42, 43], pneumonia [42-46], upper gastrointestinal bleeding [42], pressure ulcers [45, 47], shock or cardiac arrest [42], failure-to-rescue [42, 46, 48] and mortality rates [45, 46, 48-51]. Further, lower reduced nurse staffing and skill mix levels were linked to higher patient dissatisfaction with care or pain management [41, 52], the length of hospital stay [42, 46], as well as work-related burnout and job dissatisfaction among nurses [48, 49, 53, 54] and needle-stick injuries [55, 56]. Other research indicates a relationship between workload and nurses' reported quality of care on their units [57-59].

An underlying problem in current outcome research is the use of cross-sectional designs incorporating non-representative sample sizes, along with non-comparable measurements of staffing (e.g. number of registered nurse hours worked per patient/day, mean number of hours of nursing care per patient-day by registered nurses, licensed practical nurses, and nurses' aides, or by full time equivalent registered nurses per adjusted inpatient day) or patient outcomes (e.g. nurse-reported adverse events, outcome data extracted from discharge files, information regarding risk-adjustment procedures), often due to feasibility issues or non-availability of other data sources [60, 61], thereby limiting the comparison, generalisation and causality of the results. These design issues and limitations of methods may have attribute to some inconsistence shown in the results regarding the link between lower nurse staffing levels and higher rates of nurse sensitive negative outcomes or patient mortality [61-63]. However, a growing body of research literature on organizational system factors and outcomes strongly suggests that a low-quality nurse work environment, low nurse staffing and reduced skill mix levels increase the risk of poor patient outcomes [64-67].

1.5 Gaps in the Literature

Increasing evidence of significant links between system factors and quality of patient care and safety has lead to the assumption that rationing of nursing care, which occurs during the process of care at the patient-to-nurse interface, is another system factor significantly associated with patient outcomes. The available evidence indicates the occurrence of rationing of nursing care, which appears to increase the risks of adverse events for inpatients, via, for example, the omission of preventive measures. To our knowledge, however, the associations between implicit rationing of nursing care and patient outcomes have not yet been studied. Further, neither a definition of implicit rationing of nursing care, nor a conceptual framework, nor a valid instrument to measure these factors yet exists.

Given that prioritization and rationing of nursing care due to scarce resources are already prominent features in nursing, and that the situation cannot be expected to improve in the coming years, in view of quality of patient care and safety, it is important to explore the association between rationing and patient outcomes. Furthermore, it is necessary to examine and understand the underlying mechanisms of this new empirical factor, as well as the interrelationships between it and other system factors (quality of the nurse work environment, nurse staffing and skill mix) with assumed relationships to patient and nurse outcomes. Such knowledge would enlarge the current evidence on the interrelations between system factors and patient safety and quality of care, and would allow nursing professionals to determine when, where and which kind of interventions would improve patient safety and quality of care, even when faced with resource shortfalls.

Besides patient safety, the safety of health care workers in the health care setting, particularly nurses, warrants careful consideration. As already shown in the previous section, research has increasingly linked work environment characteristics and staffing levels with fluctuations in the safety of workers in health care settings, including burnout and sharps injury rates among hospital staff nurses [56, 68]. Sharp-device injuries are frequent adverse events among hospital nurses, carrying the risk of exposure to blood-borne pathogens [56, 69]. Such injuries are affected not only by working conditions, but also by the frequency of use of sharp devices and risk-carrying procedures, and can be reduced by the adoption of safer technologies (e.g., sharps disposal, the use of specially-engineered devices to reduce risks, and staff education). Sparse directly comparable international statistics regarding sharps injury frequency indicate the need for further studies to explore their incidence vis a vis elevated-risk procedures and the use of safety-engineered equipment.

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Chapter 2

2 Aims of this program of research

The literature review demonstrate that, although various studies and reports discussed limited care resources and prioritization of nursing care, neither an accepted definition, a conceptual framework of implicit rationing of nursing care, nor a measurement tool has yet been provided. Furthermore, no evidence has been found of a relationship between prioritizing and rationing of nursing care with patient and nurse outcomes.

Therefore the five objectives of this dissertation were:

(1) to develop a conceptual framework of implicit rationing of nursing care and an instrument to measure it as an empirical factor;

(2) to evaluate the psychometric properties of the newly developed instrument;

(3) to explore the association between implicit rationing of nursing care in Swiss acute care hospitals and its association with patient outcomes, with consideration for major organisational variables;

(4) to describe the levels of implicit rationing of nursing care in a sample of Swiss acute care hospitals and to identify clinically meaningful thresholds of rationing; and

(5) to compare sharp-device injury rates among hospital staff nurses in four Western countries (IHOS study).

Chapter 3

3 Effects of cost saving strategies and staffing levels on patient and nurse outcomes - Literature review

Auswirkungen von Kosteneinsparungsstrategien und Stellenbesetzung auf die Ergebnisse von Patienten und Pflegefachpersonen - Eine Literaturübersicht

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3.1 Abstract

The effects of cost saving strategies and changes in staffing levels and skill mix in the inpatient care setting on patient and nurse outcomes have not yet been examined in Switzerland. In 2002 the Swiss Federal Office of Health mandated the Institute of Nursing Science at the University of Basel to conduct a literature review to examine the evidence available on this topic. The literature research and analysis cover the period of 1991 - 2003. Sixty publications out of a total of 260 reviewed abstracts were included and analyzed. The results show that in the inpatient care settings in Switzerland as well as in other countries positions for registered nurses have been reduced and/or the qualification and skill mix in care teams have been down-graded. Given the present health care situation where the intensity and complexity of caring for hospitalized patients is increasing, an imbalance occurs between the need for high quality care and the possibilities to offer this care. This affects patients' and nurses outcomes. The international results show a significant relationship between lower staffing levels and skill mix in care teams and higher complication -, "failure -to- rescue" and mortality rates in patients, as well as a lower job satisfaction, and higher fluctuation, burnout and work- related injury rates in nursing personnel. Thus, nursing care within hospitals represents not only a cost factor but also an important quality factor which is essential in order to be able to realize good patient's outcomes.

Zusammenfassung

Die Auswirkungen von Kosteneinsparungsstrategien und Stellenbesetzung im stationären Akutpflegebereich auf die Behandlungsergebnisse von Patienten und arbeitsbezogene Ergebnisse von Pflegefachpersonen wurden in der Schweiz bisher nicht untersucht. Das Institut für Pflegewissenschaft der Universität Basel erhielt vom Schweizer Bundesamt für Gesundheit im Jahr 2002 den Auftrag eine Literaturrecherche zur Erfassung der verfügbaren Evidenz zu dieser Thematik durchzuführen. Die Literaturrecherche und -analyse umfasst den Zeitraum 1991 bis 2003. Von den total 260 gelesenen Abstracts wurden 60 Publikationen aufgenommen und analysiert. Die Ergebnisse zeigen, dass in der Schweiz, wie auch in anderen Ländern, im stationären Bereich Stellen von diplomiertem Pflegefachpersonal abgebaut und / oder die Qualifikationen und Fachkompetenzen in Pflegeteams hinuntergestuft werden. Da parallel hierzu die Pflegeintensität und -komplexität stationärer Patienten gestiegen ist, entsteht ein Ungleichgewicht zwischen dem Angebot und dem Bedarf an Pflege. Dies wirkt sich auf die Ergebnisse von Patienten und Pflegefachpersonen aus**.** Internationale Forschungsergebnisse zeigen einen signifikanten Zusammenhang zwischen einer knappen Stellenbesetzung und Fachkompetenz in Pflegeteams, einer schlechten Arbeitsumgebungsqualität und höheren Komplikations-, „failure-to-rescue“ und Mortalitätsraten bei Patienten, sowie einer geringeren Arbeitszufriedenheit, und höheren Fluktuations-, Burnout- und arbeitsbedingten Verletzungsraten beim Pflegepersonal. Dies zeigt, dass die Pflege innerhalb des Spitals nicht nur einen Kostenfaktor sondern einen wichtigen Qualitätsfaktor darstellt, welcher wesentlich zu der Erzielung guter Ergebnisse bei Patienten beiträgt.

3.2 Einleitung

Fortschritte in der medizinischen Forschung und Technologie, demographische und epidemiologische Veränderungen, die steigende Lebenserwartung und die steigende Nachfrage nach medizinischer Betreuung in der Gesellschaft haben weltweit in den Industriestaaten zu einem massiven Kostenanstieg im Gesundheitswesen geführt. Durch die gestiegene Lebenserwartung sind in der Schweiz schon jetzt 15% der Bevölkerung älter als 65 Jahre. Auf diese Altersgruppe entfallen 30% der Arztkonsultationen und im Durchschnitt sind in den Spitälern und Pflegeheimen pro Tag ca. $^4/_5$ aller Betten von Menschen dieser Altersgruppe belegt. Von den 80 bis 100jährigen, welche 4% der Schweizer Bevölkerung ausmachen, sind in den Allgemeinspitälern ¼ und in den Pflegeheimen nahezu ¾ aller Betten belegt (Duerr, 2000). Als Folge dieser und anderer Entwicklungen sind in der Schweiz die Ausgaben im Gesundheitswesen gemessen am Bruttoinlandsprodukt (BIP = GDP) von 4,9% 1960 auf 11,2 % im Jahr 2002[2] gestiegen (BFS, 2004; OECD, 2003). Um die Kosten einzudämmen werden weltweit verschiedene Restrukturierungs-, Reengineerings-, Rationalisierungs- und Ratio-nierungsstrategien[3] durchgeführt.

Die Auswirkungen von Kosteneinsparungsstrategien und Stellenbesetzung im stationären Akutpflegebereich auf die Behandlungsergebnisse von Patienten und arbeitsbezogene Ergebnisse von Pflegefachpersonen wurden in der Schweiz bisher nicht untersucht. Das Institut für Pflegewissenschaft der Universität Basel hat im Auftrag des Schweizer Bundesamts für Gesundheit, im Jahr 2002 / 2003 eine Literaturrecherche und -analyse durchgeführt, mit dem Ziel die aktuelle wissenschaftliche Evidenz zu dieser Thematik zu erfassen.

Beruhend auf den Ergebnissen der Literaturrecherche und -analyse werden in diesem Artikel zunächst die Auswirkungen von Kosteneinsparungsstrategien im Gesundheitswesen auf den stationären Akutpflegebereich beschrieben. Anschließend wird anhand der verfügbaren wissenschaftlichen Evidenz aufgezeigt, wie sich spezifische organisatorische Merkmale von Spitälern und Veränderungen in den Bereichen Stellenbesetzung und Fachkompetenz in Pflegeteams auf die Behandlungsergebnisse der Patienten und auf arbeitsbezogene Ergebnisse beim Pflegefachpersonal auswirken.

3.3 Methode

Die den Zeitraum 1991 bis 2003 umfassende Literatursuche erfolgte über die Datenbanken MEDLINE, CINAHL, Pubmed, PsycINFO und COCHRANE LIBRARY. Die folgenden

[2] Zuletzt erhältliche Daten.

[3] Zur Verbesserung der Lesbarkeit wird nachfolgend für Restrukturierungs-, Reengineerings-, Rationalisierungs- und Rationierungsstrategien der Begriff Kosteneinsparungsstrategien verwendet.

Suchbegriffe wurden hierbei einzeln und kombiniert verwendet: *rationing, implicit rationing, rationing in hospitals, rationing and nursing care, nursing shortage, nursing work environment, organizational characteristics of hospitals and quality of care, patient outcomes, nursing / nurses and burnout, nurses and job satisfaction*. Weiter wurde Literatur anhand von Referenzen in Artikeln, über Handsuche in der medizinischen Bibliothek der Universität Basel sowie aufgrund von Empfehlungen von Mitarbeitern des Centers for Health Outcomes and Policy Research der Universität Pennsylvania (USA), Mitarbeitern des Instituts für Pflegewissenschaft und des Instituts für angewandte Ethik der Universität Basel gesucht. Von insgesamt 260 gelesenen Abstracts wurden 60 Publikationen aufgenommen.

Ein- und Ausschlusskriterien für Artikel

In die Literaturrecherche und -überprüfung eingeschlossen wurden deutsch- oder englischsprachige Artikel zu Studien, Untersuchungen, Projekte, Literaturübersichten, die sich auf den stationären Akutpflegebereich für Erwachsene bezogen zu den Themen:

1. Gesundheitswesen und Spitalorganisationen: Kosteneinsparungsstrategien im Gesundheitswesen in der Schweiz und weltweit, Entwicklungen im Akutpflegebereich, Qualität der Spitalpflege, Verteilung von knappen finanziellen, materiellen und personellen Ressourcen im Gesundheitswesen, Auswirkungen von Kosteneinsparungsstrategien und Merkmale von Spitalorganisationen auf die Stellenbesetzung und Fachkompetenz in Pflegeteams.

2. Ergebnisse Patienten: Auswirkungen von Kosteneinsparungsstrategien, Merkmale von Spitalorganisationen und Stellenbesetzung und Fachkompetenz in Pflegeteams auf den stationären Betreuungsprozess, die Pflegequalität und die Behandlungsergebnisse der Patienten (Patientenzufriedenheit, Komplikations- und Mortalitätsraten, „failure-to-rescue“[4]- Raten).

3. Ergebnisse Pflegepersonen: Auswirkungen von Kosteneinsparungsstrategien, Merkmale von Spitalorganisationen und Stellenbesetzung und Fachkompetenz in Pflegeteams auf Arbeitszufriedenheit, Fluktuation, Burnout und arbeitsbedingte Verletzungen beim Pflegepersonal.

Ausgeschlossen wurden Artikel aus den Bereichen stationäre Langezeitpflege, Geriatrie, Spitalexterne Pflege, Ambulanz, Operationssaal, Rehabilitation, Psychiatrie, Kinderkrankenpflege, Pädiatrie, Krankenpflegeausbildung oder Pflegemanagement.

3.4 Beschreibung der Ergebnisse

Im internationalen Bereich sind verschiedene Studien zu den Auswirkungen von Kosteneinsparungsstrategien im stationären Akutpflegebereich, Stellenbesetzung und Fachkompetenz in

[4] Tod eines Patienten in Folge einer unvorhergesehenen Komplikation, welcher durch entsprechendes Handeln und Einleiten von Maßnahmen hätte verhindert werden können.

Pflegeteams auf die Pflegequalität, dem Vorkommen von potentiell nachteiligen Ereignissen, Komplikations-, „failure-to-rescue"- und Mortalitätsraten bei Patienten, sowie Arbeitszufriedenheit, Burnout, Fluktuation und arbeitsbedingte Verletzungen beim Pflegepersonal zu finden. Bei diesen Studien handelt es sich mehrheitlich um große Multicenterstudien, die unter Verwendung mehrerer Datenquellen in verschiedenen Ländern oder US Staaten durchgeführt wurden. In Deutschland und der Schweiz wurde vielfältige Literatur zum Thema Kosteneinsparungen im Gesundheitswesen herausgegeben. Es wurden jedoch kaum empirische Studien durchgeführt. Alle in der Schweiz durchgeführten Untersuchungen weisen ein unterschiedliches Design auf und sind auf einzelne Kantone oder Spitäler begrenzt. Eine Verbindung zu den Behandlungsergebnissen von Patienten und arbeitsbezogenen Ergebnissen beim Pflegefachpersonal wurde bei diesen Untersuchungen nicht hergestellt.

Auswirkungen von Kosteneinsparungsstrategien auf den stationären Akutpflegebereich

Nationale und internationale Publikationen zeigen, dass die weltweit durchgeführten Kosteneinsparungsstrategien im Gesundheitswesen insbesondere darauf abzielen, die Ausgaben für die stationäre Pflege und Betreuung, die den größten Kostenanteil ausmachen, zu kontrollieren, die Betriebskosten von Spitälern zu senken und die Effizienz der Spitäler zu erhöhen. Bezogen auf den stationären Akutpflegebereich sind hierbei zwei parallel ablaufende Prozesse erkennbar: 1. Fixe Budgetierung öffentlicher Spitäler und / oder Kontrolle der Anzahl öffentlicher Spitäler und Spitalbetten durch den Staat, 2. Umgestaltung des Spitalsystems durch Zusammenschluss von Spitälern, Optimierung von Abläufen und Prozessen, Re-Konfiguration von Rollen, Verantwortung und Service, Verkürzung der Spitalaufenthaltsdauer, Abbau von Akutbetten, Verlagerung von stationärer Pflege in den ambulanten Bereich, sowie Reduzierung der Personalkosten durch Abbau von Personalstellen oder Ersatz von professionellem Personal durch weniger gut ausgebildetes Personal (Aiken, Clarke & Sloane, 2001a; Aiken, Clarke, Sloane, Sochalski, Busse, Clarke, Giovannetti, Hunt, Rafferty & Shamian, 2001b; Aiken, Sloane & Sochalski, 1998; Aiken & Sochalski, 1997; BFS, 2003; Buchan, Hancock & Rafferty, 1997; Buerhaus, 1999; Buerhaus, 2002; Busse & Schwartz, 1997; Decter, 1997; Maarse, Mur-Veeman & Spreeuwenberg, 1997; Shamian & Lightstone, 1997; Sochalski, Aiken & Fagin, 1997).

In der Schweiz wurde beispielsweise die mittlere Spitalaufenthaltsdauer im Akutpflegebereich von 14,7 Tagen 1985 auf 9,3 Tage im Jahr 2000 reduziert (OECD, 2003). Im Vergleich zu anderen Ländern weist die Schweiz jedoch nach Korea mit 11 Tagen und Deutschland mit 9,6 Tagen weltweit die drittlängste Spitalaufenthaltsdauer im Akutpflegebereich auf (OECD, 2003). Bezo-

gen auf die Stellenbesetzung im Akutpflegebereich dokumentieren die Statistiken von H+[5], dass zwischen 1987 und 1998 der Pflegepersonalbestand in den Akutspitälern um 14,2% pro 100 Austritte gesunken ist, bei einem gleichzeitigen Anstieg der Anzahl Ärzte um 13,3% (Weyermann, 2000)[6]. Es ist zu berücksichtigen, dass der Anstieg bei den Ärzten zum Teil durch die gesetzliche Verkürzung der ärztlichen Arbeitszeiten in den letzten Jahren mitbedingt ist. Spezifischere Daten aus einzelnen Schweizer Kantonen zeigen, dass beispielsweise im Kanton Bern zwischen 1992 und 1998 die Stellen des Pflegepersonals um 7% reduziert wurden, während die Stellen für Ärzte / Ärztinnen von 1986 – 1998 um 30% und für medizinisch / technisches oder medizinisch / therapeutisches Personal um 20% erhöht wurden (Kuenzi & Schaer - Moser, 2002. Im Kantonsspital Winterthur im Kanton Zürich wurde von 1990 - 1999 das Pflegefachpersonal im Akutpflegebereich um 18% reduziert, während die Gesamtstellenzahl um 3,3% anstieg. Im Kantonsspital Basel Stadt wurden im gleichen Zeitraum die Stellen für das Pflegefachpersonal um 30,6%, die Gesamtstellenzahl um 15,6% reduziert (Schopper, Baumann-Hölzle & Tanner, 2001a; Schopper, Baumann-Hölzle & Tanner, 2001b).

Hieraus ergibt sich folgende Problemstellung. Durch die Verkürzung der Spitalaufenthaltsdauer, die Hospitalisierung von Patienten nur noch während der akuten Krankheitsphase, sowie die steigende Anzahl an polymorbiden Patienten ist die Pflegeintensität und -komplexität stationärer Patienten gestiegen. So ist zum Beispiel gemäß dem Medicare Case Mix Index in den US Spitälern zwischen 1985 und 1995 die Patientenkomplexität um mehr als 27% angestiegen (Sochalski et al., 1997). Durch den parallel hierzu ablaufenden Abbau von Pflegefachpersonalstellen, Ersatz von Pflegefachpersonal durch Hilfspersonal oder dem nicht erfolgten Anpassen von Stellen an den gestiegenen Pflegebedarf, besteht die Gefahr eines Ungleichgewichts zwischen dem Angebot und dem Bedarf an Pflege. Dies wirkt sich nicht nur auf die Pflegequalität, sondern auch auf die Behandlungsergebnisse von Patienten und die arbeits-bezogenen Ergebnisse des Pflegefachpersonals aus, wie internationale Forschungsergebnisse zeigen (Aiken et al., 1998; Aiken, Clarke, Sloane, Sochalski & Silber, 2002b; Aiken, 2002a; Blegen, Goode & Reed, 1998; Cho, 2001; Clarke, Rockett, Sloane & Aiken, 2002a; Havens & Aiken, 1999; Kovner & Gergen, 1998; Kovner, Jones, Zhan, Gergen & Basu, 2002; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002; Scott, Sochalski & Aiken, 1999).

[5] H+ = die Spitäler der Schweiz
[6] Zuletzt erhältliche Daten

Internationale Daten zur Arbeitsumgebung, Stellenbesetzung, Fachkompetenz und Ergebnisse

Organisatorische Merkmale von Spitälern und Ergebnisse Patienten und Pflegefachpersonen

Um den Zusammenhangs zwischen organisatorischen Merkmalen von Spitälern, Veränderungen von Stellenbesetzung und Fachkompetenz in Pflegeteams und den Behandlungsergebnissen von Patienten sowie arbeitsbezogenen Ergebnissen beim Pflegefachpersonal zu untersuchen, wurden im internationalen Bereich verschiedene Studien durchgeführt. Anlass hierzu gaben US-Spitäler, welche in den frühen achtziger Jahren in Zeiten des Pflegepersonalmangels in den USA keine Schwierigkeiten hatten Pflegefachpersonal zu rekrutieren und zu behalten, wodurch der Begriff Magnethospital entstand. Dieses Phänomen veranlasste die ANA[7] erste Studien durchzuführen, um zu untersuchen, was die Attraktivität dieser Spitäler für das Pflegepersonal ausmacht. Hierbei wurden acht spezifische organisatorische Merkmale von Magnethospitälern ermittelt, welche diese Spitäler und deren Arbeitsumgebungsqualität auszeichnen (McClure, Poulin, Sovie & Wandelt, 2002; Aiken, 2002a, Kramer & Schmalenberg, 2002) (siehe Tabelle 1).

Tabelle 1: Organisatorische Merkmale von Magnethospitälern (Aiken, 2002a, Kramer & Schmalenberg, 2002)

1. Zusammenarbeit mit klinisch kompetenten Pflegepersonen
2. Eine gute Beziehung und Kommunikation zwischen Pflegepersonen und Ärzten
3. Autonomie und Verantwortlichkeit des Pflegepersonals
4. Unterstützendes Pflegemanagement
5. Kontrolle der Pflege über die eigene Pflegepraxis und Praxisumgebung
6. Unterstützung von Ausbildung
7. Adäquate Stellenbesetzung
8. Die Belange der Patienten haben höchste Priorität

Diese acht organisatorischen Merkmale von Magnethospitälern und die hiermit verbundene gute Arbeitsumgebungsqualität ermöglichen den Pflegefachpersonen eigene professionelle Entscheidungen zu treffen und so zu pflegen, wie es dem professionellen Auftrag und dem eigenen Berufsverständnis von guter Pflege und Pflegequalität entspricht. Die Pflegefachpersonen können so ihr eigenes Wissen und ihre Fachkompetenz in der vollen Breite nutzen und besser im Sinne des Patienten handeln. Diese gute Arbeitsumgebungsqualität in den Magnethospitälern wirkt sich einerseits positiv auf die Arbeitszufriedenheit des Pflegepersonals aus und senkt die Häufigkeit von Burnout, Fluktuation und Nadelstichverletzungen beim Pflegepersonal. Verschiedene Studien zeigen, dass die Magnethospitäler in Vergleich zu anderen Spitälern eine

[7] ANA = American Nursing Association

signifikant höhere Arbeitszufriedenheit und signifikant niedrigere Burnout- und Fluktuations- und Nadelstichverletzungsraten beim Pflegefachpersonal aufweisen (Aiken, 2002a; Aiken et al., 1998; Clarke et al., 2002a; Clarke et al. 2002b; Havens & Aiken, 1999; Scott et al., 1999).

Andererseits wirkt sich die gute Arbeitsumgebungsqualität in den Magnethospitälern auch positiv auf die Behandlungsresultate der Patienten aus. So weisen die Magnethospitäler im Vergleich zu anderen Spitälern eine höhere Patientenzufriedenheit mit der Pflege, eine kürzere Spitalaufenthaltsdauer und niedrigere Mortalitätsraten von total 5% und bis zu 60% bei Patienten in spezialisierten AIDS Abteilungen auf (Aiken, 2002a; Aiken et al., 1999; Aiken et al., 1998). Diese guten Patientenergebnisse in den Magnethospitälern sind dadurch erklärbar, dass die Pflege durch ihre 24-stündige Verfügbarkeit innerhalb des Spitals ein 24-Stunden Überwachungssystem zur frühzeitigen Entdeckung von unvorhergesehenen Komplikationen und Zwischenfällen bei Patienten zur Verfügung stellt. Die Funktion dieses Überwachungssystem, das heißt, ob und wie schnell eine Spitalorganisation auf unvorhergesehene Zwischenfälle oder Komplikationen bei Patienten reagiert und notwendige Maßnahmen einleitet, wird maßgeblich durch die Stellenbesetzung, die vorhandene Fachkompetenz in den Pflegeteams und die Zusammenarbeit zwischen Pflegefachpersonen und Ärzten bestimmt (Aiken, 2002a, Aiken et al., 2002b; Aiken et al., 1998; Aiken et al., 1997; Havens & Aiken, 1999).

Stellenbesetzung und Fachkompetenz, Pflegequalität und Ergebnisse Patienten und Pflegepersonen

Aufbauend auf die US-Magnethospitalforschung begannen Aiken et al. (1998) mit der Durchführung einer zurzeit noch andauernden internationalen Spitalergebnisstudie (IHOS)[8], an welcher anfangs fünf und inzwischen neun Länder beteiligt sind. Neben den Auswirkungen organisatorischer Merkmale von Spitälern, und hiermit verbunden die Arbeitsumgebungsqualität, untersucht diese Studie wie sich die Stellenbesetzung und Fachkompetenz in Pflegeteams auf die Pflegequalität und Behandlungsergebnisse der Patienten und die arbeitsbezogenen Ergebnisse beim Pflegepersonal auswirken. Erste Datenauswertungen bestätigen die durch die Magnethospitalforschung gewonnenen Erkenntnisse und lassen auffallende Parallelen zwischen den verschiedenen Ländern mit ihren unterschiedlich organisierten Gesundheitssystemen erkennen. So gaben nur zwischen 30 und 40% von 43’329 befragten Pflegefachpersonen aus 711 Spitälern in fünf Ländern (USA, Kanada, England, Schottland, Deutschland) an, dass an ihrem Arbeitsort eine ausreichende Anzahl an registrierten Pflegefachpersonen zur Gewährleistung einer hohen Pflegequalität zur Verfügung steht. Nur eine von neun befragten Pflegefachpersonen aus

[8] IHOS = International Hospital Outcome Study

Deutschland und eine von drei befragten Pflegefachpersonen aus den anderen beteiligten Ländern schätzten die Pflegequalität in ihren Abteilungen als exzellent ein. Hier ist zu berücksichtigen, dass möglicherweise in den verschiedenen Ländern unterschiedliche Maßstäbe bei der Einschätzung der Pflegequalität in Bezug auf das, was als „exzellent“ oder „schlecht“ angesehen wird, angesetzt werden. Die Ergebnisse zeigen jedoch, dass es in allen an der Studie beteiligten Ländern an Personal und Zeit zur Gewährleistung einer hohen Pflegequalität fehlt. Dies spiegelt sich auch in der von den Pflegefachpersonen rapportierten Anzahl an aus Zeitmangel in der letzten Arbeitsschicht nicht durchgeführten notwendigen pflegerischen Maßnahmen wider, wie Gespräche oder Zuwendung, Hautpflege, Aktualisierung von Pflegeplänen (siehe Tabelle 2) (Aiken et al., 2001b).

Tabelle 2: Ergebnisse IHOS Studie (Aiken, Clarke, Sloane & Sochalski, 2001b)

Aus Zeitmangel nicht durchgeführte notwendige pflegerische Massnahmen in der letzten Arbeitschicht	**USA %**	**Kanada %**	**Deutschland %**
Gespräche / Zuwendung	39,5	43,6	53,6
Hautpflege	31,0	34,7	13,0
Mundpflege	20,1	21,7	10,0
Schulung von Patienten / Angehörigen	27,9	26,2	29,6
Austrittsplanung	12,7	13,7	13,4
Erstellung oder Anpassung von Pflegeplänen	40,9	47,4	34,0

Wie diese Studie weiter zeigt, mussten die Befragten gleichzeitig Zeit für nicht pflegespezifische Tätigkeiten wie hauswirtschaftliche Tätigkeiten oder Essen austeilen aufwenden, für die sie eigentlich vom Stand ihrer Ausbildung her überqualifiziert sind (siehe Tabelle 3). Hierdurch geht ihnen noch zusätzlich Zeit für notwendige pflegerische Tätigkeiten verloren (Aiken et al., 2001b).

Wie aufgrund der durch die Magnethospitalforschung gewonnenen Erkenntnisse zu erwarten war, zeigte der in den an der IHOS Studie beteiligten Spitälern dokumentierte Mangel an Pflegepersonal und Zeit auch Auswirkungen auf die Arbeitszufriedenheit, Burnout und Fluktuation des befragten Pflegefachpersonals. Mit Ausnahme von Deutschland waren von den befragten 43’329 Pflegefachpersonen 30% - 40% mit ihrer jetzigen Arbeit unzufrieden. Ebenfalls 30% - 40% wiesen hohe Burnoutwerte auf und 26% bis 54% der unter 30-Jährigen, sowie 20% - 40% der über 30 -Jährigen beabsichtigen die gegenwärtige Stelle innerhalb eines Jahres zu verlassen (Aiken et al., 2001b).

Tabelle 3 Ergebnisse IHOS Studie (Aiken, Clarke, Sloane & Sochalski, 2001b)

Ausgeführte nicht pflegespezifische Tätigkeiten in der letzten Arbeitsschicht	**USA %**	**Kanada %**	**Deutschland %**
Essen austeilen	42,5	39,7	71,8
Hauswirtschaftliche Tätigkeiten	34,3	42,9	-
Transporte	45,7	33,3	53,7
Koordination und Ausführung von Hilfsdiensten	68,6	71,7	27,6

Wie sehr sich jeder zusätzliche Patient pro Pflegeperson auf die Patientenergebnisse und auch auf das Pflegepersonal auswirkt, zeigt eine weitere im Rahmen der IHOS Studie durchgeführte Studie von Aiken et al. (2002b). Bei dieser Studie wurden 232'342 Patientenaustrittsdaten und die Befragungsdaten von 10'184 Pflegepersonen aus 168 US Spitäler in Pennsylvania analysiert. Die Ergebnisse zeigen, dass gemessen an der Gesamtstellenbesetzung und Arbeitsbelastung eines Spitals, mit jedem zusätzlich zu betreuenden Patienten pro Pflegefachperson für chirurgische Patienten das Risiko innerhalb von 30 Tagen nach Spitaleintritt oder in Folge eines „failures-to rescue" zu sterben um 7% ansteigt. So muss bei einer Betreuung von 6:1 (6 Patienten/ 1 Pflegeperson) statt 4:1 von 2,3% zusätzlichen Todesfällen pro 1000 Patienten und 8,7% zusätzlichen Todesfällen pro 1000 Patienten mit „failure-to-rescue" ausgegangen werden. Bei einer Betreuung von 8:1 statt 4:1 erhöht sich dies auf 5% zusätzliche Todesfälle pro 1000 Patienten und 18,2% zusätzliche Todesfälle pro 1000 Patienten mit „failure-to-rescue". Bezogen auf das Pflegepersonal war in dieser Studie jeder zusätzlich zu betreuende Patient pro Pflegefachperson mit einem Anstieg der Arbeitsunzufriedenheit um 15% und einem Anstieg des Burnouts um 23% verbunden (Aiken et al., 2002b). Dies ist bedenklich, da in einer anderen Studie von Aiken et al. (2002a) bereits 33% - 54% der befragten 10'329 Pflegefachpersonen aus 303 Spitäler in fünf Ländern Burnoutwerte aufwiesen, die über der für medizinische Personen rapportierten Norm lagen. In einer Nachfolgestudie konnten Aiken, Clarke, Cheung, Sloane & Silber (2003) nachweisen, dass nicht nur die Stellenbesetzung des Pflegefachpersonals, sondern auch dessen Ausbildung einen entscheidenden Beitrag zur Erzielung guter Behandlungsresultate bei Patienten leistet. In den an dieser Studie beteiligten 168 US Spitälern war ein 10%iger Anstieg des Anteils an Pflegefachpersonen mit einem Bachelor oder einem höheren akademischen Grad mit einer 5%igen Abnahme des Risikos für Patienten innerhalb von 30 Tagen nach Spitaleintritt oder in Folge eines „failure-to-rescue" zu sterben verbunden.

Auch verschiedene andere in den US durchgeführte Studien beschreiben einen signifikanten Zusammenhang zwischen der Stellenbesetzung und / oder der Anzahl von registrierten Pflegepersonen geleisteten Pflegestunden sowie organisatorischen Merkmalen und den Patientenergebnissen. Eine Literaturüberprüfung von Mitchell and Shortell (1997) zeigt, dass sich Spitäler mit

niedrigen Komplikations- und Mortalitätsraten von Spitälern mit hohen Raten anhand ihres pflegerischen Überwachungssystems, der Qualität der Arbeitsumgebung, sowie der Interaktion der Professionellen untereinander unterscheiden. Van Servellen & Schultz (1999) identifizierten im Rahmen ihrer Literaturüberprüfung die Anzahl Pflegestunden pro Patiententag, geleistet durch registrierte Pflegepersonen, als den sich am signifikantesten auf die Mortalitätsraten von chirurgischen Patienten auswirkenden Faktor. Eine weitere Literaturüberprüfung von Schultz & van Servellen (2000) zeigt einen signifikanten Zusammenhang zwischen einer höheren Anzahl an Pflegefachpersonen und niedrigeren Mortalitätsraten.

Weitere US Studien liefern noch spezifischere Ergebnisse. So wiesen Blegen et al., (1998) bei einer in einem US Universitätsspital durchgeführten Studie einen signifikanten Zusammenhang zwischen einer höheren Anzahl an durch registrierte Pflegepersonen geleisteten Pflegestunden und niedrigeren Dekubitus- und Reklamationsraten nach. Sovie & Jawad (2001) befragten 4'144 registrierte Pflegepersonen aus 29 US-Ausbildungsspitälern. Hierbei fanden sie einen signifikanten Zusammenhang zwischen einem höheren Anteil an durch registrierte Pflegepersonen geleisteten Pflegestunden pro Patiententag und einer geringeren Anzahl von Stürzen bei Patienten sowie einer höheren Zufriedenheit der Patienten mit dem Schmerzmanagement. Kovner und Gergen (1998) analysierten chirurgische Patientenaustritts- und administrative Spitaldaten von 589 Spitälern in 10 US-Staaten. Hierbei wiesen sie einen signifikanten negativen Zusammenhang zwischen der Anzahl Vollzeitstellen von registrierten Pflegepersonen und der Häufigkeit des Vorkommens von Harnwegsinfektionen, Pneumonien, sowie einen etwas weniger ausgeprägten Zusammenhang zwischen dem Vorkommen von Thrombosen und pulmonaler Dekompensation bei Patienten nach großen chirurgischen Eingriffen nach. Durch einen Anstieg der durch registrierte Pflegepersonen geleisteten Pflegestunden pro Patiententag um 0,5 Stunden nahmen bei den chirurgischen Patienten die Pneumonien um 4,2%, die Thrombosen um 2,6% und die pulmonalen Dekompensationen um 1,8% ab. In einer Nachfolgestudie analysierten Kovner et al (2002) zwischen 1990 und 1996 erhobene Austrittsdaten von 530 – 560 Spitäler aus 13-US Staaten und wiesen wiederum einen signifikanten negativen Zusammenhang zwischen einer geringeren Anzahl an durch registrierte Pflegepersonen geleisteten Pflegestunden und einer höheren Anzahl an Pneumonien bei chirurgischen Patienten nach. Needlemann et al. (2002) analysierten von 799 Spitälern in 11 US-Staaten 5'075'969 medizinische und 1'104'659 chirurgische Patientenaustrittsdaten. Die Ergebnisse dieser Studie zeigen einen signifikanten Zusammenhang zwischen einer höheren Anzahl an registrierten Pflegepersonen oder einer höheren Anzahl an durch registrierte Pflegepersonen geleisteten Pflegestunden und einer geringeren Anzahl an Harnwegsinfektionen, Pneumonien, Blutungen im oberen Gastrointestinaltrakt,

Schock (oder Herzstillstand) und einer kürzeren Aufenthaltsdauer bei medizinischen Patienten, sowie niedrigeren „failure-to-rescue“ Raten bei chirurgischen Patienten. In einer Studie von Cho (2001), bei der 124’204 Austrittsdaten chirurgischer Patienten mit 20 DRGs[9] aus 232 Akutpflegespitäler in Kalifornien analysiert wurden, nahmen mit jedem Anstieg des Anteils an registrierten Pflegepersonen um 10% die Pneumonien bei chirurgischen Patienten um 9,5% ab. Stieg die Anzahl der durch registrierte Pflegepersonen geleisteten Pflegestunden um eine Stunde an, nahm die Wahrscheinlichkeit, dass bei Patienten eine Pneumonie auftrat um 8,9% ab. Diese Studie zeigt weiter, dass die bei den Patienten eingetretenen potentiell nachteiligen Ereignisse (Sturz, Dekubitus, Medikamentenfehler, Pneumonie, Harnwegsinfektionen, Wundinfektion und Sepsis) mit einem signifikant längeren Spitalaufenthalt und höheren medizinischen Kosten verbunden waren. So war zum Beispiel das Auftreten einer Pneumonie mit einer Verlängerung der Spitalaufenthaltsdauer von 5,1 – 5,4 Tagen, einem Anstieg des Risikos zu sterben von 4,7 - 5,6% sowie einem Kostenanstieg von $22,390 – $28,505 US Dollar verbunden.

Nationale Daten aus der Schweiz

In der Schweiz wurden bisher keine mit den internationalen Studien vergleichbaren Untersuchungen durchgeführt. Zur Erfassung der Personal- und Arbeitssituation im Pflegebereich fanden in den letzten Jahren drei Befragungen statt. Bei diesen Befragungen handelte es sich um Gelegenheitsstichproben, bei denen unterschiedliche Methoden angewendet wurden. Deshalb sind die Ergebnisse nicht für die ganze Schweiz verallgemeinerbar. Jedoch lassen sie gewisse Parallelen untereinander und gewisse Tendenzen in Richtung der internationalen Ergebnisse erkennen.

Bei einer repräsentativen Befragung von Mitgliedern des Schweizer Berufsverbandes der Pflegefachfrauen und Pflegefachmänner (SBK) gaben 52% der befragten Personen an, dass sie in den letzten fünf Jahren einen Stellenabbau festgestellt haben. 68% stellten im gleichen Zeitraum eine stärkere psychische Belastung fest und für 47% hatten diese Belastungen direkte gesundheitliche Folgen (Weyermann & Brechbühler, 2001). Bei einer im Auftrag der SVAP[10] durchgeführten Befragung von 20 Personalverantwortlichen in Akutspitälern in verschiedenen Schweizer Kantonen gab eine Mehrheit der Befragten an, dass es vor allem an qualifiziertem Personal in den Spezialbereichen fehlt. Dies wirkt sich kurzfristige in Form von unterlassenen Therapien, Gesprächen, unzureichender Informierung von Patienten, Bettenstreichungen, einem Anstieg der Fehlerrate sowie langfristig durch einen Qualitätsabbau aus. Der Personalmangel ergab sich zum Teil durch offene Stellen (von total 6’619 Stellen waren 206 offen und 47 nur behelfsmäßig

[9] DRGs = Diagnostic Related Groups

[10] SVAP = Schweizerische Beratungs- und Vermittlungsstelle für das Gesundheitswesen AG

besetzt), die bei Stellenplänen, die bereits einer Minimalbesetzung entsprachen, nicht besetzt werden konnten. Durch jährliche Fluktuationsraten von 19% musste zusätzlich viel Zeit für die Einarbeitung neuer Mitarbeiter aufgewendet werden (Kindschi, Held, Lechmann, Karges & Rechsteiner, 2001). Zur Erfassung der Arbeitssituation im Pflegebereich im Kanton Bern befragten Künzi und Schaer–Moser (2002) Pflegefachpersonen, Geschäftsleitungen und Pflegedienstleitungen von 70 Pflegeinstitutionen. Von den an der Studie teilnehmenden 1'954 schriftlich befragten Pflegefachpersonen gaben 40% an, eine Qualitätsverschlechterung in der Pflege festzustellen. Über die Hälfte der Befragten musste aus Zeitmangel Abstriche insbesondere im Bereich Gespräch / Betreuung, aber auch in den Bereichen Ernährung / Ausscheidung, Körperpflege / Kleiden und Bewegung machen. 30% der Befragten musste sich in der pflegerischen Betreuung darauf beschränken, dass ihre Patienten „warm, satt und sauber“ sind. Etwas weniger als die Hälfte der Befragten konnten die Arbeit nicht mehr so verrichten, wie es dem professionellen Verständnis einer guten Pflege entspricht. Die bei einer Untergruppe von 830 Pflegefachpersonen durchgeführten Zeitverwertungsanalysen ergaben einen zusätzlichen Zeitbedarf von durchschnittlichen 22 Minuten pro Pflegefachperson pro Erhebungstag oder in Stellenprozente hochgerechnet von 380 zusätzlichen Vollzeitstellen um eine angemessene Pflege durchführen zu können. Die an der Studie teilnehmenden 283 Geschäftsleitungen und 158 Pflegedienstleitungen stellten am häufigsten Mängel im administrativen Bereich fest, wie mangelhaftes Nachführen der Pflegedokumentation, mangelhafte Instruktion von Patienten und Vergessen von wichtigen Terminen. Eine Mehrheit der befragten Geschäfts- und Pflegedienstleitungen bestätigte, dass es durch Stress und Überforderung beim Pflegepersonal selten bis manchmal zu Medikamentenverabreichungsfehlern oder Stürzen bei Patienten kommt. Wie ein knappes Drittel der Geschäftsleitungen der öffentlichen Großspitäler aussagte, kann aufgrund der Personalsituation im Pflegebereich das Durchführen der benötigten Behandlung ohne Zeitverzögerungen und ohne gesundheitliche Folgen für den Patienten nicht mehr garantiert werden. Die Fluktuationsraten im Akutpflegebereich lagen zum Erhebungszeitpunkt bei 22%.

3.5 Diskussion und Schlussfolgerung

Die Ergebnisse dieser Literaturarbeit, spezifisch die internationalen Forschungsergebnisse haben gezeigt, dass die Pflege innerhalb des Spitals nicht nur einen Kostenfaktor darstellt, sondern wesentlich zur Erzielung guter Patientenergebnisse beiträgt. Damit die Pflege diesen Beitrag zur Erreichung guter Behandlungsresultate bei Patienten leisten kann und eine optimale Funktion des von ihr zur Verfügung gestellten 24-Stunden Überwachungssystems gewährleistet ist, bedarf es gewisser Voraussetzungen. Dies sind eine an die Pflegeintensität und -komplexität der Patienten angepasste Stellenbesetzung und Fachkompetenz in Pflegeteams, eine qualitativ gute Arbeits-

umgebung, die den Pflegefachpersonen ermöglicht ihr professionelles Wissen vollumfänglich umzusetzen und an die individuelle Patientensituation angepasst, angemessen im Sinne des Patienten zu handeln.

Wie die internationalen Ergebnisse gezeigt haben, wirkt sich der Personalmangel, Mangel an Fachkompetenz in Pflegeteams, Arbeitsüberlastung oder eine qualitativ schlechte Arbeitsumgebung durch eine Verschlechterung der Pflegequalität und einen Anstieg der Komplikations-, „failure-to-rescue"- und Mortalitätsraten negativ auf die Behandlungsergebnisse der Patienten aus. Aufgetretene potentiell nachteilige Ereignisse und / oder Komplikationen bei Patienten sind oft mit unterschiedlich großen Nachfolgeschäden und zusätzlichen Kosten verbunden wie Cho (2001) in ihrer Studie gezeigt haben. Können diese Folgen durch eine angemessene Stellenbesetzung und Fachkompetenz in Pflegeteams verhindert oder zumindest reduziert werden, trägt dies nicht nur zu besseren Patientenergebnissen sondern auch zu geringeren Kosten bei. Dieser Aspekt sollte bei der Durchführung von Kosteneinsparungsstrategien mehr berücksichtigt werden.

Wie die internationalen Ergebnisse weiter gezeigt haben, wirkt sich eine nicht an den Pflegebedarf und die -komplexität angepasste Stellenbesetzung in Pflegeteams auch auf die Arbeitszufriedenheit und die Häufigkeit des Vorkommens von Burnout, Fluktuation und arbeitsbedingten Verletzungen beim Pflegepersonal aus. Zu berücksichtigen ist hierbei auch, dass mit jeder ausscheidenden Pflegefachperson ein Verlust an Fachkompetenz einhergeht, der insbesondere in Spezialgebieten zum Tragen kommt. Hinzu kommen noch die mit jeder Stellenneubesetzung verbundenen hohen Kosten. In den USA kostet beispielsweise der Ersatz einer chirurgisch oder medizinisch spezialisierten Pflegefachperson zwischen $42'000 und $64'000 (Aiken et al., 2002b). Für die Schweiz konnten keine genauen Angaben hierzu gefunden werden. Es ist jedoch anzunehmen, dass sich die Kosten auf eine vergleichbare Höhe in CHF belaufen.

Wie die Literaturüberprüfung gezeigt hat, wurde in der Schweiz bisher keine mit den internationalen Studien vergleichbare Untersuchungen durchgeführt, in denen die Auswirkungen von Kosteneinsparungsstrategien, Stellenbesetzung und Fachkompetenz in Pflegeteams auf die Behandlungsergebnisse der Patienten und die arbeitsbezogenen Ergebnisse beim Pflegepersonal untersucht wurden. Die verfügbaren Schweizerdaten weisen jedoch darauf hin, dass es den Pflegefachpersonen an Zeit fehlt um bei Patienten alle notwendigen pflegerischen Maßnahmen durchzuführen und den Patienten so eine gute an ihre individuelle Situation angepasste Pflege anbieten zu können. Wie auch von den befragten Pflegefachpersonen in der internationalen Spitalergebnisstudie berichtet, wirkt sich dies insbesondere auf den Bereich Gespräch und Betreuung, sowie auf eine Verschlechterung der Pflegequalität aus. Dieser von den Pflegefach-

personen berichteten Pflegequalitätsverschlechterung ist Bedeutung beizumessen, da internationale Studien eine hohe Übereinstimmung zwischen der von den Pflegefachpersonen eingeschätzten Pflegequalität und der objektiven gemessenen Pflegequalität gezeigt haben (Aiken, 2002b; Smith, 2002).

Zur aktuellen Personalsituation im Akutpflegebereich sind in der Schweiz zurzeit keine Daten verfügbar. Es ist jedoch davon auszugehen, dass der Pflegepersonalmangel und die Anzahl offener Stellen im stationären Akutpflegebereich gegenwärtig konjunkturbedingt und aufgrund von finanziell bedingten notwendigen Minimalstellenbesetzungen rückläufig sind. Die internationalen Ergebnisse haben jedoch gezeigt, dass Pflegepersonen, die mit ihrer Arbeit unzufrieden sind und nicht mehr so pflegen können wie es einer guten Pflege entspricht, häufiger als die zufriedenen Pflegepersonen hohe Burnoutwerte aufweisen und auch öfters als diese die Stelle wechseln oder ganz aus dem Beruf aussteigen. Es muss daher davon ausgegangen werden, wenn sich in Zusammenhang mit Kosteneinsparungsstrategien die Arbeitsbedingungen im stationären Akutpflegebereich in der Schweiz weiter verschlechtern, die Fluktuation und der Pflegepersonalmangel im Akutpflegebereich wieder ansteigen werden. Daten aus Deutschland zeigen, dass dort im Jahr 2002 in einer Stichprobe von 328 Krankenhäusern 780 offene Vollzeitstellen respektiv hochgerechnet auf alle Allgemeinkrankenhäuser 2'572 Vollzeitstellen im Pflege- und Funktionsdienst nicht besetzt werden konnten. Etwa ¼ aller Krankenhäuser in drei Größenklassen bis zu 600 Betten und 38% der Krankenhäuser mit mehr als 600 Betten gaben an kein Pflegepersonal zu finden (Offermanns, 2003).

Da in der Schweiz die Zusammenhänge zwischen Kosteneinsparungsstrategien, Stellenbesetzung und Fachkompetenz in Pflegeteams und deren Auswirkungen auf die Ergebnisse von Patienten und Pflegefachpersonen noch nicht untersucht wurden, muss es im Hinblick auf die gegenwärtigen Entwicklungen im schweizerischen Gesundheitswesen als sehr wichtig angesehen werden, dieser Thematik im Rahmen einer wissenschaftlichen Untersuchung nachzugehen. Nur so können evidenzbasierte Daten gewonnen werden, welche als Grundlage für weiterführende gesundheitspolitische Diskussionen und Entscheidungen zum Thema Kosteneinsparung und -senkung im Gesundheitswesen genutzt werden können. Das Institut für Pflegewissenschaft der Universität Basel, hat deshalb in Zusammenarbeit mit Professor L. Aiken und ihrem Team vom Center for Health Outcomes and Policy Research der Universität Pennsylvania (USA) im Auftrag des Schweizer Bundesamts für Gesundheit im Herbst 2003 mit der Durchführung der RICH – Nursing Studie (Rationing in Swiss (CH) Nursing) begonnen. Diese Studie knüpft an die internationale Spitalergebnisstudie (IOHS) an. An ihr beteiligt sind acht Schweizer Akutpflege-

spitäler aus der deutsch- und französischsprachigen Schweiz, sowie 2'052 Pflegefachpersonen und 1'190 Patienten. Erste Ergebnisse werden ab Herbst 2005 vorliegen.

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Chapter 4

4 Conceptual framework: implicit rationing of nursing care

Building upon the accepted definitions of rationing in healthcare, implicit rationing of nursing care refers here to "the withholding of or failure to carry out necessary nursing measures for patients due to a lack of nursing resources (staffing, skill mix, time) [1]. Considering that rationing of nursing care also occurs on the meso- and macro levels, this definition refers to rationing and the allocation of scarce resources on the micro level, i.e., resource constraints at the level of the individual nurse, which is the focus of this dissertation.

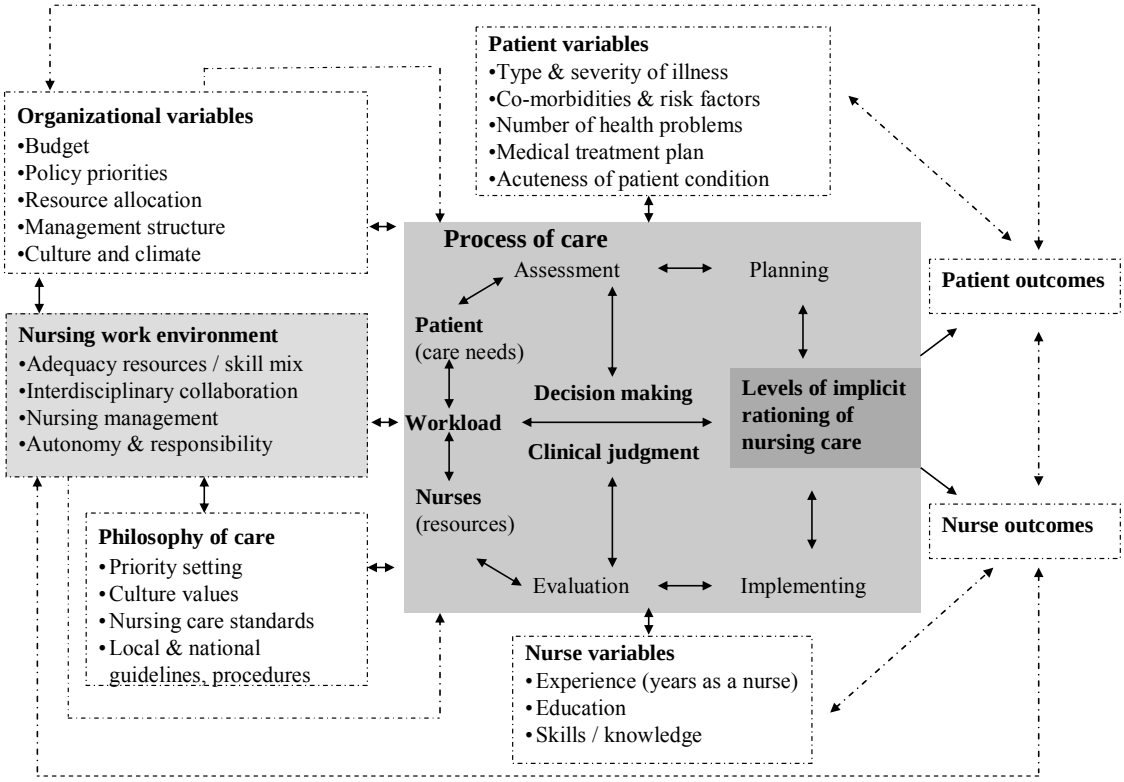
Within this definition, "necessary nursing measures" refers to a group of nursing tasks and actions which are accepted – both by clinical consensus and by the attending nurse – as important for a patient to achieve the desired outcomes. Such tasks and actions can be classified according to the following aims: surveillance, therapy, support, prevention or prophylaxis, activation or rehabilitation, educational and instructional measures, and measures related to the application, documentation, and adaptation of nursing processes. The individual levels of necessity of these measures are based on the nurse's assessment of the patient's healthcare needs (number of nursing problems identified, desired outcomes, and evaluated effectiveness of the care planned during the nursing process), scientific evidence, reflected expert knowledge and patient preferences [2]. Further, the necessity of a measure is prescribed by nursing standards and local and national guidelines and procedures, insofar as these are available.

In Switzerland, no national nursing standards are available, but the Swiss Red Cross (SRC) framework for nursing education, entitled "the five dimensions of nursing care" [3] [11], describes the scope and responsibilities of nursing education and, to a large extent, nursing in general. The SRC framework is a non-prescriptive one, which does not prescribe necessary nursing measures, but rather a basic structure for the planning, implementation and evaluation of necessary care.

11 In Swiss Red Cross framework (SRC) (Schweizerisches Rotes Kreuz (SRK))Bern, describing the overall supply of nursing care to satisfy the nursing needs of the population (individuals, groups, neonates, children, juveniles, adults, older people; healthy, acute and long-term patients, people with higher health risk), is summarized in five mutually supplementary dimensions: 1) supporting patients in or taking over the activities of daily living (ADLs), 2) supporting patients in crisis situations and during the dying process, 3) participating in preventive, diagnostic and therapeutic interventions, 4) participating in prevention of illnesses and accidents as well as in health promotion, and integration programs , 5) improving the quality of care and developing nursing as a profession, as well as collaborating in research projects. Further, for every dimension the necessary skills and knowledge are defined regarding their implementation.

Implicit rationing of nursing care, as defined above, refers less to nursing care than to what the participating nurses judged necessary to reach the desired outcomes or protect the patients from additional negative events or conditions such as falls or pressures sores. Implicit rationing of nursing care can be seen as an end product of processes of clinical decision making and critical judgment, when nursing resources are too scarce to provide all necessary care to all patients (see Figure 1).

Figure 1: Conceptual framework: Implicit rationing of nursing care



In general, decision-making is seen as a complex process involving the following steps: information collection, problem identification, consideration of alternative strategies, and selection of optimal actions. Factors influencing the process include education, compliance with unit based practice, hospital culture, leadership and responsibility, all of which are influenced by experience, confidence, willingness, the nurse's ability to take responsibility, the patient's condition (stable, unstable), and the available resources (real or impending lack of resources) [4].

Factors influencing priority-setting in clinical nursing practice include characteristics of the nurse care work environment (e.g., organization of nursing practices at the ward level, nurses' autonomy and responsibility), the philosophy of care, the amount of available time and resources

(number of staff, skill mix, and equipment), philosophy and aims of the organization, nursing care standards (including local and national policies, regulations, guidelines, and procedures), patients' values and priorities, urgency of health problems, medical treatment plans, acuteness of patient conditions, number of problems per patient, and nurse caseloads (patient-to-nurse ratio) [5,6].

Indications exist that the allocation of available resources and decision-making quality are based on the utilization of practice-based evidence, professional knowledge, nursing standards, guidelines and the experience level of the nursing team [7]. Further, internal prioritization of the necessary nursing tasks takes place when nurses are short of time, and care aspects most associated with nursing, such as emotional support, support of patients in activities of daily living, or documentation are most likely omitted in favor of life-saving, medical–technical and therapeutic treatment [8-10].

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Chapter 5

5 Validation of the Basel Extent of Rationing of Nursing Care (BERNCA) Instrument

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5.1 Abstract

Background: Financial constraints and other forces affecting health care in many countries have led to nurses implicitly limiting their care in some instances. In the absence of an accepted definition and theoretical framework of implicit rationing of nursing care, a framework and the Basel Extent of Rationing of Nursing Care (BERNCA) instrument were developed. This instrument was used in the Swiss part of the International Hospital Outcome Study (IHOS), which also studied implicit rationing of nursing care.

Objective*:* To examine the validity and reliability of the newly developed BERNCA instrument.

Method: Psychometric analysis of data from 957 nurses in five Swiss acute care hospitals enrolled in a larger hospital organization study. An explanatory factor analysis with varimax rotation was used to investigate the instrument's internal structure. Spearman correlations were used to test relationships between implicit rationing and two related concepts, and Cronbach's alpha and interitem correlations were used to test the reliability of the scale.

Results: Expert feedback confirmed that the BERNCA covered the "implicit rationing of nursing care" domain adequately and that its questions were fully comprehensible. The single-factor solution confirmed the instrument's unidimensional internal structure. A moderate to strong correlation in the expected direction was found between the BERNCA implicit rationing data and the quality of the nurse work environment as measured by the Nursing Work Index-Revised – particularly the perceived adequacy of nursing resources, although a significant but low correlation was also shown with patient-to-nurse ratios. Cronbach's alphas (.93) and inter-item correlations indicated internal consistency and homogeneity.

Discussion: Initial evidence of the validity and reliability of the BERNCA instrument was provided.

Keywords: Healthcare rationing, health resources, nursing care

5.2 Background

Global healthcare costs are rising dramatically, alongside scientific and technological advances, demographic trends, and epidemiological shifts. Such costs often surpass the means of governments, insurers, and users to finance them. To contain the growth of public healthcare expenditures, costs saving strategies have been implemented at national, regional, and local levels. These include: a) hospital budget cuts, often straining patient-to-nurse ratios and staff skill mixes; b) changes in hospital utilization by shortening stay periods, or substitution of outpatient for inpatient care, and c) efforts to maximize cost-effectiveness regarding medical practices (e.g., managed care) (Aiken, Clarke, & Sloane, 2001; Finlayson & Gower, 2002; McKee & Healy, 2002). However, restructuring, reorganizing and reengineering strategies often lead to rationing of health care services (Bodenheimer & Grumbach, 2002; Ward, 2005), meaning the extent to which the tasks / measures are withheld is the purpose of the Basel Extent of Rationing of Nursing Care (BERNCA) Instrument. This study is designed to validate this instrument.

Preliminary evidence

An extensive literature review showed that the available empirical evidence on rationing of health care services focused primarily on rationing of medical care and services and that, although various studies or reports (the majority, unfortunately, in non-English articles) discussed implicit rationing of nursing care, the topic had neither an accepted definition nor a conceptual framework.

Still, it was readily apparent that, due to limited resources, nurses in hospitals could not always provide what they considered necessary care to all patients. In the IHOS study, for example, only 30-40% of 43,329 nurses surveyed reported enough registered nurses were staffed to perform all required nursing tasks and to provide high quality care. Furthermore, considerable numbers (from 10 to 54% across tasks and countries) reported that a number of nursing activities considered as markers of adequate nursing care, such as brushing patients' teeth, teaching patients and their families, and comforting / talking with patients had been left undone on their most recent shift (Aiken, Clarke, Sloane et al., 2001).

Sixty-four percent of 2,510 nurses in the United Kingdom reported lacking the time to perform essential nursing tasks such as addressing patients' anxieties, fears and concerns (19.7% to 51.9%), treating their symptoms and conditions (15.4% to 33.1%), or providing them and their relatives with necessary information (9% to 50.7%) (West, Barron, & Reeves, 2005).

Thirty percent of 1,954 participating Swiss nurses indicated that, due to a lack of time resources, they had had to limit their necessary nursing care to keeping patients warm, well fed, and clean. Time pressure primarily affected patient comfort and communication, followed by feeding and elimination functions, personal hygiene, dressing and mobilization. Furthermore, many nurses indicated that they had had insufficient time to monitor disoriented or confused patients carefully enough to ensure their safety, and had therefore restrained them, given them sedatives, or both as protective measures (Kuenzi & Schaer - Moser, 2002). Another Swiss survey of 20 administrative leaders in Swiss acute care hospitals linked the lack of qualified nursing personnel with the omission of necessary nursing therapies and discussions with patients, closing of beds, and increased error rates on a short term basis, concurrent with decreased care quality on a long-term basis (Kindschi, Held, Lechmann, Karges, & Rechsteiner, 2001).

Little is known about the processes of how nurses decide which patients do not receive required nursing care when resources are scare. In general, decision-making is seen as a complex process that includes information collection, problem identification, consideration of alternative strategies, and selection of optimal actions. Factors influencing decision-making and clinical judgment, priority setting and triage processes in clinical nursing practice are as follows: (a) hospital-level organizational factors; (b) characteristics of the nurse work environment (e.g., patient-to-nurse ratios, amount of available time and resources), (c) the philosophy of care, (d) the nurse's personal characteristics (e.g., education, experience, knowledge) and (e) patients' characteristics (e.g. number and urgency of health problems, condition) (Andersson, Omberg, & Svedlund, 2006; Bucknall, 2000; Currey & Botti, 2006; Hendry & Walker, 2004).

Although this evidence suggested the existence of implicit rationing of nursing care, to our knowledge, no research was found on the extents and mechanisms of implicit rationing of nursing care in hospitals, or on its relationship with patient and nurse outcomes, and no instrument was available to quantify it. To address this gap, as part of the IHOS study (Aiken, Clarke, & Sloane, 2002), the Rationing of Nursing Care in Switzerland (RICH) study was conducted. The BERNCA instrument was developed in preparation for the study, and the current study was designed to test its reliability and validity in accordance with accepted standards for educational and psychological testing American Educational Research Association (AERA), American Psychological Association & National Council on Measurement in Education (AERA, APA, & NCME, 1999).

Definition of implicit rationing of nursing Care

The definition of implicit rationing of nursing care was based on the following general definition of rationing in medical care and healthcare: rationing is the allocation of scarce or limited health-care resources, when standard measures expected to be beneficial have to be withheld from some individuals (Bodenheimer & Grumbach, 2002; Truog et al., 2006; Ubel & Goold, 1998).

Based on these definitions implicit rationing of nursing care was defined as "the withholding of or failure to carry out necessary nursing measures for patients due to a lack of nursing resources (staffing, skill mix, time)" (Schubert et al., 2005). Within this definition, "necessary nursing measures" refers to a set of nursing tasks / treatment measures which are accepted – by clinical consensus and the attending nurse – as important for a patient to achieve the desired outcomes. Such tasks and measures can be classified according to the following aims: surveillance; therapy, support; prevention or prophylaxis; activation or rehabilitation; educational and instructional measures; and measures related to the application, documentation, and adaptation of nursing processes. These are influenced by the professional standards, educational levels and cultural characteristics of the relevant regions / countries.

Conceptual framework of Implicit Rationing of Nursing Care

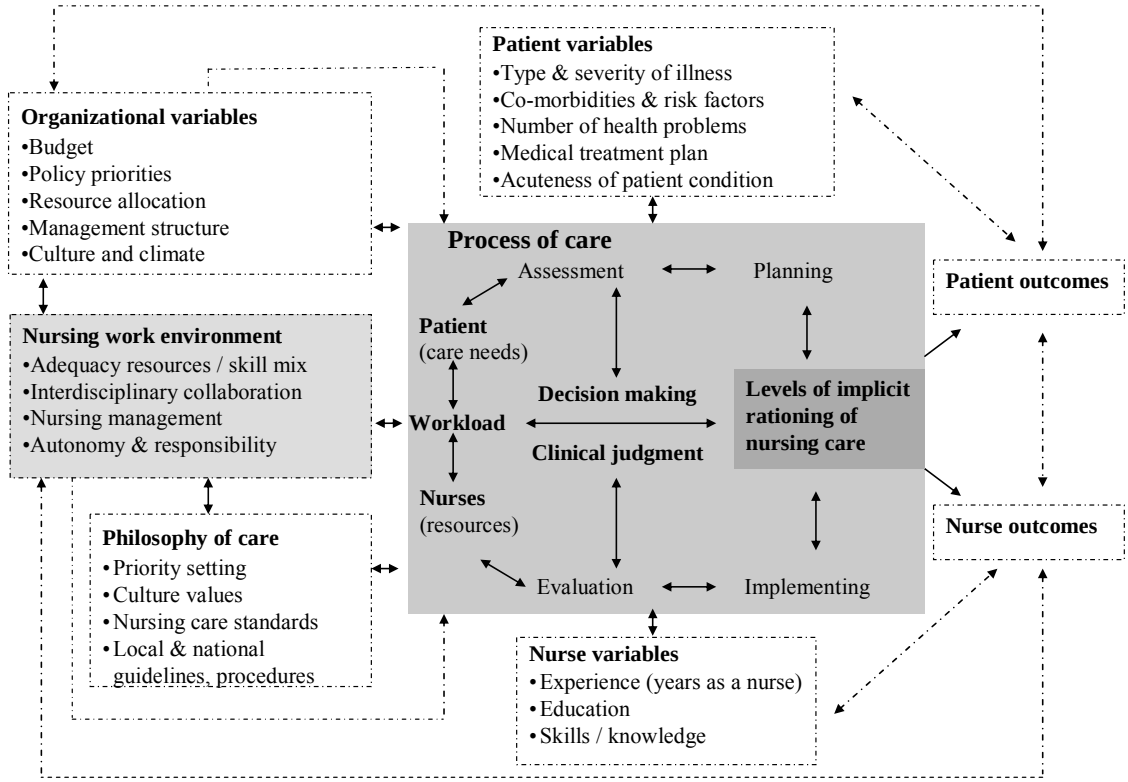
Based on the available empirical evidence regarding factors influencing decision-making and prioritization of nursing care, as well as patient and nurse outcomes, a conceptual framework was developed to explain the construct of implicit rationing of nursing care, with related constructs and influences (Figure 1).

This implicit rationing of nursing care occurs during the process of care when a nurse' resources are insufficient to provide what she considers necessary care to all patients under her care. The precise details of the rationing depend on individual processes of clinical decision making and judgment. The extent is expressed in the number and urgency of necessary nursing tasks with-held. It is influenced by the capacity of a nursing unit's resources to meet the patients' care needs and is precipitated when that capacity is surpassed. Imbalances may occur due to a range of organizational and individual factors influencing decision-making, judgment, and prioritization processes, along with triage.

Nursing care depends on problem-solving and decision making processes which include several steps: assessment of the patient situation and identification of the relevant problem, planning of the needed nursing care (measures and intervention), and implementation and evaluation of care. During this process each nurse has to evaluate the needs of every patient under her care and has to judge and to decide whether to adhere to or adapt the existing care plan. Based on the overall

workload on the unit and the individual patient case load and patient preferences, the nurse then has to assess if there are enough nursing resources to provide the needed care to all patients, or if he or she needs to withhold needed nursing care from some patients. It can be expected that, before a nurse withholds necessary nursing tasks, he or she will try to utilize other possibilities, including delegation, suboptimal execution, or simply postponement of the task.

Figure 1: Conceptual framework: Implicit rationing of nursing care



As described above, no data on the relationship between implicit rationing of nursing care on patient and nurse outcomes was found to have been published before the current research was undertaken. However, based on the results of several studies demonstrating significant relationships between the nurse work environment, staffing/skill mix, and patient and nurse outcomes (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Kovner & Gergen, 1998; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002) a hypothesis was formed: implicit rationing, which occurs at level of the nurse-to-patient interface, would be related directly to patient and nurse outcomes. Also, the lower quality nurse work environments and higher workloads would be related to higher levels of implicit rationing of nursing care and poorer patient and nurse outcomes.

5.3 Methods

Development of the BERNCA instrument

The development of the BERNCA instrument was based on the previously described conceptual framework of implicit rationing of nursing care, as well as on preliminary evidence, clinical expertise of members of the research team and the Swiss Red Cross (Schweizerisches Rotes Kreuz; SRK) framework for nursing education (SRK, 1992). In Switzerland, no national nursing standards exist, but the Swiss Red Cross framework, which is non-prescriptive, describes the scope and responsibilities of nursing education, and, to a large extent, of nursing in general. The SRK framework does not specify necessary nursing measures, but provides a basic structure for their planning, implementation and evaluation.

As a first step an initial list of 20 questions was generated on necessary nursing tasks indicated in the literature and the experience of the research team as those most likely omitted during nursing resource shortfalls. The list was sent to 20 qualified nursing specialists from the German-speaking part of Switzerland. These experts have at least a Swiss or equivalent foreign nursing diploma, and the majority have completed advanced education in nursing (Level 1 or 2), or bachelor's, master's or doctoral degrees in nursing. All were working in direct patient care in hospitals or had a minimum of 2 years' experience in this area. (No nursing administrators were included.) These experts were asked to indicate whether all significant aspects of the construct of implicit rationing of nursing care had been included, and whether all content was relevant and the formulation was clear. Based on their evaluation, no questions had to be excluded or added, but two questions had to be rephrased.

In the final version of the questionnaire, the 20 questions were divided into five dimensions, according to their aims in relation to the categories provided in the Swiss Red Cross framework. These were: (a) Activities of Daily Living (ADLs), (b) Caring & Support, (c) Rehabilitation & Instruction & Education, (d) Monitoring & Safety and (e) Documentation (Table 1). Using a 4-point Likert scale (*never* = 0, *rarely* = 1, *sometimes* = 2, *often* = 3), nurses assessed how often they had been unable to carry out the listed nursing tasks in the previous 7 working days. To interpret the test scores, it was necessary to calculate the overall rationing score and the mean.

The BERNCA was further pilot-tested in two phases. In the first, 10 students at the Institute of Nursing Science (University of Basel, Switzerland), all of whom were experienced professional nurses having worked for at least 2 years in direct patient care in Swiss acute care hospitals, evaluated the clarity and comprehensibility of the items' wording. Subsequently, a group interview was conducted with four of the respondents to discuss these points further. As a result, a

number of minor changes were made. In a second phase, the BERNCA was given to 14 registered nurses from one hospital to evaluate the clarity of the questions and wording. No further changes were required.

Table 1: BERNCA Questions and Results of the factor analysis (method Principal Component Analysis, One-Factor Solution)

Items questionnaire abbreviated	Factor loading	Mean	SD
1. Activity of Daily Livings (ADLs)			
(1a) .Bathing / skin care	,580	0.58	0.71
(1b) Perform oral or dental hygiene for patients	,648	0.62	0.76
(1c) Eating	,563	0.33	0.63
(1d) Mobilization / changing positions	,687	0.66	0.76
(1e) Managing body waste (urine, stool, vomit)	,562	0.20	0.48
(1f) Changing bed linen	,663	0.71	0.76
2. Caring - Support			
(2a) Emotional or psychosocial support	,723	1.30	0.83
(2b) Conversations with patients or their families	,745	0.90	0.83
3. Rehabilitation - Instruction - Education			
(3a) Toilet training	,643	0.58	0.82
(3b) Activating / rehabilitating care	,749	0.92	0.82
(3c) Education of patients / their families about self-care	,705	0.55	0.71
(3d) Preparation for hospital discharge	,734	0.80	0.76
4. Monitoring - Safety			
(4a) .Adequate monitoring of patients vital signs	,616	0.70	0.81
(4b) .Adequate monitoring of confused / impaired patients	,590	0.76	0.90
(4c) Coping with the delayed response of a physician	,579	0.96	0.92
(4d) Respond promptly to patient calls	,563	0.84	0.86
(4e) Adequate hand hygiene	,571	0.70	0.77
5. Documentation			
(5a) Review patient documentation at the beginning of the shift	,622	0.87	0.85
(5b) Formulate / update patient care plans	,713	1.14	0.86
(5c) Documentation of performed nursing care	,713	0.86	0.79

Validity and Reliability Testing

Our estimates of the BERNCA's validity and reliability were based on the STANDARDS (AERA et al., 1999), as a prescriptive guideline and framework of validity testing among four of five possible validity dimensions.

Validity testing Evidence based on test content was explored through a logical analysis of the adequacy with which the test content represented the content domain of implicit rationing of nursing care and the relevance of the content domain to the proposed interpretation of the test

score. This also involved expert judgments and further pilot testing (previously discussed in the description of the scale development).

Evidence based on response processes was explored through an assessment of each question and the entire scale in relation to missing values and specific patterns of responses, as well as through an analysis of the relationships between parts of the test. Given the anonymity of the surveys, it was not possible to ask the respondents about their thought processes in answering the questions. To explore evidence based on internal structure of the BERNCA and to investigate the construct of implicit rationing of nursing care, based on the conceptual framework, the following hypothesis was formulated and tested: H1) There is a moderate to strong positive correlation among the test items and the overall construct of implicit rationing of nursing care.

The evidence of the BERNCA based on relations to other variables was explored through an examination of the relationship between implicit rationing of nursing care and two related constructs: quality of the nurse work environment and patient-to-nurse ratio. To test this evidence dimension, two hypotheses were developed: (H2) There is a negative correlation between implicit rationing of nursing care (measured with the BERNCA) and the quality of the nurse work environment (measured with the Nursing Work Index- Revised (NWI-R)). The correlation will be stronger between implicit rationing of nursing care and the underlying dimensions of nursing resources and nursing autonomy than between the two underlying dimensions of nursing leadership and professional development, and interdisciplinary collaboration and competence. (H3) There is a moderate positive correlation between implicit rationing of nursing care (measured with the BERNCA) and the patient-to-nurse ratio.

The *quality of nurse work environment* was measured with the NWI-R, an instrument used in the IHOS study (Aiken, Clarke, & Sloane, 2002; Aiken & Patrician, 2000; Lake, 2002), containing 51 questions, each of which used a 4-point Likert scale (ranging from *strongly agree* to *strongly disagree*) to record the extent to which each identified element was present in the respondent's current position. A factor analysis of the current dataset resulted in a solution involving three factors: (a) nursing leadership and professional development, (b) nursing resources and autonomy, and (c) interdisciplinary collaboration and competence. Seventeen questions were excluded because of commonalities of less than 0.30. The Cronbach's alphas of the three subscales ranged between .72 and .90**.** To calculate the quality of the nurse work environment, the scores for items, total scale and subscales were summarized and the means calculated.

*Patient-to-nurse ratio***,** the number of patients each nurse was personally responsible for on the last shift worked – viewed here as a proxy for workload – was measured using an item developed

for the IHOS study (Aiken, Clarke, & Sloane, 2002). The NWI-R and other instruments from the IHOS used in the RICH Nursing study were translated from English to German using the adapted Brislin protocol (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001).

Reliability testing To test the reliability of the BERNCA and to explore the consistency and precision of the tests results of the measurement process the following hypothesis was formulated: (H4) The BERNCA instrument is internally consistent and homogenous. Possible sources of measurement error were investigating using summary statistics.

Design and sample

Data from 957 nurses working in five acute care hospitals in the German speaking part of Switzerland who took part in the RICH Nursing Study were used in these analyses. The RICH Nursing Study included a convenience sample of hospitals which had more than 100 beds and offered surgical, medical, or gynecological services, and whose directors had provided written consent for participation. All nurses working in the participating hospitals' medical, surgical, or gynecological units were invited to participate. Inclusion criteria for nurses were: (1) a Swiss nursing diploma (DN I / DN II[12]) or an equivalent foreign nursing diploma and (2) a minimum of 3 months' experience in direct patient care at the current hospital and of 1 month on the current unit. Student nurses, nursing assistants and float pool nurses were excluded specifically.

Data collection and Data management

Data collection was consecutively conducted in the five participating hospitals between fall 2003 and summer 2004. Nurses were surveyed voluntarily and anonymously. All nurses who fitted the inclusion criteria were invited to fill out the nurses' questionnaire. The questionnaires were distributed by the research team and contact persons in the respective hospitals and were collected in a closed box placed on the participating units. Informed consent of nurses was implied by the completion and return of the questionnaires. Approval was obtained from the four local ethics committees responsible for the five participating hospitals.

Data analysis

Descriptive statistics (frequencies, medians, interquartile ranges (IQR), means, standard deviations (*SD*), variances, graphs**,** and cross-tabulations) were used to depict the nurse sample and to investigate response processes, possible systematic answer patterns, missing values and measurement errors. Cronbach`s alpha and interitem correlations were used to test the reliability

[12] DNI = Diploma Level I with three years' training and and DN II = Diploma Level II four years' training

of the instrument's overall scale and extracted subscales. To evaluate the internal structure of the BERNCA and the NWI-R, various factor extraction types and rotation methods were tested. The factor extraction was based on eigenvalues and scree plot. Spearman correlations with two-sided significance levels were used to test the relationship between implicit rationing of nursing care (BERNCA) and the two related constructs of quality of the nurse work environment and patient-to-nurse ratio. Statistical data analyses were performed using SPSS 13 software **(**Chicago, IL**).**

5.4 Results

Of the 1435 nurses invited to participate, 957 (67%) returned completed questionnaires. Characteristics of the participating nurses are described in Table 2.

Table 2: Characteristics of the nurse sample

Nurses (N = 957)	%	
Female	91	
Non Swiss Nationality	22	
Age		
20-30 years	43	
31-40	29	
41–50	20	
> 50	8	
Education		
Specialized[a]	31	
Graduate and postgraduate[b]	1	
Number of years working		Mean (*SD*)
as a nurse		10.32 (9.19)
in hospital		7.53 (7.64)
at unit		5.66 (6.43)

Note: *SD* = Standard Deviation
[a]Specialized education e.g. intensive care, higher education in nursing (Level 1), clinical teacher, [b]Graduate and postgraduate education e.g. advanced education in nursing (Level 2), advanced education, or university degree in nursing management, pedagogic, science, or public health

Validity

Evidence Based on Test Content As previously discussed in the "Methods" section, evidence based on test content was established through a logical analysis of the content and the judgments of nursing experts, who confirmed that the BERNCA represented the domain of implicit rationing of nursing care, and that the included questions were relevant. Further pilot testing was conducted also as discussed previously.

Evidence Based on Response Processes Although it was not possible to ask the respondents about their thought processes in answering the questions, each individual question and the entire scale were assessed with respect to missing values, specific patterns of responses, and the relationship among parts of the test. A low frequency of missing values among items was observed (1.3% - 5.7%). Positively skewed distributions were observed in 15 of the 20 item response sets, which occurred because the majority of the nurses indicated that these items never or rarely applied; that is, that they had rarely or never been unable to carry out the listed necessary nursing tasks in the last 7 working days. Floor effects (52.6% - 82.7%) were observed for items 1a, 1b, 1c, 1e, 3a, and 3c. The mean for the entire scale was 0.77 (*SD* = 0.52) and the median score was 0.70 (25-75th quartile = 0.34, 0.70, 1.13; possible range: 0 – 3). Among the individual questions, the mean ranged from 0.20 (*SD* = 0.47; item 1e) to 1.30 (*SD* = 0.83; item 2a) (Table 1).

Evidence Based on Internal Structure The evidence based on internal structure of the BERNCA was explored with various factor extraction types and rotation methods. The Kaiser -Meyer-Oblimin test result of sampling adequacy was 0.95, and the Bartlett's test (χ^2= 7919.78, p =0) indicated that the correlations among the items were significant and the correlation matrix was factorable. The factor analysis (principal component analysis) showed three initial factors with eigenvalues greater than one and two factors close to one (Kaiser Guttman rule) (Backhaus, Erichson, Plinke, & Weiber, 2003). However, only one dominant factor was reflected in the eigenvalue and screeplot. The one-factor solution accounted for 42% of the total item variance and showed stable to very stable factor loadings for all twenty items (> .50) (Table 1).

Evidence Based on Relations With Other Variables The evidence based on relations with other variables was explored by examining the relationship between implicit rationing of nursing care and two related constructs: the quality of nurse work environment and the patient-to-nurse ratio. According to the conceptual framework and previous research, negative correlations were expected between implicit rationing of nursing care (measured with the BERNCA) and nurse work environment quality (measured with the NWI-R; H2). As expected, the correlation between implicit rationing of nursing care and the underlying dimension of nursing resources and autonomy was stronger (*r*= -.46, *p* = .01) than the correlation between implicit rationing and the two other underlying dimensions (nursing leadership and professional development (*r* -.31, *p* = .01) and interdisciplinary collaboration and competence (*r* -.26, *p* = .01)). A significant low correlation in the expected direction was found between implicit rationing of nursing care and the patient-to-nurse ratio (*r* = .14, p = .01; H3).

Reliability

The internal consistency and homogeneity of the BERNCA was investigated using Cronbach`s alpha, interitem correlations, and summary statistics. Results of the summary statistics are described in the "Evidence based on response process" section and Table 1. As predicted, the BERNCA was internally consistent and homogeneous (H4). The interitem correlation mean of 0.39 (range: 0.19 - 0.63) indicated the good consistency of the scale. The Cronbach`s alpha was .93.

5.5 Discussion

The purpose of this study was to evaluate the reliability and validity of the newly developed BERNCA instrument, which was developed to measure the levels of implicit rationing of nursing care in Swiss acute care hospitals. In a first step, a conceptual framework of implicit rationing of nursing care was developed, based on the conceptual framework of the IHOS study and empirical evidence. Building on this framework, expert knowledge, and the principles of the Swiss SRK framework of nursing education, the BERNCA instrument was developed. Initial validity and reliability of the BERNCA were established along lines of evidence as suggested in the Standards (AERA et al., 1999).

The literature review indicated the existence of implicit rationing of nursing care in hospitals, a factor which had not yet been systematically studied. This study provides a leveled systematic measurement tool to measure implicit rationing of nursing care. As the conceptual framework shows, implicit rationing of nursing care occurs during the process of care at the point of nurse to patient interaction. This makes it a very influential factor, which is linked directly with patient outcomes and the quality of care and not limited to dilution processes. The BERNCA instrument can be used in outcome research to define the effects of this factor on patient and nurse outcomes and to explain the interaction between this factor and other known outcome-influencing factors. This would extend the current knowledge in related fields and might allow the definition of the most significant factors of clinical practice relating to patient safety, quality of care and cost-saving strategies. Additionally, it could help to isolate the economic factors which should be monitored most closely.

The BERNCA can be used in clinical practice to monitor the effects of organizational changes on patient and nurse outcomes and quality of care. Further research is needed to determine the precise point at which implicit rationing begins to affect patient and nurse outcomes negatively. This would allow purposive monitoring of organizational changes and would indicate when interventions were necessary for the protection of patients and nurses.

The *evidence based on test content* of the BERNCA was confirmed by nursing experts from the German speaking part of Switzerland and by a logical analysis of the content. It has to be noted that the content of the BERNCA instrument is focused on the necessary nursing tasks that are omitted in the experience of Swiss nursing experts or in the literature, most frequently omitted when resources are scarce. It is a limitation of this study that it does not address the entire domain of nursing care activities that might be omitted and would affect usefulness in the situations mentioned above. Based on available evidence, which indicates an internal prioritization of necessary nursing measures (Morin & Leblanc, 2005; Schopper, Baumann-Hölzle, & Tanner, 2001a, 2001b) it may be valuable to extend the BERNCA instrument and to include other necessary nursing tasks such as medical, technical, and therapeutic treatment measures. Although the involved nursing experts indicated that the formulations of the questions were clear, a division of the questions with double content into single content questions is necessary so that the nurses' assessments can be assigned explicitly to the respective nursing tasks. This may also improve the skewed distribution, the low interitem correlation of some items and possible measurement errors related to double content.

Due to the anonymity of the questionnaire, validity based on *evidence of response processes* cannot be ensured; no data exist regarding the strategy and assessment criteria the nurses used when they filled out the survey. The evaluated answer pattern indicates that the evidence based on response process was appropriate, and very few missing values were noted. The anonymous survey provided some protections against response biases such as social desirability or acquiescence begin responsible for the skewed distribution and the floor effect. It is possible that recall errors contributed to the skewed distribution and the low reported levels of implicit rationing of nursing care. However, a finer scaling of the BERNCA could improve such floor effects, along with the skewed distribution.

The hypothesized moderate to strong positive correlation between the test items and the construct of implicit rationing of nursing care (H1) was confirmed via the explanatory factor analysis. The results indicated a strong relationship between the individual items and the overall factor of implicit rationing of nursing care (*evidence based on internal structure*).

The hypothesized relation between implicit rationing of nursing care and the related construct of quality of the nurse work environment was confirmed (H2; *evidence based on relation to other variables*). In the study, the factor analysis of the NWI-R provides different solution from other international studies. Nevertheless, all three NWI-R subscale scores, particularly regarding the staffing and resource dimension, were moderately to strongly related with implicit rationing (in

the expected direction), indicating that, as expected, particularly with regard to the perceived adequacy of staffing and resources, a lower rating of the quality of the nurse work environment is related with higher levels of implicit rationing of nursing care. The factor structure underlying the NWI-R is still under discussion. In a current study, questions were raised regarding the reliability and validity of the NWI-R, using Lake's scale as a measure of the nursing practice environment (Cummings, Hayduk, & Estabrooks, 2006). In turn, other researchers in non-North American countries have reported a factor structure similar to Lake's (Gunnarsdottir, Clarke, Rafferty, & Nutbeam, 2007; McCusker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004). Predominantly, the staffing and resource adequacy dimension appears consistently across linguistic and cultural adaptations.

The hypothesized relation between implicit rationing of nursing care and the related construct of patient-to-nurse ratio was confirmed (H3); yet the correlation was very low. In this study, the patient-to-nurse ratio was used as a proxy for workload and analyzed it in terms of each nurse's personal last-shift workload. As such, the patient-to-nurse ratio may be insufficiently refined to show a strong relationship with implicit rationing of nursing care. As shown by our conceptual framework, and by other studies, workload is influenced by a range of factors including the amount and type of nursing resources needed to care for each patient, as well as the patient case mix and complexity; the acuity of the patient situation; the adequacy of staffing and resources vis à vis high-quality patient care (O'Brien-Pallas, Meyer, D., & T., 2005). Further studies are needed to accumulate more evidence regarding the relation between the construct of workload and implicit rationing of nursing care, and the mechanism between these constructs. In a study conducted in intensive care units, four levels of nursing workload (unit, job, patient and situation) were identified (Carayon & Gürses, 2005). Acknowledging different levels of work-load might be a useful approach for further studies to investigate the relationship between work-load, implicit rationing of nursing care, and its effect on outcomes and patient safety.

Conclusion

In view of patient safety and quality of care, implicit rationing of nursing care is an important construct that allows researchers and administrators to compare the degree to which specific nursing measures are being restricted in acute care hospitals because of lack of resources and to investigate the association between the measured levels of rationing and patient outcomes. Initial evidence was provided in the results of the validity and reliability of the BERNCA instrument. The results indicate that the BERNCA is a research tool that can be used for assessing the levels of implicit rationing of nursing care in acute care hospitals. Future studies are needed to

investigate the predictive evidence of the BERNCA instrument, and the tool's value to measure and predict changes in the quality of care and patient outcomes. To enhance the reliability and validity of the BERNCA for use in other countries and areas, revisions of the instrument are recommended to reflect cultural and regional differences.

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Chapter 6

6 Rationing of nursing care and its relationship to patient outcomes: The Swiss extension of the International Hospital Outcomes Study

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6.1 Abstract

Objectives: To explore the association between implicit rationing of nursing care and selected patient outcomes in Swiss hospitals, adjusting for major organizational variables, including the quality of the nurse practice environment and the level of nurse staffing. Rationing was measured using the newly developed Basel Extent of Rationing of Nursing Care (BERNCA) instrument. Additional data were collected using an adapted version of the International Hospital Outcomes Study questionnaire.

Design: Multi-hospital cross-sectional surveys of patients and nurses.

Setting: Eight Swiss acute care hospitals

Participants: 1338 nurses and 779 patients on 118 medical, surgical, and gynecological units.

Main Outcome Measures: Patient satisfaction, nurse-reported medication errors, patient falls, nosocomial infections, pressure ulcers and critical incidents involving patients over the previous year.

Results: Generally, nurses reported rarely having omitted any of the 20 nursing tasks listed in the BERNCA over their last seven working days. However, despite relatively low levels, implicit rationing of nursing care was a significant predictor of all six patient outcomes studied. Although the adequacy of nursing resources was a significant predictor for most of the patient outcomes in unadjusted models, it was not an independent predictor in the adjusted models. Low nursing resource adequacy ratings were a significant predictor for five of the six patient outcomes in the unadjusted models, but not in the adjusted ones.

Conclusion: As a system factor in acute general hospitals, implicit rationing of nursing care is an important new predictor of patient outcomes and merits further study.

Key words: Healthcare rationing, organizational factors, patient outcomes, quality of care

6.2 Introduction

Over the past decade, economic and demographic forces influencing both the supply of and demand for nurses have led to shortfalls in the number of nurses, particularly in hospitals. Concurrently, cost-cutting strategies to stem exploding health care costs have raised the thresholds for hospital admissions and shortened lengths of stay. This has increased the average acuity of hospital in-patients, along with the intensity of nursing services they require; however, budgetary concerns have typically limited nursing staff numbers [1-3].

Nursing practice involves a wide range of daily tasks. When resources are limited, nurses are forced to ration their attention across their patients, using their clinical judgment to prioritize assessments and interventions [4-6]. On understaffed units, nurses are presumably forced to minimize or omit certain tasks, thereby increasing the risk of negative patient outcomes.

Worldwide, stakeholder groups consistently agree that many hospitals operate with suboptimal nursing staff levels [3,7,8], while a growing evidence base connects nurse understaffing with negative patient outcomes. Internationally, studies have shown significant relationships between reduced nurse practice environment quality, nurse staffing levels / skill mixes, and increased numbers of adverse events or outcomes (medication errors, falls, nosocomial infections, pressure scores, "failure-to-rescue" events, and mortality rates) [9-14]. Furthermore, negative nurse practice environment features show significant associations with job dissatisfaction, burnout, work-related injuries and staff turnover [10,15-18].

In fact, rationing of nursing care, defined as “the withholding or failure to carry out necessary nursing tasks due to inadequate time, staffing level, and/or skill mix,” may be a directly observable consequence of low staffing levels and poor practice environments. To our knowledge, the association between this type of implicit rationing of care and patient outcomes in hospitals has never been directly investigated.

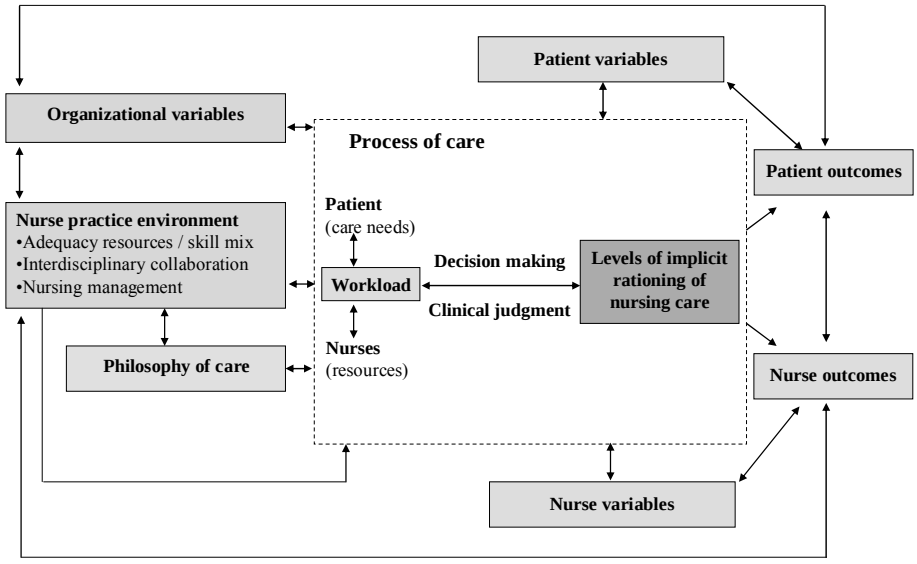
In 2003-2004, in an extension of the International Hospital Outcomes Study led by the Center for Health Outcomes and Policy Research at the University of Pennsylvania (USA), the Rationing of Nursing Care in Switzerland Study measured levels of implicit rationing of nursing care in Swiss acute care hospitals to explore its association with selected patient outcomes. The International Hospital Outcomes Study is an international study of the organization of nursing care in hospitals and its impact on patient outcomes [6,15,19]. The Swiss study extended the research protocol of the international study by developing a new empirical measure of implicit rationing of nursing care. Specifically, it involved surveys of patients and nurses and analyses adjusting for

major organizational variables shown in prior research to correlate with outcomes, including the quality of the nurse work environment and staffing/workload. The study's guiding hypothesis was that higher levels of implicit rationing of nursing care would be associated both with lower patient satisfaction and more frequent nurse-reported adverse patient outcome rates (medication errors, falls, nosocomial infections, critical incidents, and pressure sores).

Conceptual framework

The Rationing of Nursing Care in Switzerland study elaborates on the conceptual framework of the International Hospital Outcomes study, as well as on empirical findings regarding decision-making and prioritization of nursing care. Figure 1 shows that implicit rationing of nursing care occurs when nurses lack sufficient time to provide all the care they perceive is needed by their patients. Nurses' decisions to ration care may be influenced by hospital organizational attributes and the nurse practice environment. With our rationing measurement instrument, the BERNCA, we found that reports of rationing were significantly associated with staffing and work environment conditions, thus supporting this contention [20].

Figure 1: Conceptual Framework for the RICH Nursing study*



*This conceptual framework builds on the IHOS study and other evidence (Schubert et al. 2007)

6.3 Method

This study used cross-sectional survey data from multiple sites and a modified version of the nurse questionnaire developed for the International Hospital Outcomes study [6,10,15]. The research ethics review committees of the eight participating hospitals approved the study.

Sample

Nurses and patients from a convenience sample of eight acute care hospitals in the German and French speaking regions of Switzerland were surveyed over an 11-month period in 2003 and 2004. Hospitals were selected if they had at least 100 beds, operated surgical, medical, and/or gynaecological units, and if their administrators agreed to allow their facilities to participate. All nurses who held Swiss nursing or equivalent foreign credentials, who had worked in direct patient care at their hospitals for at least three months, including at least one month on their current unit, were approached. Patients hospitalized for at least two days on an eligible unit were approached if they could understand and read German or French, and if their physical and mental conditions were judged adequate for participation. Since the sample included nurses and patients speaking German and French, the original English questionnaires were translated into both languages using a modified Brislin protocol [21].

Variables and Measures

Hospital Characteristics Hospital size (number of beds), ownership status (public versus private), and location data were provided by the hospital administrations and the Swiss Federal Office of Statistics for 2002.

Nurse Survey Measures, Analyzed at the Unit Level Implicit rationing of nursing care was measured using the BERNCA instrument developed and validated within the Rationing of Nursing Care in Switzerland study. With 20 items, BERNCA asks nurses how frequently they were unable to perform basic nursing tasks in the past 7 working days due to inadequate time, staffing levels and/or skill mixes. Respondents rated each item on a 4-point Likert-type scale (never (0), rarely (1), sometimes (2), or often (3)) (Appendix I, BERNCA instrument). Initial validity (content and construct validity) and reliability of the BERNCA were established using survey data from German speaking Swiss hospital nurses [20]. An explanatory factor analysis confirmed the internal structure and the hypothesized uni-dimensionality of the scale (construct validity). The Cronbach`s alpha was 0.93 [20]. To calculate the average level of implicit rationing of nursing care on the unit, the scores for each nurse were averaged over all 20 items (summary score ranged from 0 – 60; means ranged from 0 – 3.0).

The quality of the nurse practice environment was measured with the Nurse Work Environment Index-Revised, a 51-item instrument [15,22,23]. Using 4-point Likert-type scales (from strongly disagree to strongly agree), nurses were asked whether specific elements were present in their workplace. A Principal Component Analysis with Varimax rotation of the Swiss data revealed that 17 items had communalities below 0.30; these items were deleted from further analysis. Subsequent rotation resulted in a 3-factor solution: 1) Nursing leadership and professional development (Leadership); 2) Nursing resources and autonomy (Resources); and 3) Interdisciplinary collaboration and competence (Collaboration) (Appendix II). Cronbach`s alphas for the subscales were 0.90, 0.84, and 0.73, respectively.

Patient-to-nurse staffing ratio, the number of patients assigned to a nurse on the last shift, the quality of care on unit, patients self-care ability and nurse job satisfaction were measured using items from the international study instrument battery (Table 1) [10].

Nurse Survey Measures, Analyzed at the Nurse Level The frequencies of adverse patient events, widely considered sensitive indicators of quality of nursing care, were assessed through nurses' reports regarding their patients over the past year on 4-point Likert-type scales ranging from "never" (1) to "often" (4). Building on questions developed for the international study, the following outcomes were assessed: (1) medication administration errors, (2) patient falls, (3) nosocomial infections, (4) critical incidents, and (5) pressure ulcers (Table 1). Based on the skewing of the data distribution, for the analyses reported here nurses' responses were dichotomized as "sometimes" and "often" versus "never" and "rarely" (i.e. infrequently vs. regularly).

Nurse characteristics, including age, sex, nationality, clinical specialty, employment status, education, and experience were measured using questionnaire items from the international study [10].

Patient survey measures Overall patient satisfaction with the care they received in their respective hospitals was assessed with one question using a 4-point Likert-type scale (from very satisfied to very dissatisfied). *Patient demographics* including age, sex and self-reported health status were measured. Patients were asked regarding the latter of these to assess their health status compared with others of their age on a 5-point Likert-type scale (from very poor to very good).

Table 1: Definitions and measures of the dependent, independent, and control variables

Variables	Definition
Dependent variables	
Patient satisfaction[+]	Patients who are very satisfied with the care they received.
Medication administration errors[++]	Medications administered at the wrong time, in the wrong dose and / or to wrong patient with or without consequences
Patient falls[++]	Any patient fall with or without consequences
Nosocomial infections[++]	Hospital-acquired infections e.g., urinary tract, respiratory tract, or wound infections experienced by patients
Critical incidents[++]	Unexpected critical patient incidents, which might have been prevented through appropriate measures
Pressure ulcers[++]	Pressure ulcers at Stages 2 through 4
Independent and control variables	
Rationing of nursing care	Average rationing score on unit
Quality of the nurse work environment (NWI-R)	Average score of each of 2 individual NWI-R subscales on unit 2) Resources 3) Collaboration
Patient-to-nurse ratio	Average number of patients cared for by nurses in the unit on their last shift
Age of the nurse	Nurse age in categories of 10 years (*nurse reported patient outcomes models*)
of the patient	Patient age in categories of 14-40, 41-50, 51-60, 61-70, > 70 (*patient satisfaction model*)
Nurse education	Basic vs. specialized: e.g. intensive care, higher education in nursing level 1, clinical teacher) and/or graduate / postgraduate education: e.g. higher education in nursing level 2, higher education or university degree in nursing management, pedagogic, science, and public health (*nurse reported patient outcomes models*) Percentage on nurses on the unit with specialization or graduate / postgraduate education (*patient satisfaction model*)
Nurse experience	Years worked as a nurse (*nurse reported patient outcomes models*) Average years nurses on unit worked as a nurse (*patient satisfaction model*)
Hospital size	Number of beds in hospital
Department	Medical vs. surgical department
Patient health	Percent of patients on unit who considered themselves to be in good health compared to others their age
Quality of care	Percentage of nurses on the unit who consider the quality of the nursing care on their unit to be good (*patient satisfaction model*)
Patient self-care ability	Percentage of nurses on the unit who are confident that their patients will be able to take care of themselves once they have left the hospital (*patient satisfaction model*)
Nurse job satisfaction	Percentage of nurses on the unit satisfied with their present job (*patient satisfaction model*)

[+] **Patient reported patient outcomes**
[++] Nurse reported patient outcomes

Data collection

Questionnaires were distributed on a defined day to all nurses and patients who met the inclusion criteria. For four weeks, completed questionnaires were collected in a closed box placed in a central location on each of the participating wards. An identification number allowed questionnaires to be linked with a specific hospital and unit, but not with specific respondents.

Data analysis

Descriptive statistics were used to analyze major variables at the nurse, patient, unit and hospital levels using techniques appropriate to their levels of measurement and data distributions. For analytical purposes, reflecting our understanding of rationing of nursing care, quality of the nurse practice environment and patient-to-nurse staffing ratios as nursing unit organizational properties, unit level mean scores were calculated for these variables.

Given the natural clustering of the data (patients and nurses within hospital units), the effects of implicit rationing of nursing care and organizational characteristics on the selected patient outcomes were assessed using multilevel multivariate regression analysis, with the unit included as a random effect. Six models were constructed – one for each dependent variable. Of these, five involved nurse reported data: medication errors, falls, nosocomial infections, critical incidents, and pressure ulcers. The sixth was patient reported satisfaction with care. The main explanatory variables were rationing of nursing care, patient-to-nurse ratios, and two nurse practice environment dimensions: Resources and Collaboration. The nurse practice dimension of Leadership was excluded from the modeling due to its high correlation with the Resources dimension ($r=0.80$). Patient and nurse characteristics and quality of care were included as control variables (Table 1). The level of significance was set at $p<0.05$. All analyses were performed using Stata 9.2 (StataCorp LP, College Station, TX) and SPSS 14 **(**SPSS for Windows, Rel. 14. 2005. Chicago: SPSS Inc.).

6.4 Results

Three of the eight hospitals studied were university-affiliated, three were cantonal and two were regional or local community hospitals. Seven were public, one was private-public and six had more than 300 beds. The majority of the included units were surgical (n=60), followed by medical (n= 51) and gynecological (n=7). Characteristics of nurses and patients are presented in Table 2. Of the 2052 nurses and 1190 patients approached, 1338 nurses and 779 patients participated, yielding a 65% response rate for both samples.

The mean level of implicit rationing of nursing care across nursing units was 0.82 (standard deviation (SD) 0.26) indicating that, at the unit level, when asked how often she or he was unable to perform specific tasks, the average nurse on the units reported this occurred slightly less frequently than “rarely" (0.80). Significant variability in the measured levels of implicit rationing of nursing care was found between hospitals (0.63 to 1.15, $p< 0.001$), departments (0.53 (gynecological) to 0.84 (medical) $p< 0.001$) and units (0.12 to 1.46, $p < 0.001$).

Table 2: Nurse and patient characteristics

Variables	
Nurse Characteristics	
N	1338
Sex: female - n (%)	1159 (90)
Nationality: non-Swiss – n (%)	392 (31)
Age - n (%)	
20-30 years	544 (42)
31-40	398 (31)
41-50	249 (19)
> 50	99 (8)
Employment - n (%)	
Full time: (= 80 to 100%)	937 (72)
Part-time: (= 10 to 70%)	365 (28)
Education - n (%)	
Specialised	423 (32)
Graduate / postgraduate	18 (1)
Years working – mean (SD)	
As a nurse	10.3 (8.9)
In this hospital	7.4 (7.4)]
On this unit	5.3 (6.0)
Patient Characteristics	
N	779
Sex: females – n (%)	403 (55)
Age in years - n (%)	
14 – 20 years	13 (2)
21 – 40	108 (14)
41 – 60	220 (30)
61 – 70	159 (21)
71 – 80	171 (23)
> 80	75 (10)
State of health - n (%)	
very poor	19 (3)
poor	155 (21)
fair	216 (30)
good	252 (35)
very good	83 (11)

Because of the limited range of the rationing scale and a standard deviation of 0.54 points at the individual level, half-point measurement increments were used for modeling in the next phase of

the analyses. Averaged data indicated neither strong agreement nor disagreement across units regarding nurse practice environment characteristics (Table 3). The average patient-to-nurse staffing ratio was eight patients per nurse (mean across nurses working on all three shifts: morning, afternoon, and night). A moderate to strong correlation was found between implicit rationing and the three nurse practice environment dimensions. Patient-to-nurse staffing ratios were only weakly negatively correlated with implicit rationing (Table 3).

Of the 779 patients, 566 (72%) were very satisfied with the care they received. The percentage of nurses who reported that adverse events had occurred sometimes or frequently during the previous year ranged from 16% (critical incidents) to 58% (nosocomial infections) (Table 4). A clear majority of nurses reported that all of the events under study had occurred with some frequency (i.e. rarely, sometimes or often). However, the regression results illustrated below lead to identical patterns of conclusions whether the dependent variables were constructed by contrasting responses of "rarely," "sometimes" or "often" against "never" (i.e. ever vs. never) or by contrasting "never" and "rarely" with "sometimes" and "often" (i.e. infrequently vs. regularly).

Table 4: Nurse reported patient outcomes

Variables		
Nurses reported patient outcomes in the last year	sometimes, often observed	observed even once
N	1338	1338
Medication errors - n (%)	380 (30)	1089 (85)
Falls - n (%)	558 (44)	1127 (89)
Nosocomial infection -n (%)	728 (58)	1161 (93)
Critical incidents - n (%)	203 (16)	838 (67)
Pressure ulcers - n (%)	313 (24)	1053 (82)

Impact of rationing of nursing care and organizational factors on patient outcomes

Implicit rationing of nursing care was a significant predictor for all six of the patient outcomes studied. Of the major organizational variables considered, the patient-to-nurse staffing ratio was not significantly related with any of the six investigated nurse-reported patient outcomes. The two measures of the nurse practice environment and the various control variables were not consistently related to any of the outcomes.

Table 3: Descriptive statistics and correlations of the organisational variables

Variables	**Descriptive statistics** (individual level measures, n= 1338 nurses)		**Correlation matrix** (unit level measures, n= 118 units)				
				NWI-R Subscales			
	mean (SD)	median (minimum- maximum)	Rationing	1) Leadership	2) Resources	3) Collaboration	Patient-to-nurse ratio
Rationing (BERNCA)*	0.82 (0.54)	0.77 (0 - 2.68)	1.00				
NWI-R Subscales:[+]							
1) Leadership	3.07 (0.50)	3.13 (1.31 – 4.00)	-0.55(**)	1.00			
2) Resources	2.51 (0.53)	2.50 (1.00 – 4.00)	-0.67(**)	0.80(**)	1.00		
3) Collaboration	3.14 (0.42)	3.13 (1.75 – 4.00)	-0.44(**)	0.54(**)	0.54(**)	1.00	
Patient-to-nurse ratio	8.19 (5.57)	7.00 (0 - 36)	0.21(**)	-0.32(**)	-0.45(**)	-0.23(**)	1.00

* Range from 0=never to 3=often, [+] Range from 1 = strongly disagree to 4= strongly agree

** p-value < 0.001

As hypothesized, implicit rationing of nursing care was consistently related to patient outcomes, both alone and after controlling for staffing and work environment measures. Higher levels of rationing were significantly related with a higher frequency of nurse-reported adverse patient outcomes. Specifically, in the full models, a .5 unit increase in rationing scores was associated with 10% to nearly tripled increases in the odds of reports that various adverse patient events occurred regularly over the past year. It was also associated in the fully-adjusted model with a 37% decrease in the odds of patients reporting satisfaction with the care they received; however, this association was only marginally significant (at p=0.08) (Table 5).

Before controlling for other major variables, the Resource dimension of the nurse practice environment was a significant predictor of five of the six patient outcomes investigated (i.e. higher scores were associated with higher patient satisfaction and lower likelihood of nurses reporting that negative events had occurred regularly). However, after controlling for rationing and patient-to-nurse ratios in the adjusted models, the Resource dimension was no longer significantly related to these outcomes. The one exception was a marginally-significant association with nosocomial infections. The nurse practice environment dimension Collaboration was associated with critical incidents in the unadjusted models, but the relationship was not sustained after controlling for the other organizational factors.

6.5 Discussion

To our knowledge, this is the first study to measure implicit rationing of nursing care and to explore associations between this factor and the selected patient outcomes. The related analyses provided estimates of the effect of implicit rationing of nursing care after controlling for patient, nurse, and hospital-related covariates, as well as for the clustering of observations within hospital units. Variations in nurse reports of rationing at the unit level were the only factor significantly related with all six patient outcomes studied. While the frequency of rationing appeared relatively low overall, increases in the unit-level scores were associated with large decreases in patients' likelihood of being satisfied with care, and substantial increases in the odds of nurses reporting that selected adverse patient outcomes had occurred with regularity over the preceding year.

Table 5: Variables influencing the six studied patient outcomes

Variables	Unadjusted Models		Adjusted Models	
	Odds Ratio (CI)	p-value	Odds Ratio (CI)	p-value
Patient reported patient outcome (n=779)				
Patient Satisfaction (patient very satisfied vs. satisfied, dissatisfied, very dissatisfied)				
Rationing (0.5 point increase in unit-level scores)	0.57 (0.39, 0.84)	0.004	0.63 (0.38, 1.05)	0.08
Patient-to-nurse ratio (1 patient-per-nurse increase unit-level score)	0.98 (0.90, 1.06)	0.64	0.97 (0.89, 1.06)	0.50
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	1.83 (1.01, 3.32)	0.045	0.78 (0.24, 2.57)	0.68
3) Collaboration	1.91 (0.70, 5.23)	0.21	1.51 (0.37, 6.24)	0.57
Nurse reported patient outcomes (n= 1338)				
Medication Errors (sometimes, often observed vs. others)				
Rationing (0.5 point increase in unit-level scores)	1.97 (1.51, 2.56)	<0.001	1.68 (1.17, 2.41)	0.005
Patient-to-nurse ratio (1 patient-per-nurse increase in unit-level score)	1.03 (0.97, 1.09)	0.37	1.00 (0.93, 1.07)	0.99
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	0.48 (0.33, 0.71)	<0.001	0.71 (0.39, 1.31)	0.28
3) Collaboration	0.57 (0.28, 1.17)	0.12	1.37 (0.58, 3.24)	0.47
Patient Falls (sometimes, often observed vs. others)				
Rationing (0.5 point increase in unit-level scores)	2.79 (1.85, 4.21)	<0.001	2.81 (1.65, 4.78)	<0.001
Patient-to-nurse ratio (1 patient-per-nurse increase in unit-level)	1.00 (0.98, 1.17)	0.15	1.01 (0.92, 1.11)	0.87
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	0.87 (0.45, 1.70)	0.70	1.00 (0.41, 2.43)	0.99
3) Collaboration	0.57 (0.19, 1.73)	0.32	1.63 (0.46, (5.58)	0.45
Nosocomial Infections (sometimes, often observed vs. others)				
Rationing (0.5 point increase in unit-level scores)	2.05 (1.44, 2.92)	<0.001	1.61 (1.03, 2.51)	0.04
Patient-to-nurse ratio (0.5 point increase in unit-level scores)	1.03 (0.95, 1.12)	0.42	1.00 (0.92, 1.08)	0.93
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	0.38 (0.23, 0.64)	<0.001	0.48 (0.22, 1.03)	0.06
3) Collaboration	0.45 (0.17, 1.19)	0.11	1.48 (0.50, 4.35)	0.48
Critical Incidents (sometimes, often observed vs. others)				
Rationing (0.5 point increase in unit-level scores)	2.65 (1.79, 3.92)	<0.001	1.10 (1.04, 1.17)	0.002
Patient-to-nurse ratio (1 patient-per-nurse increase in unit-level ratio)	1.01 (0.92, 1.10)	0.88	0.99 (0.98, 1.00)	0.15
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	0.34 (0.19, 0.61)	<0.001	0.96 (0.89, 1.07)	0.45
3) Collaboration	0.18 (0.06, 0.48)	0.001	0.93 (0.80, 1.07)	0.31
Pressure Ulcers (sometimes, often observed vs. others)				
Rationing (0.5 point increase in unit-level scores)	2.81 (1.88, 4.20)	<0.001	1.15 (1.06, 1.25)	0.001
Patient-to-nurse ratio (1 patient-per-nurse increase in unit-level ratio)	1.08 (0.99, 1.18)	0.09	1.00 (0.99, 1.02)	0.86
NWI-R Subscales (1 point increase in unit-level scores)				
2) Resources	0.30 (0.17, 0.55)	<0.001	0.96 (0.83, 1.10)	0.55
3) Collaboration	0.35 (0.12, 1.02)	0.05	1.01 (0.83, 1.24)	0.91

While prior research suggests that lower nurse staffing ratios are related to worse patient outcomes [11-14,24-25], in this study patient-to nurse staffing ratios failed to predict nurse reports of any of the outcomes studied. As our conceptual model and the empirical evidence show, workload is influenced by a range of factors, including the amount and type of nursing resources needed to care for each patient, as well as patient case mix and complexity [26]. As such, the patient-to-nurse staffing ratio reflects only one aspect of nurses' workloads and may not have been sufficiently refined to show a relationship with the patient outcomes studied here. Placing this study's mean unit-level ratio of 8 patients per nurse into context, it is similar to those of 7 to 14 patients per nurse described in acute care hospitals in the United Kingdom [14], but higher than the average ratio of 5 patients per registered nurse described in US hospitals [27,28]. However, it should be borne in mind that patients in Swiss hospitals, particularly in the regional and cantonal hospitals, generally tend to be less acutely ill than those in some other countries (notably the US).

Higher nurse ratings of nursing resources and autonomy (as measured using the Resources subscale) were a consistent predictor of five of the six outcomes in unadjusted models, but did not remain statistically significant in models controlling for rationing and the other organizational variables. It was somewhat logical that the measure of interdisciplinary collaboration and competence (Collaboration subscale) would be associated with reports of avoidable critical patient incidents, but a significant relationship was only detected before controlling for other organizational variables. Such results are in line with prior research, which suggests that higher-quality practice environments in hospitals are associated with superior outcomes [15,29]. However, the majority of studies in this area identify significant associations use nurse job outcomes or nurses' appraisals of care quality in general. Data has been much less clear in terms of showing work environments' effects on specific patient outcomes. For instance, McCusker and colleagues also failed to find an association between practice environment features and the nurse-reported frequencies of various types of adverse patient events [30].

In summary, the results of this study suggest that rationing of nursing care, a process that occurs at the nurse-patient interface, is a strong independent predictor of patient outcomes, and may partially explain the effects of patient–to-nurse staffing ratios and nurse work environment factors on patients. Even low rationing levels were linked with deteriorating patient outcomes. Since rationing can never entirely be avoided, it is important to define the threshold above which rationing affects outcomes negatively. Such data would enable nursing administrators to use implicit rationing of nursing care (e.g., through surveys employing the BERNCA instrument) as

an indicator of the impact of cost-cutting strategies and changes in the nurse practice environment on processes of care in their facilities (particularly changes in staffing levels, skill mix and other resources). Regular surveys of this (and perhaps other measures of rationing on the front lines of care) could provide data for health policy discussions about nurse staffing levels and decisions regarding mandated minimum patient-to-nurse ratios.

Limitations of the study

The Rationing of Nursing in Switzerland study, like other studies in the International Hospital Outcomes Study collaboration, used a cross-sectional design which does not allow the direct assessment of causal relationships between implicit rationing of nursing care and patient outcomes. Furthermore, while nurses and patients from hospital units accounting for 10% of acute care beds in Switzerland were surveyed, the convenience sample here limits the generalizability of our findings, particularly for smaller facilities (<100 beds). In addition, all outcomes in this study except patient satisfaction were assessed through nurse reports. Validation of the measures in this study against hospital records of patient outcomes is currently underway.

Conclusion

Implicit rationing of nursing care is an important newly-identified organizational variable reflecting processes in acute care nursing and appears to be directly linked to patient outcomes. Rationing offers promise as a measure of the impacts of staffing and the quality of the nurse practice environment on patient outcomes. As an indicator of the understudied processes of care affected by organizational conditions in hospitals, measures of rationing could assist in building theory in this area of outcomes research. Rationing levels, analyzed alongside other data, may help health systems and hospitals determine the minimum staffing and skill mix levels necessary to achieve desired patient outcomes and inform administrative decisions and policy.

Further studies are necessary to develop a deeper understanding of its mechanisms and effects. Such studies will need to incorporate prospectively collected data on patient outcomes sensitive to nursing care quality. Furthermore, studies are needed to investigate the applicability and sensitivity of rationing and the BERNCA instrument in international contexts, with different health care systems and in hospitals and units with various patient acuity levels. Also, as described above, studies are needed to define the threshold when rationing begins to affect patient outcomes negatively. A study to address this question using data from the Rationing of Nursing Care in Switzerland study is currently in preparation.

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6.6 References

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Appendix I
Basel Extent of Rationing of Nursing Care (BERNCA) questionnaire

How often in the last 7 work days did it happened that…..(question 1-5)	never	rarely	sometimes	often
1. ACTIVITY OF DAILY LIVINGS (ADLs)	☐	☐	☐	☐
1a) ..you could not assist a patient with a necessary sponge bath or skin care?	☐	☐	☐	☐
1b) ..you could not perform a necessary oral or dental hygiene to a patient?	☐	☐	☐	☐
1c) ..you could not feed the patient a needed?	☐	☐	☐	☐
1d) ..you were not able to mobilize or change the position of a patient?	☐	☐	☐	☐
1e) ..you had to leave a patient for longer than half an hour in urine, stool, or vomit?	☐	☐	☐	☐
1f) ..you could not put clean sheets on a dirty bed?	☐	☐	☐	☐
2. CARING - SUPPORT	☐	☐	☐	☐
2a) ..you could not offer emotional or psychosocial support to a patient even though you felt it was necessary e.g. dealing with insecurities and fear of his / her illness, the feeling of dependency?	☐	☐	☐	☐
2b) ..you could not have a necessary conversation with a patient or his / her family?	☐	☐	☐	☐
3. REHABILITATION - INSTRUCTION - EDUCATION	☐	☐	☐	☐
3a) ..you had to put a patient in diapers or insert a catheter because you did not have time for toilet training?	☐	☐	☐	☐
3b) ..you could not perform activating or rehabilitating care?	☐	☐	☐	☐
3c) ..you could not teach and /or educate a patient and / or their family about their necessary self-care e.g. insulin injection, behavior or coping with illness- specific symptom (hypo-glycemia, dyspnoea)?	☐	☐	☐	☐
3d) ..you could not prepare a patient or their family for his / her hospital discharge?	☐	☐	☐	☐
4. MONITORING - SAFETY	☐	☐	☐	☐
4a) ..you could not monitor a patient as closely as had been prescribed by a physician or as you felt was necessary?	☐	☐	☐	☐
4b) ..you had to restrain and/or give confused patients sedatives because you were not able to watch them carefully enough?	☐	☐	☐	☐
4c) ..a physician either did not come in person or took a long time to arrive after you called him / her because of an acute or sudden change in a patient's condition?	☐	☐	☐	☐
4d) ..you had to keep a patient who had rung for a nurse waiting longer than 5 minutes?	☐	☐	☐	☐
4e) ..you could not wash or disinfect your hands adequately?	☐	☐	☐	☐
5. DOCUMENTATION	☐	☐	☐	☐
5a) ..you did not have enough time to go over the patient documentation at the beginning of your shift?	☐	☐	☐	☐
5b) ..you could not set up or bring up to date a patient's care plan?	☐	☐	☐	☐
5c) ..you could not document the performed nursing care for a patient detailed enough?	☐	☐	☐	☐

Appendix II

Nursing Work Index – Revised (NWI-R) subscales and related items

For each item in this section, please indicate the extent to which you agree that the following items ARE PRESENT IN YOUR CURRENT JOB.		strongly Agree	somewhat Agree	somewhat Disagree	strongly Disagree
1) Nursing leadership and professional development (16 questions)					
4	Supervisory staff that is supportive of nurses	□	□	□	□
10	Support for new and innovative ideas about patient care	□	□	□	□
13	A nurse managers who is a good manager and leader	□	□	□	□
27	Nursing staff are supported in pursuing degrees in nursing	□	□	□	□
8	Career development/ clinical ladder opportunity	□	□	□	□
41	Nurse managers consult with staff on daily problems and procedures	□	□	□	□
37	A preceptor program for newly hired RNs	□	□	□	□
26	Opportunities for advancement	□	□	□	□
39	Staff nurses have the opportunity to serve on hospital and nursing committees	□	□	□	□
18	Praise and recognition for a job well done	□	□	□	□
3	A good orientation program for newly employed nurses	□	□	□	□
7	Active staff development of continuing education programs for nurses	□	□	□	□
28	A clear philosophy of nursing that pervades the patient care environment	□	□	□	□
32	A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician	□	□	□	□
19	The opportunity for staff nurses to consult with clinical nurse specialties or expert nurse clinicians	□	□	□	□
34	An active quality assurance program	□	□	□	□
2) Nursing resources and autonomy (10 questions)					
16	Enough staff to get the work done	□	□	□	□
12	Enough registered nurses on staff to provide quality patient care	□	□	□	□
17	Freedom to make important patient care and work decisions	□	□	□	□
11	Enough time and opportunity to discuss patient care problems with other nurses	□	□	□	□
1	Adequate support services allow me to spend time with my patients	□	□	□	□
14	A chief nursing officer who is highly visible and accessible to staff	□	□	□	□
9	Opportunity for nurses to participate in policy decisions	□	□	□	□
35	Staff nurses are involved in the internal governance of the hospital	□	□	□	□
33	Administration that listens and responds to employee concerns	□	□	□	□
40	The contributions that nurses make to patient care are publicly acknowledged	□	□	□	□
3) Interdisciplinary Collaboration and Competence (8 questions)					
36	Collaboration (joint practice) between nurses and physicians	□	□	□	□
24	A lot of teamwork between nurses and physicians	□	□	□	□
2	Physicians and nurses have good working relationships	□	□	□	□
25	Physicians give high-quality medical care	□	□	□	□
49	Working with experienced nurses who "know" the hospital system	□	□	□	□
50	RNs and assistive personnel have good working relationships	□	□	□	□
30	Working with nurses who are clinically competent	□	□	□	□
51	RNs and nursing students have good working relationships	□	□	□	□

Chapter 7

7 Identifying thresholds for relationships between impacts of rationing of nursing care and nurse- and patient-reported outcomes in Swiss hospitals: A correlational study

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7.1 Abstract

Background: In the Rationing of Nursing in Switzerland Study, despite low measured levels, implicit rationing of care was significantly associated with all six studied patient outcomes. Since rationing cannot be completely avoided, in order to protect patient safety and quality of care it is important to identify the thresholds of its effects, i.e., the levels at which it begin to negatively affect patient outcomes.

Objectives: To describe the levels of implicit rationing of nursing care in a sample of Swiss acute care hospitals and to identify clinically meaningful thresholds of rationing.

Design: Descriptive cross-sectional multi-center study.

Settings: Five Swiss-German and three Swiss-French acute care hospitals.

Participants: 1338 nurses and 779 patients.

Methods: Implicit rationing of nursing care was measured using the newly developed Basel Extent of Rationing of Nursing Care (BERNCA) instrument. Other variables were measured using survey items from the International Hospital Outcomes Study battery. Data were summarized using appropriate descriptive measures, and logistic regression models were used to define a clinically meaningful rationing threshold level.

Results: For the studied patient outcomes, identified rationing threshold levels varied from 0.5 (i.e., between 0 (never') and 1 ('rarely') 'to 2 ('sometimes')). Three of the identified patient outcomes (nosocomial infections, pressure ulcers, and patient satisfaction) were particularly sensitive to rationing, showing negative consequences anywhere it was consistently reported (i.e., average BERNCA scores of 0.5 or above). In other cases, increases in negative outcomes were first observed from the level of 1 (average ratings of rarely).

Conclusions: Rationing scores generated using a standardized tool (the BERNCA) provide a clinically-meaningful method for tracking the correlates of low resources or difficulties in resource allocation on patient outcomes. Thresholds identified here provide parameters for administrators to respond to whenever rationing reports exceed the determined level of '0.5' or '1'. Since even very low levels of rationing had negative consequences on three of the six studied outcomes, it is advisable to treat consistent evidence of any rationing as a significant threat to patient safety and quality of care. Reducing rationing could logically be expected to improve care outcomes.

Keywords Health Care Rationing, Nursing, Quality of Heath Care, Safety

What is already known about the topic?

- Recent international evidence indicates a significant relationship between low nurse staffing and skill mix levels, negative characteristics of the nurse work environment and deteriorated patient and nurse outcomes.
- Recent Swiss data suggests a connection between rationing of nursing care and adverse events in inpatients, as well as lower patient satisfaction with nursing care.

What this paper adds?

- A preliminary set of clinically meaningful thresholds for assessing rationing were identified. These can be used by nursing administrators to identify when action may be needed to protect patients from rationing-related adverse events
- The defined rationing threshold levels indicate that not all patient outcomes may be equally affected by implicit rationing of nursing care.
- These findings are strongly suggestive of a dose-response relationship between rationing and negative patient outcomes, strengthening the case for a causal relationship between the two as well as providing support for stringently limiting rationing to protect patient safety.

7.2 Background

Implicit rationing of nursing care is the withholding of or failure to carry out all needed nursing measures in the face of inadequate time, staffing or skill mix (Schubert et al., 2007). Cost-cutting managerial strategies have increased average acuity of hospital in-patients, along with the intensity of nursing services and reductions of nurse staffing and skill mixes (Aiken et al., 2001, McCloskey and Diers, 2005, Norrish and Rundall, 2001). Combined with the growing nurse shortage (Buerhaus et al., 2007, Kingma, 2007, Simoens et al., 2005), such cutbacks are making rationing an increasingly prominent feature in health care. Although a number of authors have observed that prioritisation and rationing are very common responses to limited nursing staff and related resources (Aiken et al., 2001, Kalisch, 2006, Kuenzi and Schaer - Moser, 2002, West et al., 2005), to our knowledge, the relationship between rationing and patient outcomes was explicitly investigated for the first time in the Rationing of Nursing Care in Switzerland Study (RICH Nursing Study) (Schubert et al., 2008).

In the RICH Nursing study (an extension of the International Hospital Outcomes Study (IHOS) (Aiken et al., 2002, Aiken et al., 2002), overall observed levels of implicit rationing were low, but were significantly associated with all six of the patient outcomes studied. Both before and

after controlling for major organisational variables, higher rationing levels were significantly linked to higher frequencies of nurse-reported medication errors, patient falls, nosocomial infections, critical incidents and pressure ulcers, and lower levels of patient satisfaction with nursing care (Schubert et al., 2008).

Of the major organizational variables evaluated as potential correlates of the patient outcomes studied, only the nursing work environment Adequacy of Resources dimension, measured with the Nursing Work Index-revised (NWI-R) (Aiken and Patrician, 2000, Lake, 2002) was a significant correlate of all of the six patient outcomes investigated except nosocomial infections. However, after controlling for rationing and patient-to-nurse ratio, none of these associations persisted. Reviews of two decades of research also revealed inconsistent results regarding the link between lower nurse staffing levels and higher rates of negative nurse sensitive outcomes (Clarke and Donaldson, 2008).

The RICH study, for which the Basel Extent of Rationing of Nursing Care (BERNCA) instrument was first developed, suggest that rationing is a new and important indicator of care quality that reflects organizational constraints and supports for providing nursing care in inpatient settings (Schubert et al., 2007). As such, it merits consideration in future research on factors influencing patient outcomes, patient safety and quality of care. Since it is presumably difficult or even impossible to avoid rationing entirely, and as it appears that even low levels have a pronounced effect on outcomes, it is important to identify the exact levels at which rationing starts to affect patient outcomes.

Knowing these thresholds would allow nursing administrators to monitor rationing and to react accordingly when it approached or exceeded the predetermined levels. The aims of this study were therefore (1) to describe the levels of implicit rationing of nursing care in a sample of Swiss acute care hospitals and (2) to identify clinically meaningful thresholds for scores on a rationing measurement tool by comparing the likelihoods of nurse-reported negative patient outcomes across rationing levels.

7.3 Methods

Design, Setting and Sample

Cross-sectional multi-hospital design data of the RICH Nursing study were used, incorporating data of 1338 working nurses and 779 hospitalized patients in a convenience sample of eight Swiss acute care hospitals (Schubert et al., 2008). The hospitals selected were located in the German (5) and French (3) speaking regions of Switzerland, had more than 100 beds each and had directors who provided written consents for their facilities to be included in the study.

Nurses in these facilities working on medical, surgical or gynecological units were approached if they held Swiss nursing or equivalent foreign credentials, and had been working in direct patient care for a minimum of three months in the current hospital, including at least one month on their current unit. Student nurses, nursing assistants, and float pool nurses were specifically excluded. Patients approached had been hospitalized for at least 2 days on one of the selected units, understood and read either German or French and deemed physically and mentally able to safely participate. Approvals were obtained from seven local ethics committees responsible for the eight participating hospitals. Nurses and patients were surveyed voluntarily and anonymously between October 2003 and August 2004. Questionnaires were distributed by the research team and contact persons in the hospitals to all eligible nurses and patients. Informed consent was implied by returning the completed questionnaires.

Variables and Measurements

Nurse Survey Measures Implicit rationing of nursing care was measured with the BERNCA instrument. On a 4-point Likert-type scale ranging from "never" to "often," nurses reported how often in the past seven working days they had been unable to carry out one or more of the 20 tasks listed. Initial validity (content, construct) and reliability (inter-item correlation, Cronbach's alpha: 0.93) of the BERNCA was established using survey data from German speaking Swiss hospital nurses (Schubert et al., 2007). To calculate the levels of implicit rationing of nursing care, the scores were summed and divided by the number of respective items (20) to calculate the total score and mean (the range of total scores was 0 – 60, the range of mean item scores [reported in the analyses here] was 0 – 3.0).

The frequency of five adverse events and complications in inpatients, including the number of nurse reported (1) medication administration errors - medications administered at the wrong time, in the wrong dose and / or to the wrong patient, with or without consequences, over the past year; (2) patient falls, with and without injury, over the past year; (3) nosocomial infections contracted by patients over the past year (e.g., infections of the urinary tract, respiratory system, or wounds); (4) critical incidents which occurred in patients over the past year, e.g., acute post-operative bleeding, cardiac arrest or circulatory collapse (shock), and (5) pressure ulcers (Stages 2 through 4) occurring in patients over the past year were assessed using questions based on items originally developed for the IHOS study (Aiken et al., 2002, Schubert et al., 2007). On a 4-point Likert-type scale ranging from "never" to "often," nurses indicated the frequency of these adverse events in their patients over the past year.

Nurse demographics reflects age, sex, experience (years as a nurse, in the current hospital, and on the current unit), education, nationality, and employment status (part-time vs. full time), which were used as control variables in the analyses (Aiken et al., 2002).

*Patient Survey Measure*s Overall patient satisfaction with the care they received during their stay was assessed with one question using a 5-point Likert type scale (from very satisfied to very dissatisfied) ("Overall, how satisfied are you with the care you have received in this hospital?"). Data on patient Age, Sex and health status were collected with additional questions on the patient satisfaction questionnaire (Schubert et al., 2008).

Hospital characteristics Hospital characteristics such as size (number of beds), mission (university, cantonal, regional), and ownership (private, public) were obtained from the hospital administrators and data provided by the Swiss Federal Office of Statistics for 2002.

Data analysis

Variables were analyzed using descriptive statistical methods appropriate to the levels of measurement. Logistic regression models using robust (Huber –White) standard errors adjusted for clustering of observations by unit were fit, with implicit rationing of nursing care (BERNCA) scores as the independent variables and patient outcomes (frequency of nurse reported adverse events and complications in inpatients, patient satisfaction) as the dependent variables.

To define the thresholds at which rationing began to affect these outcomes negatively, BERNCA scores were recoded into 6 levels: 0, 0.5, 1.0, 1.5, 2.0, ≥ 2.5. Because of the skewed distribution of the adverse event measures (individual nurses' responses regarding the frequencies of adverse events among their patients over the preceding year), two separate dichotomizations approaches were used to gain a fuller understanding of the underlying patterns/ in the first reports of 'rarely', 'sometimes' and 'often' were contrasted against those of various events 'never' occurring in the second reports of 'sometimes' and 'often' were contrasted with those of 'never' and 'rarely'. With the exception of the analyses involving patient satisfaction, all analyses were performed at the level of individual nurses (i.e. nurse-level measures of rationing were used as predictors of nurse-level reports of adverse events). Since the study's design made it impossible to link individual nurse rationing data to individual patient satisfaction scores, unit level rationing measurements were used to define odds of individual patients expressing high satisfaction with their care. The level of significance was set at $p<0.05$. Analyses were performed using SPSS 14 (SPSS for Windows, Version 14, 2005. Chicago: SPSS Inc.) and Stata 8 (StataCorp LP, College Station, TX).

7.4 Results

Sample characteristics

Of the included hospitals, three were university hospitals with more than 600 beds, three were cantonal hospitals with more than 300 beds and two were regional hospitals with 100 - 300 beds. Seven were public; one was both public and private. Of the 2052 nurses and 1190 patients approached in these hospitals, 1338 nurses and 779 patients participated, a 65% response rate for both samples. The characteristics of the nurses and patients are presented in Table 1.

Table 1: Summary of nurse and patients characteristics

Variables	
Nurse characteristics	
N	1338
Age (%)	
20-30 years	42
31-40	31
41-50	19
> 50	8
Sex: female (%)	90
Foreigners (%)	31
Employment (%)	
Full time: 100%	39
80 / 90%	33
Part-time: ≤ 70%	28
Education (%)	
Specialised	31
Graduate / postgraduate	1
Years working – mean (SD)	
As a nurse	10.3 (8.9)
In this hospital	7.4 (7.4)
On this unit	5.3 (6.0)
Patient Characteristics	
N	779
Age (%)	
14 – 20 years	2
21 – 40	14
41 – 60	30
61 – 70	21
> 71	33
Sex: female (%)	55

SD= Standard Deviation

Patient outcomes

The majority of patients (72%) were very satisfied with the care they received. Of the outcomes studied, nurses reported most frequently that nosocomial infections had occurred in their patients over the past year, followed by falls, medication errors, pressure ulcers, and critical incidents (Table 2).

Table 2: Frequency of Nurse-Reported Adverse Outcomes (N=1338)

Event Type	Ever (rarely, sometimes, often) against Never	Regularly (sometimes, often) against Rarely, Never
Medication errors (%)	85	30
Falls (%)	89	44
Nosocomial infection (%)	93	58
Critical incidents (%)	67	16
Pressure ulcers (%)	82	24

Measured levels of implicit rationing of nursing care

Ninety-six percent of the 1338 nurses reported that they were unable to perform at least one of the listed nursing tasks at some point in the preceding week and therefore had resorted to rationing their care (rarely (1) -sometimes (2) -often (3)) in the last seven working days. The mean nurse-level score suggested that, on average, tasks were omitted slightly less frequently than "rarely" (mean 0.82, SD 0.53, median 0.77, range 0 – 2.68). The six recoded cut-off points for individual nurse-level rationing scores (see "Data analysis," above) are shown in Table 3.

Table 3: Allocation of the six recoded rationing levels (BERNCA Scores)

	Rationing level	
0.00 =	never –n (%)	51 (4)
0.50 =	very rarely–n (%)	354 (29)
1.00 =	rarely –n (%)	381 (31)
1.50 =	rarely / sometimes–n (%)	291 (24)
2.00 =	sometimes –n (%)	120 (10)
≥ 2.50 =	more common than sometimes –n (%) (including rationing levels 2.50 to 3.00)	23 (2)

Threshold of implicit rationing of nursing care

Even very low levels of nurse-reported rationing (i.e., any score above 0) were associated with significantly elevated risks for five of the six reported negative events. Regression modelling suggested that the levels of rationing above which reports of negative events were distinctly

elevated (i.e., the rationing thresholds) varied from ‘0.5’ to ‘2’ across the patient outcomes studied (Table 4).

Using the first dichotomization approach for the nurse reported adverse events (“rarely”, “sometimes”, “often” versus “never”); a rationing level of ‘0.5’ was significantly associated with more-than-doubled to nearly fourfold increases in the odds of nurses reporting nosocomial infections and pressure ulcers for the previous year. A rationing level of ‘1’ was significantly linked with an increase factor of from 2.50 to nearly 5 in the odds of nurses ever reporting critical incidents or medication errors. Levels of rationing above 1 were associated with heightened likelihood of nurse reported patient falls, while levels of ‘2’ and higher were associated with a large jump in the odds of patient falls (Table 4, Figure 1).

Repeating the modelling using the second dichotomization approach contrasting regularly (“sometimes or often”) versus “rarely or never” revealed the expected pattern. Fewer nurses reported that the negative events were as common, and a rationing level of ‘0.5’ was no longer significantly linked with any of the reported adverse events. In most cases, the thresholds associated with elevated risk of frequent adverse events were approximately 0.5 point higher. A rationing level of ‘1’ was now significantly associated with increases in the frequency of nosocomial infections and pressure ulcers, while a level of ‘1.5’ was significantly linked with increases in the frequency of critical incidents and medication errors. Using this dichotomisation, no clear threshold could be defined for patient falls (Table 4, Figure 2).

At the same time, though, patient reported satisfaction with care was impacted significantly even by a rationing level of 0.5 (unit level measures), this accompanied a 57% decrease in the number of patients who reported being very satisfied with their care (Odds 0.43, CI 0.21, 0.90, p 0.02). n summary, these results suggest that limiting rationing levels to either ‘0.5’ or ‘1’ would likely be associated with beneficial effects on patient satisfaction and the frequency of nurse reported adverse events.

Table 4: Rationing threshold levels for selected patient outcomes using different dichotomization

			Lowest level				Rationing				Highest level	
		0	**0,5**		**1**		**1,5**		**2**		**2,5**	
	Patient Outcomes		odds (CI)	p value	odds (CI)	p value	Odds (CI)	p value	odds (CI)	p value	odds (CI)	p value
Dichotomization Ever (Rarely, sometimes, often) versus never	Medication errors /	Reference category	1.81 (0.93, 3.52)	***0.08***	4.62 (2.29, 9.33)	**<0.001**	4.60 1.99, 10.66)	**<0.001**	6,30 (2.98, 13.30)	**<0.001**	11.33 (1.44, 89.38)	**0.02**
	Falls		0.80 (0.40, 1.60)	0.52	2.04 (0.91, 4.57)	0.08	1.96 (0.83, 4.67)	0.13	5,35 (1.98, 14.43)	**0.001**	3.91 (0.48, 31.53)	**0.20**
	Nosocomial infections		2,32 (0.96, 5.61)	**0.06**	6.19 (2.38, 16.10)	**<0.001**	4.44 (1,55, 12,75)	**0.006**	4.91 (1.37, 17.58)	**0.014**	5.79 (0.67, 50.23)	0.11
	Critical incidents		1.55 (0.90, 2.69)	0.12	2,50 (1,47, 4,26)	**0,001**	4,46 (2,46, 8,10)	**<0.001**	8.79 (4.02, 19.20)	**<0.001**	8.79 (2.12, 36.47)	**0.003**
	Pressure ulcers		3.80 (1.93, 7.47)	**<0,001**	5,52 (2.87, 10.61)	**<0,001**	7,35 (3.60, 15.01)	**<0.001**	10.64 (4.53, 24.96)	**<0.001**	23.83 (2.84, 200.11)	**0.003**
Dichotomization Regularly (sometimes, often) versus rarely, never	Medication errors	Reference category	1.55 (0.73, 3.33)	0.26	1.92 (0.69, 4.13)	0.10	2.24 (1.02, 4.93)	**0.05**	2.22 (0.99, 4.98)	**0.05**	4.56 (1.52, 13.68)	**0.01**
	Falls		0.66 (0.38, 1.15)	0.14	0,73 (0.43, 1.24)	0.24	0.83 (0.47, 1.45)	0.51	1,25 (0.64, 2.45)	0.51	2,00 (0.62, 6.47)	0.25
	Nosocomial infections		1,06 (0.58, 1.95)	0.84	2,12 (1.08, 4.14)	**0.03**	2.36 (1.22, 4.94)	**0.02**	3,05 (1.56, 6.00)	**0.001**	2.41 (0.90, 6.45)	***0.08***
	Critical incidents		1.04 (0.28, 3.81)	0.95	2,6 (0.81, 8.33)	0.11	5.51 (1.55, 19.55)	**0.008**	7.29 (2.34, 22.70)	**0.001**	5.65 (1.33, 28.14)	**0.04**
	Pressure ulcers		1.55 (0.68, 3.56)	0.30	2.98 (1.33, 6.68)	**0.008**	3.83 (1.62, 9.06)	**0.002**	6.30 (2.52, 15.73)	**<0.001**	9.82 (2.53, 27.27)	**<0.001**

Figure 1: Rationing threshold levels for selected patient outcomes, as reported over the past year*

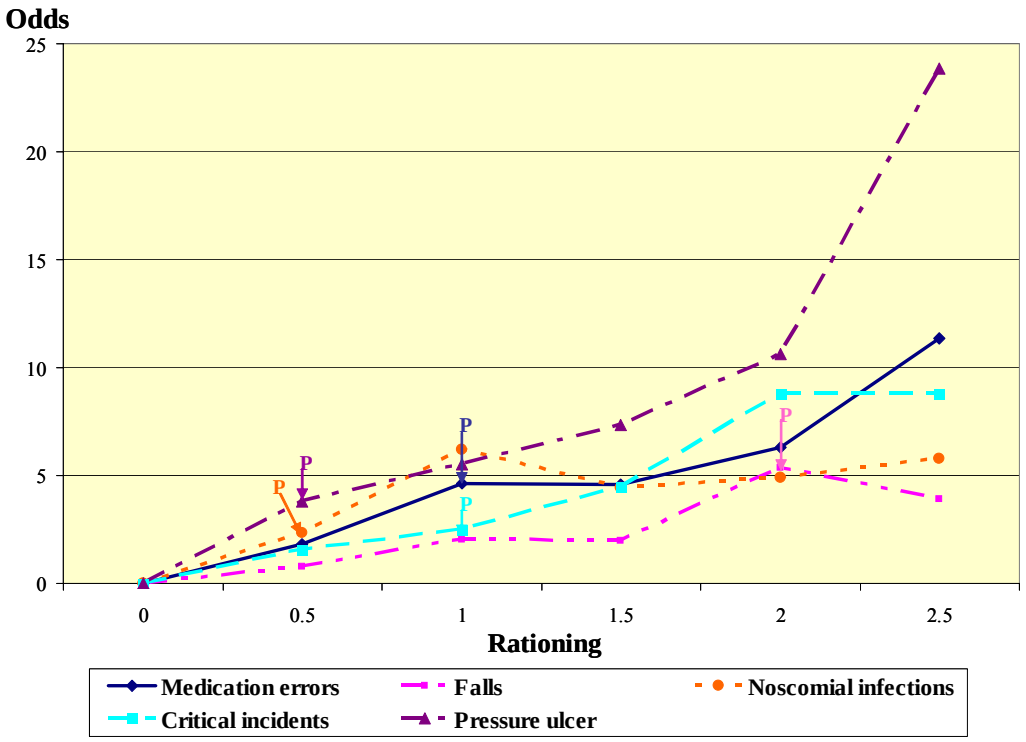
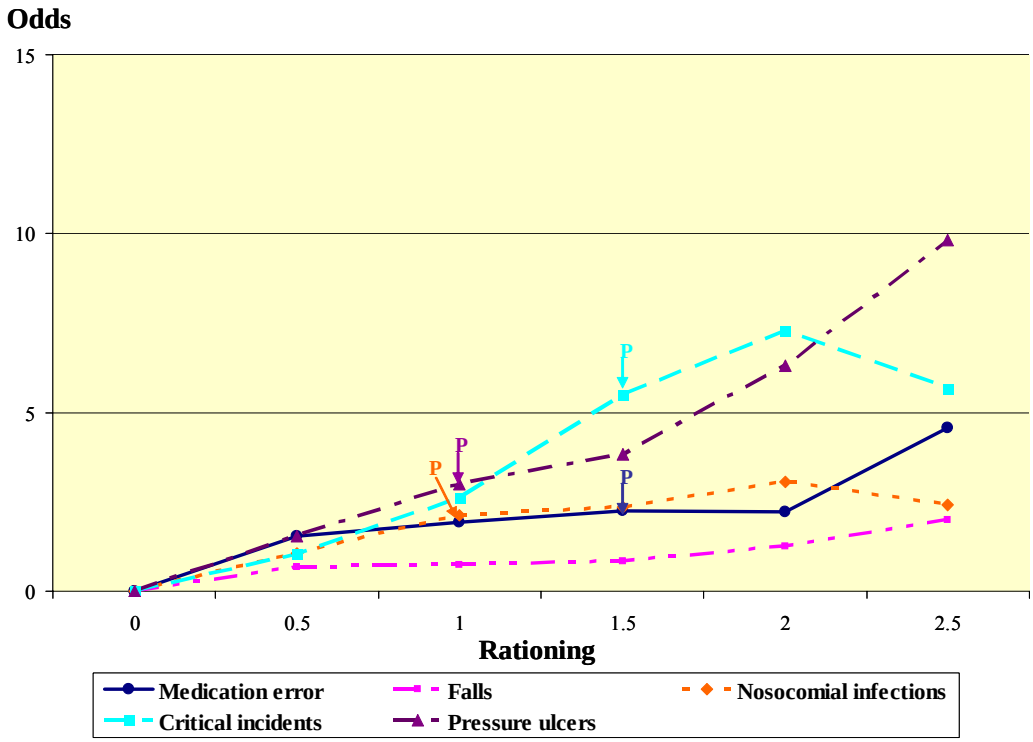


Figure 2: Rationing threshold levels for selected patient outcomes, regularly reported over the past year§



Note: 'p' represents the rationing level at which the accepted level of significance < 0.5 was reached and rationing began to affect the particular outcome negatively

** Dichotomization of patient outcomes: Ever (rarely, sometimes, often) versus Never)*

§ Dichotomization of patient outcomes: Regularly (sometimes, often) versus Never, Rarely)

7.6 Discussion

This study used data from the RICH Nursing Study to define clinically meaningful thresholds at which implicit rationing of care begins to affect patient outcomes negatively. Only four percent of participating nurses reported never having had to ration any of the 20 nursing measures listed in the tool over their last seven working days. Nonetheless, average rationing levels were somewhat low. Since 11 of the 19 hospitals invited to participate in the RICH Nursing study declined to participate, either because of limited resources or for political reasons, the levels of rationing in other Swiss hospitals could actually be much higher.

The rationing threshold levels defined here suggest that limiting rationing levels respectively to '0.5' and '1' should lower most, if not all, negative consequences of rationing on patient outcomes. In these data, the patient outcomes of nosocomial infections, pressure ulcers and patient satisfaction appeared particularly sensitive to rationing, since they showed significant increases whenever any consistent rationing was reported (scores of 0.5). Such low rationing thresholds suggest that providing conditions where rationing is only minimally necessary will both protect patients from harm and increase their overall satisfaction. If this is not possible, administrators are advised, as a minimum, to intervene to hold rationing levels well below '1' (i.e. a level at which nurses report that most or all aspects of nursing care are being rationed at least some of the time). Of the patient outcomes studied here, patient falls appear to be the least sensitive to rationing. In other words, rationing of care may be involved in fall risk, but it may not operate in quite the same ways or to the same extent for other outcomes, especially since the sensitivity of falls in inpatient settings to staffing remains a contentious question (Lake and Cheung, 2006).

The survey data in this study were derived from a convenience sample of Swiss acute care hospitals, in which all consenting eligible nurses and patients were included and a high response rate of 65% was observed for both surveys. The result was likely a precise depiction of implicit rationing of nursing care and its association with outcomes in a specific hospital sample, but may not be generalizable either to all Swiss hospitals or to hospitals in other health care systems. It should also be recognized that the cross-sectional design used here does not allow definitive causal inferences to be drawn about the connection between rationing and outcomes. A further limitation is that, with the exception of patient satisfaction, all outcomes were assessed through nurse reports. One last limitation of note is that, the nurse-reported outcomes data and the rationing data refer to different time frames (the preceding year for outcomes versus the last seven-working days for rationing), which may have attenuated the associations observed.

However, the results show similarities among the defined rationing thresholds of the two dichotomizations used. Further, additional analyses, one adjusting for hospitals as the level of analysis, the other adjusting neither for units nor for hospitals, resulted in similar thresholds. Therefore, the defined rationing thresholds appear robust to differences in variable definitions and model specifications.

Nevertheless, further studies in other countries with representative hospital samples and possibly prospective designs, also controlling for nurse and patient background variables, are needed to confirm the rationing thresholds defined here. Currently, little is known about the decision-making processes used by nurses to make rationing choices (Schubert et al., 2007). The roles of clinical judgment, the allocation criteria nurses use to distribute scarce resources among their patients, and the complex mix of factors influencing implicit rationing of nursing care (Bucknall, 2000, Hendry and Walker, 2004, Schubert et al., 2007) are still minimally understood. Studies with a qualitative or a mixed-method design are needed to get a deeper understanding of the processes. Additional studies are needed to guide nurse administrators in tracking rationing and minimising its negative effects on patient outcomes.

Conclusions

In this study, rationing threshold scores were generated using a standardized tool (the BERNCA instrument). Threshold scores can be used as a clinically meaningful method for tracking the effects of low resources or difficulties in allocating resources with regard to patient outcomes. Furthermore, the identified thresholds (0.5 and 1.0) provide parameters for nursing administrators to monitor negative effects of rationing on patient outcomes, and to respond accordingly whenever rationing exceeds tolerable levels. Since any measurable rationing showed negative effects on three of the six patient outcomes studied, it is recommended, with regard to patient health and safety, to avoid rationing as far as feasible.

The findings of this study are strongly suggestive of a dose-response relationship between rationing and negative patient outcomes, strengthening the case for a causal relationship between these two variables. Based on the importance of rationing, as shown both in this study and in the RICH Nursing study, further rationing studies are recommended to develop a deeper understanding of the processes influencing the levels of implicit rationing of nursing care, and of its association with patient outcomes, patient safety and quality of care.

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Chapter 8

8 Effects of Rationing of Nursing Care in Switzerland

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8.1 Abstract

The Rationing of Nursing in Switzerland Study was initiated in response to reports from nurses regarding implicit rationing of nursing care in Swiss hospitals. The aims of this study were to describe the levels of implicit rationing of nursing care in Swiss acute care hospitals and to explore its association with selected patient and nurse outcomes, adjusting for major organizational variables. A convenience sample of 1338 nurses and 779 patients of eight acute care hospitals were included.

Ninety-three percent of participating nurses reported having had to ration their care in the previous seven working days. Due to scarce nursing resources, the most frequently omitted nursing measures involved documentation or caring. Although average rationing levels were low (slightly below rarely), implicit rationing of nursing care was the only factor significantly related with all six patient and both nurse outcomes studied. Regarding patient safety, quality of nursing care and patient protection from harm, then, even very slight rationing is cause for concern. Since rationing of nursing care cannot be completely avoided, it is important to acquire more knowledge of these processes, and to define a clinically meaningful rationing threshold.

Keywords: implicit rationing of nursing care, outcomes, patient safety

8.2 Background

In response to nurses' reports regarding implicit rationing of nursing care in Swiss hospitals, the Swiss Federal Office of Public Health asked the Institute of Nursing Science of the University of Basel to conduct the Rationing of Nursing in Switzerland Study (RICH Study). This became part of the International Hospital Outcomes Study (IHOS), involving 11 countries, on the organization of nursing care in hospitals and its impact on patient outcomes [1-3].

The aims of the RICH Nursing study were (1) to document the extent of implicit rationing of nursing care in a sample of Swiss acute care hospitals; (2) to investigate the relationship between implicit rationing of nursing care, nurse work environment quality, staffing and skill mix and selected patient and nurse outcomes.

8.3 Methods

A convenience sample of 1338 nurses and 779 patients of eight acute care hospitals in the German (5) and French (3) speaking regions of Switzerland were included in the study. Rationing was measured using the newly developed Basel Extent of Rationing of Nursing Care (BERNCA) instrument. The BERNCA includes 20 questions regarding a range of necessary nursing tasks. On a 4-point Likert-type scale, nurses assessed how often in their last seven working days they had had to omit the specified tasks due to a lack of resources.

8.4 Results

Implicit rationing of nursing care

Although various studies and reports (the majority of which are, unfortunately, not available in English) discuss implicit rationing of nursing care, this topic has been accorded neither an accepted definition nor a conceptual framework. Building on definitions of rationing in other areas of health care, implicit rationing of nursing care was therefore provisionally defined as "the withholding of or failure to carry out necessary nursing measures for patients due to a lack of nursing resources (staffing, skill mix, time)" [4]. The term "necessary nursing measures" refers to a group of nursing tasks and actions which are accepted – both by clinical consensus and by the attending nurse – as important for a patient to achieve all desired outcomes. Being aware that rationing of nursing care also occurs at higher organizational levels, this definition and the focus of the RICH Nursing study refer to rationing and the allocation of scarce resources on the micro-level, in response to resource constraints at the level of the individual nurse.

Mechanism of implicit rationing of nursing care

Nursing care depends on a problem-solving and decision making process which takes place over three main steps: assessment of the patient's situation and identification of relevant problems; planning of necessary nursing care (measures and intervention); and implementation and evaluation of care. Throughout this process, nurses have to evaluate the needs of every patient under their care and then decide whether to adhere to or to adapt the existing care plan. Based on the overall unit's workload, her individual patient caseload, her experiences as a nurse, and patient preferences, she has to judge whether there are enough nursing resources to provide the needed care to all patients, i.e., whether she needs to withhold necessary care tasks from some patients. Therefore, the extent of rationing is expressed in the number of necessary nursing tasks withheld. It is influenced by the capacity of a nursing unit's resources to meet all patients' care needs, and includes processes of decision-making, judgment, and prioritization, along with triage. However, the strategies nurses used to allocate scarce nursing resources among their patients and the related processes named here are currently neither well understood nor regulated.

Does implicit rationing of nursing care occur in Swiss acute care hospitals?

In the RICH Nursing study 93% of the 1338 nurses reported that, due to scarce nursing resources (personnel, time, skill mix) they had had to ration their care in the previous seven working days, with the average nurse rating falling slightly below rarely. The care tasks most frequently omitted were offering emotional or psychosocial support to patients, followed by formulating or updating patient care plans. The least common form of rationing was omitting management of bodily waste (urine, stool, vomit) [5].

What are the consequences of implicit rationing of nursing care?

Although in the RICH nursing study only very limited rationing took place, as shown in the reports cited above, rationing was significantly linked with all patient and nurse outcomes studied, which demonstrates the importance of this factor. Higher levels of rationing were associated with lower patient satisfaction regarding care, and higher rates of nurse reported medication errors, patient falls, nosocomial infections, critical incidents and pressure ulcers in patients. Furthermore, higher levels of rationing were related with higher rates of emotional exhaustion and job dissatisfaction among nurses [6].

Regarding the quality of the nurse work environment, patient-to-nurse staffing ratio showed no consistent links with patient and nurse outcomes. For example, the perceived adequacy of resources was significantly related with some of the patient outcomes before controlling for rationing and the patient-to-nurse staffing ratio; after controlling, this relationship was no longer

significant [6]. Furthermore, the patient-to-nurse staffing ratio was not significantly related with any of the six investigated patient outcomes. These results contradict the international evidence, which indicates a significant relationship between nurse staffing and skill mix and the quality of the nurse work environment vis à vis the frequency of adverse events, failure-to-rescue and mortality rates in patients, and job dissatisfaction and work-related burnout in nurses [7-13].

How can the strong effect of such small rationing levels on outcomes be explained?

As described above, in the RICH Nursing study, even small rationing levels were linked with deteriorated patient outcomes. This effect may be amplified because implicit rationing of nursing care occurs during the process of care at the patient to nurse interface. Furthermore, one explanation is that before a nurse withholds necessary nursing tasks, she will try, based on various decision-making, judgment and triage processes, to utilize other possibilities, including delegation, suboptimal execution, or simple postponement of the task. Therefore, rationing only occurs when there is no alternative but to omit a necessary nursing task. This makes it a very strong factor and explains its direct link with patient and nurse outcomes, care quality and patient safety.

8.5 Discussion / Conclusion

Comparable with the results of other studies [14-17] the nurses included in the RICH Nursing Study reported that, due to scarce nursing resources (personnel, time, skill mix) they most frequently had to omit nursing measures in the areas of caring or documentation. The lack of time to discuss individual patients' worries is a cause for concern, because caring is considered an essential aspect of nursing care and an important aspect of the nursing role, indicating, from the patient's perspective, a personal commitment to positive patient outcomes [18].

The strong association of even low rationing levels and deteriorating patient and nurse outcomes is another cause of concern in view of patient safety, quality of care and patient protection from harm. Since very low rationing levels have such a pronounced effect on outcomes, while rationing, on the other hand, can not be completely avoided, it is important to increase the current knowledge of the dynamics and thresholds of implicit rationing of nursing care regarding patient and nurse outcomes. Such data will enable nursing administrators to plan and react accordingly when rationing levels surpass meaningful clinical thresholds. Further, it will assist in the definition of interventions or strategies to support nurses in their decision making and clinical judgment processes, ensuring patients' just treatment and equitable distribution of available care resources.

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Chapter 9

9 Sharps-Devise Injuries to Hospital Staff Nurses in 4 Countries

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9.1 Abstract

Objective: To compare sharp-device injuries rates among hospital staff nurses across four Western countries.

Design: Cross-sectional survey.

Setting: Acute care hospital nurses in the United States (Pennsylvania), Canada (Alberta, British Columbia, and Ontario), the United Kingdom (England and Scotland) and Germany

Participants: A total of 34,318 acute-care hospital staff nurses in 1998-1999

Results: Survey-based rates of retrospectively-reported needlestick injuries in the previous year for medical-surgical unit nurses ranged from 146 injuries per 1000 full-time equivalent positions (FTEs) in the US sample to 488 per 1000 FTEs in Germany. In the United States and Canada, very high rates of sharps injuries among nurses working in operating room and/or perioperative care were observed (255 and 569 injuries per 1000 FTEs per year, respectively). Reported use of safety-engineered sharp devices was considerably lower in Germany and Canada than it was in the United States. Some variation in injury rates was seen across nursing specialties in North American nurses, mostly in line with the frequency of risky procedures in nurses' work.

Conclusions: Studies conducted in the United States over the past 15 years suggest that the rates of sharp-device injuries to front-line nurses have fallen over the past decade, probably at least in part because of increased awareness and adoption of safer technologies, suggesting that regulatory strategies have improved nurse safety. The much higher injury rate in Germany may be due to slow adoption of safety devices. Wider diffusion of safer technologies, as well as introduction and stronger enforcement of occupational safety and health regulations, is likely to decrease sharp-device injury rates in various countries even further.

9.2 Background

Since the 1980's, state and federal authorities in the United States have considered the consequences of sharps injuries from needles and other sharp devices (hereafter, sharps) to be serious enough to warrant regulation of healthcare workplaces, including mandates for staff education, sharps disposal, and the use of specially-engineered devices to reduce injury risk.[1,2] In other countries, percutaneous injuries and the associated transmission of bloodborne pathogens to healthcare workers have been tracked for some time, but adoption of safety-engineered sharps has been limited. Directly comparable international statistics regarding the sharps injury frequency (using a standardized protocol such as the EPINet system) have been sparse and interpreting differences in rates has been difficult, because of variations in health care practice as well as reporting trends across countries.[1]

In this article, rates and risk factors for sharps injuries are presented for over 30,000 hospital nurses across 4 countries in 1998-1999. Injury incidence, risky procedures and use of safety-engineered equipment are analyzed for medical-surgical nurses in 4 countries and for all hospital nursing specialties in the United States and Canada.

9.3 Methods

Data were gathered through confidential, mailed-in paper surveys of nurses, conducted by teams in International Hospital Outcomes Research Consortium, which undertook a study of nurse staffing and organizational attributes in more than 700 hospitals in 1998-1999. A common core questionnaire containing previously tested and validated questions was designed to measure working conditions and experiences relevant to acute-care hospital nurses in different countries.[3,4] The retrospective recall question regarding sharps exposure analyzed here was validated in an earlier study.[5] Details about overall study design, which also included data regarding patient outcomes and hospital structure, have been published elsewhere.[3,4]

In the American state of Pennsylvania and the Canadian provinces of British Columbia, and Ontario, random samples of Registered Nurses holding current licenses were mailed questionnaires at their home addresses; in the province of Alberta, all eligible registered nurses were sent a questionnaire. Because a current license is a requirement for practicing nursing in these jurisdictions, the samples were representative of all working nurses. Nurses located in the Canadian survey areas report their employers to licensing bodies at the time of renew their licenses, and hospital nurses were specifically sampled. In Pennsylvania, data regarding employers are not collected by the state board, and the sample was drawn from the group of all licensed nurses.

Nurses from all acute care specialties (i.e. not medical-surgical unit nurses only) were included in the sampling frames in these 4 areas.

For the 3 European areas, surveys were delivered to nurses in specific acute care specialty areas at their employing hospitals and returned to the researchers by mail. A convenience sample of hospitals from different regions in England and Germany were selected on the basis of their participation in commercially patient outcomes data benchmarking programs (information from these firms was used in a separate part of the study). The sample included 28 hospitals from across Germany, as well as 30 hospitals from 4 (of 8) National Health Service regions in England. In Scotland, 27 of 29 acute-care hospitals ultimately agreed to participate in the study. The specialty areas included differed slightly from country to country; however, medical-surgical nurses constituted the majority of the sample in every country.

For all survey areas except Germany (where nonresponders were not recontacted), nonresponders received a reminder letter or postcard and a second mailing of the questionnaire in a modified version of Dillman's protocol.[6] No incentives for participation were offered in any of the survey areas. Results for the 3 Canadian provinces are reported together, as are data for England and Scotland (for the United Kingdom). Response rates were 42% in Germany, 50% in both of the U.K. sites, 52% in the U.S. and 54% in Canada.

The rates of sharps injuries and safety-engineered equipment use for self-identified staff nurses (as opposed to nurse managers or other nurses in non-staff nurse roles) were analyzed because direct-care nurses were assumed to have common or comparable exposure to sharps within and across countries. Medical-surgical unit nurses were representatively sampled in all countries--injury rates and responses for that particular specialty were calculated for all survey areas. In the United States and Canada, where sampling was broader, injury rates and descriptive statistics could also be calculated for other acute care nursing specialties.

Nurses were asked how many times they had been injured by used needles or sharps in the past year. At survey sites except those in the United Kingdom, they were also asked whether various types of safety-engineered sharps devices were routinely used in their workplaces. Presented here are their responses to questions regarding needleless (IV) tubing systems and self-recapping and/or retractable needles. Except in England and Scotland, nurses also reported various clinical activities on the last shift they worked before completing the survey. Nurses were asked whether they performed a number of technical and non-technical tasks, to define the nature of nursing work across hospitals and countries and to determine whether nurses engaged in work that could be performed by specialized teams or delegated to other staff. Of specific interest here were 2

questions about sharps-related procedures: whether or not nurses inserted an intravenous IV cannula or performed a routine phlebotomy ("blood draw").

Nurses were also asked whether they worked full-time or part-time. Two part-time workers were assumed to represent 1 full-time-equivalent position (FTE), an approximation commonly made in hospital outcomes research. Rates of needlestick injury are reported as the number of injured workers per 1000 FTEs per year (where an injured worker was counted only once) as well in terms of total injuries per 1000 FTEs per year, with confidence intervals computed using binomial and Poisson exact procedures, respectively. Stata 8.0 (College Station, TX) was used for all analyses.

9.4 Results

The sample included 11,537 nurses from the United States (Pennsylvania), 3,581 of whom were medical-surgical unit nurses, and 16,285 from Canada, 6,456 of whom were medical-surgical unit nurses. In addition, it included 4,943 medical-surgical nurses from the United Kingdom and 1,553 from Germany.

Table 1 displays the number of hospitals represented as well as injury rates for medical-surgical unit nurses in each of the 4 countries. The rates in the Unites States and United Kingdom were similar and have overlapping confidence intervals; they are decidedly lower than those in the other countries. The rates for Canadian nurses were somewhat higher and the German rates were the highest of all, with nearly 1 nurse in 3 experiencing an injury in the preceding year. Because each nurse could report multiple injuries, the number of injured nurses and of injuries are both provided. The rates of injuries are from 18%-51% higher than rates of injured workers, suggesting multiple injuries in the same workers were relatively common, and that this was most common in Germany. The majority (64,1%) of US medical-surgical unit nurses and almost half (49,2%) of the Canadian ones reported inserting an IV line on their last shift before completing the survey. About one-quarter of nurses in the United States, Canada and Germany performed routine venipuncture on their last shifts. Nearly 80% of the US nurses reported using needleless IV tubing. Because US federal labor regulations strongly discourage using needles in circumstances where they are not required (for instance, to connect IV lines), in theory, all American nurses should have reported that needleless tubing was in use at the time of the surveys. Nearly 40% of the US nurses reported using some type of safety-engineered needles or syringes. The rate of use of these types of equipment was lower in Canada and almost negligible in Germany.

Table 1: Summary of Survey Data on Rates of Injury From Sharp Devices and Associated Practices Among Medical-Surgical Unit Nurses in 4 Countries, 1998-1999

Variable	United States (Pennsylvania)	Canada	United Kingdom	Germany
No. of hospitals represented	210	393	61	28
No. of nurses who responded	3,581	6,456	4,943	1,553
Injuries measured per 1000/ FTEs per year (95% CI)				
Injured nurses[a]	118 (106-130)	177 (166-188)	119 (110-130)	322 (297-348)
Injuries	146 (133-161)	209 (196-222)	157 (145-169)	488 (451-528)
Performed risky procedures on last shift, % of nurses				
IV line insertion	64.1	49.2	ND[b]	--[c]
Routine phlebotomy	27.8	17.5	ND[b]	24.4
Regularly use safety-engineered devices, % of nurses				
Needleless IV tubing	78.2	58.1	ND[b]	8.7
Safety-engineered needles	37.4	14.1	ND[b]	7.1

NOTE: CI, confidence interval, FTE, full-time equivalent positions; IV=Intravenous, ND, no data
[a] Nurses injured ≥ 1 time in the previous year
[b] Question series not asked of these nurses (see Methods)
[c] Question not asked; not a part of German nurses' scope of practice

Table 2 lists injury rates and reports of risky procedures performed on the last shift across specialties. The frequencies of IV insertions and routine phlebotomies varied in expected ways from specialty to specialty. For instance, almost all the US and Canadian emergency department nurses reported performing IV insertions on their last shifts, as did quite a few nurses working in psychiatry. Higher rates of injuries were observed for Canadian nurses in virtually every specialty. Nurses working in operating room and/or perioperative settings had injury rates doubled those of nurses in other specialties in both countries. Given the frequency of IV line insertions and venipuncture reported, neonatal nurses in the United States had particularly low rates of injury, and Canadian nurses working in acute geriatrics had relatively high sharps injury rates. No systematic differences in the use of safety-engineered sharps were found among specialties in either country.

9.5 Discussion

The US sharps injury rates reported here are comparable to those observed in earlier studies, such as the 1997-1998 National Surveillance System for Health Care Workers (NaSH) study involving 60 hospitals, in which 1,070 injuries were reported among 8,896 nursing staff members—a rate of 120 injuries per 1,000 workers.[7] Overall, published data suggest that a distinct reduction in sharps injuries occurred in the United States in the 1990s.[1,8] For instance, survey-based studies of US hospital nurses using nearly identical questions found annual injury rates of

52-66% in 1991,[5,9] followed by a much lower rate of 8.6% in a group of 22 hospitals with reputations for excellence 1998,[10] and, in the current study, an annual rate of 12% in a representative sample of hospital nurses across a major state in 1999. During the 1990s, nurses became better informed about avoiding injuries when performing risky procedures, and an extensive range of needleless and safety-engineered devices that eliminate or reduce contact with bare sharps (associated with 22%-100% reductions in injury rates[8]) were developed and marketed, and their use was strongly encouraged by federal and state legislation.

US and UK medical-surgical unit nurses appeared to have equal injury risks. UK publications tend to cite US statistics extensively--perhaps because of a relative paucity of UK data. However, a 2002 United Kingdom EPINet study indicated that 12.7 injuries occurred per 100 beds (the comparable rate for the same time period for US hospitals was 23.8 injuries per 100 beds).[11] Both sets of EPINet statistics were based on smaller numbers of institutions than were studied in the present article, included employees other than nurses, and were derived from officially-reported injuries affected by different biases than those reported anonymous surveys. Either mode of reporting or the selection of agencies or personnel across the studies may explain the differences in rates observed between the United States and the United Kingdom in EPINet data, but not in the present study. Unfortunately, the survey data on hand do not allow evaluations of risky procedures and use of safety-engineered sharps in these 2 countries. Although injury rates in the Unites States and the United Kingdom appeared somewhat lower than in Canada and Germany, sharps safety is an important issue in the United Kingdome and nursing organizations continue to advocate wider adoption of safer sharps.[11-14]

Table 2: Annual Sharps Injury Rates and High-Risk Procedures for U.S. and Canadian Hospital Nurses by Specialty, 1998-1999

	United States (Pennsylvania)				Canada (Alberta, British Columbia, Ontario)			
			Procedures performed, % of nurses[a]				Procedures performed, % of nurses[a]	
Speciality	No. of nurses	Injuries per 1000 FTEs per year (95% CIs)	IV line insertion	Routine phlebotomy	N	Injuries per 1000 FTEs per year (95% CIs)	IV line insertion	Routine phlebotomy
Medical-surgical	3581	146 (133-161)	64.1	27.8	6456	209 (196-222)	49.2	17.5
Intensive and/or critical care	2267	134 (118-152)	73.3	55.0	1545	237 (210-267)	64.7	37.5
Obstetrics	1131	114 (92-138)	64.1	36.2	1366	215 (187-246)	35.7	19.1
Operative and/or peri-operative	1125	255 (224-289)	21.0	12.7	1217	569 (521-621)	36.7	6.1
Emergency	809	164 (135-198)	95.7	74.8	1632	312 (280-346)	92.8	46.0
Psychiatry	440	69 (44-103)	8.6	9.3	507	102 (72-139)	4.6	3.4
Special procedures	427	99 (69-138)	71.4	30.0	120	207 (121-332)	54.2	14.0
Pediatrics	306	74 (43-118)	60.5	29.1	466	133 (96-179)	38.6	11.9
Clinics	258	105 (64-162)	59.3	34.1	223	215 (149-301)	50.0	14.6
Neonatal	234	49 (23-94)	69.2	61.1	162	217 (141-320)	73.1	38.3
Rehabilitation	231	82 (46-135)	39.4	20.3	144	155 (89-252)	12.6	0
Geriatric	206	103 (60-166)	21.0	14.6	173	321 (225-445)	12.7	1.7
Other	522	94 (66-129)	60.3	29.7	2272	256 (232-282)	59.2	14.0
ALL	11,537	140 (132-150)	61.1	35.7	16,285	251 (242-261)	54.7	20.4

NOTES: FTE, full-time equivalent position; IV, Intravenous

[a] Procedures reported as performed on the last shift before completion of the survey questionnaires.

Canadian Needle Stick Surveillance Network (CNSSN) data for 2000-2001 showed an injury rate of only 4.88 injuries per 100 FTEs for hospital registered nurses in hospitals, less than half of the rate in our survey.[15] However, the CNSSN data were based on institutional reports from a convenience sample of 12 hospitals, in contrast to anonymous self-reports from a more representative sample of nearly 400 hospitals in the present study. The higher injury rates for Canadian nurses were somewhat surprising, given that Canadian nurses in all but 1 specialty were less likely to perform IV insertions and routine phlebotomies, and therefore were theoretically at lower risk for injuries. A potentially compelling explanation for the higher injuries rates in Canada supported by the data in the present study relates to low rates of use of safety-engineered sharps in Canadian hospitals in 1999, demonstrated not only in our survey findings but also discussed in the literature.[16,17] As in the United States and the United Kingdom, the adoption of safer sharps remains an important labor issue in Canadian health care.[18]

Generally overlapping confidence intervals for the injury rates across specialties in both the United States and Canada suggest that nurses in most practice areas shared similar risks of injury. Overall, specialty-specific injury rates were in line with the frequency of IV line insertions and venipunctures prformed. Injuries among perioperative nurses were particularly high, suggesting both frequent contact with sharps (other than through venipuncture and IV insertions, which appear to be uncommon in this specialty) and adverse working conditions. Perioperative nurses are in contact with a variety of sharps during surgical operations. Double-gloving, use of hands-free technique for passing surgical instruments, and the use of blunt suture needles where appropriate, are important but underused safety practices known to lower risks in the operating room.[19,20] They were not studied in this study, but deserve examination in the future.

Most striking were the very high injury rates seen among German medical-surgical unit nurses, particularly because IV cannula insertion is not in their normal scope of practice. These elevated rates are consistent with reports published elsewhere. Some German authorities cite an annual rate of 1 sharps injury for every 2 health care workers,[21] which is very close to the statistic for German medical-surgical nurses in the present study. Another German report found 1 injury per year for nurses; those whose work involved more than 20 sharps-related procedures per week had a sharps injury rate of 1.4 injuries per year.[22] Researchers extrapolating from needlestick surveillance data estimate 500 000 injuries occur annually in German health care workers,[22] a startling figure when compared with the statistic of 600 000-800 000 needlesticks per year put forth for the United States in the late 1990s, because Germany has a population about one-third the size of the US population.[21,23] The uptake of safety-engineered devices in Germany has been

slow,[24] as the survey data here would imply. Perhaps because low perceived risks to workers, staff training has historically been limited, as has willingness to invest in safer equipment (even containers for safe sharps disposal).[24] Although federal regulations to increase adoption of safer technologies were passed in 2003, cost considerations led to very strong resistance from the German hospital industry and suggestions as recently as a few years ago, suggestions were made that hospitals disregard these guidelines.[25]

The large number of nurses and institutions represented here are, to our knowledge, unique and offer an important complement to previous work. Nonetheless, a number of limitations should be considered. Injury rates are a product of time at risk and the density of risky procedures in one's work, as well as hospital- and nurse-specific factors. When interpreting the international comparisons, differences in the delivery of hospital care across countries should be considered. For instance, in 1999, the average length of stay in acute care was 5.9 days in the United States, 6.2 days in England, 7.1 days in Canada and 9.6 days in Germany.[26] The survey data in the present study do not offer insights about whether decreased per-day intensity of treatment in countries with greater length of stay might increase or decrease the risk of injury per-procedure or per-nurse. Also, while respondents were instructed to report on exposures to used sharps, the proportion of these sharps that were contaminated with blood (and therefore posed the greatest infection risk for the injured nurses) is not known from the data.

The response rates for the present survey were within the range of those of many published voluntary surveys of health professionals,[27] because non-respondents may have had more, fewer, or different patterns of sharps injuries; all results here should be interpreted in this context. Although representative groups of hospital nurses were contacted in the North American survey sites, hospitals in Germany and in England were not selected completely at random, and thus extrapolations of these injury rates to either country as whole should be cautious. However, the sampling unit in the North American survey areas was the individual nurse, and for all areas nurses were either selected at random from all nurses in the jurisdiction or a full census of nurses from eligible units was performed.

Self-reports involve obvious limitations and biases. Lack of familiarity with types of equipment and terminology may have led to errors in reporting regarding safety-engineered equipment. In particular, the use of needles to access IV lines for secondary IV medication administration has not been common practice for some time, and so respondents, particularly those in Germany (where the use of 3-way connectors and stopcocks to access lines has always been the accepted

practice), may not have had a context for understanding the question about using needleless systems for medication administration.

The survey question regarding injuries refers to a 1-year period and rates calculated using the data are subject to memory biases. However, statistics based on reports to institutional officials are also subject to separate biases. Whether a particular sharps injury is reported relates to many factors, including workload, perceptions of injury severity, as well as opinions about whether reporting will improve safety.[28] In the United States, 1991 data suggested that as few as 1 in 4 sharps injuries were reported to hospital authorities.[5] In subsequent studies from 1997 and 1998, respondents indicated that 73% and 85% of their most recent injuries were officially reported,[10,29] suggesting that reporting to officials may be improving but remains imperfect. Hofmann and colleagues[23] indicated that only 6.3% and 14.7% of injuries in a German hospital in the late 1990s were officially reported. In the present study, 10% or fewer of the injuries reported in the German surveys here appear in official hospital databases. Given pervasive under-reporting of injuries to hospital officials, anonymous self-reports offer an essential complement to data assembled by institutional authorities and workers' compensation agencies, although it is somewhat unclear which injuries are more likely to be reported through official versus voluntary channels and the degree to which this influences estimates of risk using the two approaches.

Since these surveys were conducted, other US researchers have identified further reductions in injury rates. EPINet data from 58 U.S. hospitals showed a particularly dramatic downward trend in sharps injuries between 1999 (the year of data collection in the present study) and 2001[30] that has been attributed to the passage of comprehensive federal sharps legislation in 2000, and more vigorous enforcement of occupational safety guidelines. Further tracking of injury trends, particularly in the same or similar US hospitals over time using parallel surveillance tools (official reports and /or survey tools, preferably both) is needed.

Although this study examined only a few countries, sharps injuries were lowest in the United States, where the use of the safety-engineered devices was highest. Particularly when read in the context of other statistics, federal sharps-safety regulations in the United States appears to have had a positive impact on nurse safety and to have helped the United States to be on leading edge in controlling this occupational health problem. As diffusion of safer sharps technology continues, injury rates in Canada and Germany certainly merit examination. There is nonetheless still considerable room for improvement in reducing injuries in all countries, of course. Documenting

patterns and circumstances of injuries is a key ingredient in planning and evaluating multifaceted strategies to reduce the financial and human toll of needle sticks and other sharps injuries.

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Chapter10

10 Discussion, Conclusion and Perspectives

10.1 Discussion and Conclusions

This research program focused on implicit rationing of nursing care and its associations with patient outcomes, with consideration for major organizational variables indicated as significant predictors of patient and nurse outcomes. It is the Swiss component of the IHOS study, an international study on the organization of nursing care in hospitals and its association with patient and nurse outcomes. The addition of implicit rationing of nursing care, as a new empirical measure, extended the IHOS research protocol and for the first time, allowed evaluation of the association between rationing and patient outcomes. In order to address the five aims of this research program, the following research was performed.

Development of a conceptual framework for implicit rationing of nursing care

Because of the lack of a concise definition, a conceptual framework for implicit rationing of nursing care, or a measurement instrument, our first aim was to develop these three components. The conceptual framework of implicit rationing of nursing care was built upon that of the IHOS study, along with empirical findings on system factors associated with patient and nurse outcomes, decision-making and prioritization of nursing care. The new framework describes the associations between rationing of nursing care, the known organisational system factors (indicated as significant correlates of outcomes), hospital, patient and nurse background variables, and patient and nurse outcomes. During this research program, several of the presumed associations were explored and confirmed. These findings are discussed below in greater detail.

Validity and reliability of the new BERNCA Instrument

The first study's aim was to evaluate validity and reliability of the newly developed BERNCA instrument. It used nurse survey data of a convenience sample of five acute care hospitals from the German speaking area of Switzerland. The new BERNCA contains 20 items on necessary nursing tasks, noted in the literature and / or the clinical experience of the research team as those most likely omitted during nursing resource shortfalls (see Appendix 1). Along suggested lines of evidence[1] initial validity and reliability were established, indicating that the BERNCA is a valid and reliable tool which can be used to measure implicit rationing in acute care hospitals.

Evidence based on test content, internal structure, homogeneity, and consistency

Nursing experts from the German speaking area of Switzerland confirmed that the BERNCA represented the domain of implicit rationing of nursing care, and that the included items were relevant. The supposed uni-dimensionality of the BERNCA was confirmed with an explanatory factor analysis, which showed strong relationships between all individual items and the overall factor of implicit rationing of nursing care. The internal consistency and homogeneity of the BERNCA instrument were confirmed by moderate to high Cronbach`s alpha and inter-item correlations.

Relations between the nurse work environment, the patient-to-nurse staffing ratio and rationing

An expected relationship was confirmed between rationing, as measured using the BERNCA, and the component 'quality of the nurse work environment,' particularly the perceived adequacy of staffing/skill mix. However, no such relationship could be confirmed for a second component, 'patient-to-nurse ratio.' The quality of the nurse work environment was measured with the Nursing Work Index – Revised (NWI-R) [2-4].

To test the reliability and validity of the NWI-R in the Swiss setting, along with other analyses, an explanatory factor analysis was conducted. This indicated a three factor solution: (1) nursing leadership and professional development (Leadership), (2) nursing resources and autonomy (Resources), and (3) interdisciplinary collaboration and competence (Collaboration), with various differences in the factor structure and item assignment compared to some international studies. The hypothesized negative correlations (formulated based on available evidence and the new conceptual framework) were confirmed regarding the three nurse work environment dimensions (i.e., Leadership, Resources, and Collaboration). As hypothesized, the correlation between rationing and the Resource dimension (including items concerning the adequacy of perceived nurse staffing/skill mix) was stronger than for either of the other two, indicating that the resource dimension is a potential predictor of implicit rationing of nursing care.

As reported above, the hypothesized positive correlation between the patient-to-nurse ratio and rationing could not be confirmed. In the absence of other data, the patient-to-nurse ratio, analyzed in terms of each nurse's last shift, was used as a proxy for workload. As such, the variable used may have been insufficiently refined to show a strong relationship with rationing. As shown in our conceptual framework and the literature, nursing workload is influenced by a range of factors, including: the volume and type of nursing resources needed to care for each patient; the patient case mix, with consideration for the acuity and complexity of each patient's situation; and the adequacy of staffing and resources vis à vis high-quality patient care [5].

Therefore the relationship between nursing workload/nurse staffing and rationing requires further investigation with more refined workload measures.

Strengths and weaknesses, further steps needed

Although initial validity and reliability of the BERNCA instrument has been established, the instrument has two weaknesses which have to be considered. One is that it does not address the entire nursing domain, but focuses on necessary nursing tasks considered to be most frequently omitted when resources are scarce. Since nursing care is a very broad and complex field, it would be impossible, from both methodological and practical standpoints, to develop a single instrument capable of addressing the entire nursing domain. However, it would be valuable to include a number of technical and therapeutic measures, which seem to preserve higher levels of internal priorities when nurses have to prioritize and to ration their care [6-10].

Another weakness is the double content of some BERNCA items, which affects the assignment of nurse assessments to their respective nursing tasks. Neither the researchers, the consulted nursing experts involved in instrument development, nor the nurses participating in the pilot test recognized this weakness. Nevertheless, the rewording of these items into questions with single content would improve the precision of the resulting data and analyses.

Since the completion of data collection for the studies described here, the BERNCA instrument has been revised to remediate these flaws for use in a new study in a Swiss hospital setting. The validity of this revised version will be tested in the coming months. A confirmatory factor analysis [11], which, among other advantages, allows controlling for every relevant aspect of the model specification and comparison of factor models across groups, could be an appropriate method to further test the validity of the revised BERNCA instrument.

Two significant strengths of the BERNCA instrument are its simple application and the short time needed to fill it out, both of which make it particularly applicable to clinical practice.

Associations between rationing, other organizational factors and patient outcomes

The second study used nurse and patient survey data of a convenience sample of eight Swiss acute care hospitals (5 German, 3 French) to investigate the associations between rationing of nursing care and six selected patient outcomes, controlling for other relevant organisational and background variables. This is the central aim of this research program. The effects of implicit rationing of nursing care and the two nurse work environment dimensions – ‘Resources’, and ‘Collaboration’ – as well as the patient-to-nurse staffing ratio, on the selected patient outcomes were assessed with multilevel multivariate regression analysis. The ‘Leadership’ dimension of

the nurse work environment was excluded from this analysis because of its high correlation with with the resource dimension.

Association between rationing and patient outcomes

Although the measured rationing levels were low (registering slightly less frequently than 'rarely'), rationing was the only factor consistently and significantly associated with the six studied patient outcomes, both before and after controlling for major organizational and background variables. Even very small increases in rationing measurements were associated with large decreases in the odds of high patient satisfaction with care. Concurrently, the odds increased substantially of nurse reports that medication errors, falls, nosocomial infections, critical incidents, and pressure ulcers had happened regularly (sometimes, often) in the last year. These strong relations between implicit rationing of nursing care and patient outcomes indicate that, although it is newly-isolated as a system factor, rationing might be directly linked with patient outcomes.

Although, no other evidence is yet available, some parallels are apparent in a U.S. study including data of 11,628 hospital nurses from a random sample of 42,219 nurses. That study showed a strong significant relationship between undone nursing tasks in the last shift (n=7) and the quality of nursing care, as well as moderate relationships between this factor and two patient safety outcomes (medication errors and patient falls) [12]. This underscores the importance of unfinished care as an indicator of quality of care and patient safety. However, the shown signifycant association between rationing and patient safety outcomes needs to be confirmed in other healthcare settings, including both acute and long term care, with various patient acuity levels.

Associations between the quality of the nurse work environment and patient outcomes

Of the other major organisational variables, the 'Resources' dimension of the nurse work environment was significantly correlated with five of the six patient outcomes (all except patient falls) in the unadjusted models; however, these associations did not hold up in the adjusted models, except for a marginally-significant association with nosocomial infections. Similarly, only in the unadjusted models was the 'Collaboration' dimension significantly associated with reports of avoidable critical patient incident factors.

Although international evidence suggests a significant association between higher-quality practice environments in hospitals and superior outcomes [13,14], the results described here only partly support such a conclusion. It has to be considered that the current research program used a somewhat different factor model and item assignment for each factor than in other international studies, which limits the comparability of the results. Furthermore, the majority of studies in this

area to identify significant associations focused on nurse job outcomes [15, 16] or nurses' appraisals of care quality in general [16]. In terms of showing work environments' effects on specific patient outcomes, their data are much less conclusive [17]. However, the underlying factor structure of the NWI-R is still under discussion [18]. Predominantly, the staffing and resource adequacy dimension appears consistently across linguistic and cultural adaptations, as was also indicated in this study [17,19]. In the adjusted model, the absence of a significant relationship between the Resource dimensions and patient outcomes may have occurred because rationing is directly linked with patient outcomes and reflects conditions affected by the adequacy of staffing and quality of the nurse practice environment. Nevertheless, these points require further investigation in other health care setting with different patient acuity levels, in which comparable NWI-R subscales are used.

Association between patient-to-nurse staffing ratio and patient outcomes

The patient-to-nurse staffing ratio was not significantly associated with any of the studied patient outcomes. This conflicts with international results, which generally indicate strong relationships [20,21]. Such inconsistency may have arisen because the patient-to-nurse staffing ratio used was insufficiently refined to show significant relationships with outcomes. The significant associations appearing in unadjusted models between the NWI-R Resource dimension and patient outcomes suggest that the items of this dimension actually offer a clearer reflection of workload. Another reason for this inconsistency might be that we used unit-level staffing data where the other studies used hospital-level staffing data. There are indications that analysis using hospitals-level staffing data could mask possible relationships [22].

Suspecting that the patient-to-nurse ratio alone did not accurately represent the nursing workload, we asked the participating hospitals for their LEP[13] [23] or PRN[14] [24] data for the study period. Unfortunately, inconsistencies in collection methods made it impossible to compare these data. For future research on this issue, it will be important to use more refined nurse staffing measures to capture the complexity of the nursing workload concept.

[13] LEP= Leisungserfassung in der Pflege [Care Workload Measurement]. The LEP® method is a scientifically-based workload measurement system for the healthcare system. LEP) [9]

[14] PRN= Projet de Recherche en Nursing [Nursing research project], Kanada (Québec).
Both LEP and PRN are used for the calculation of nursing staff requirements (Personal endowment). For this purpose the necessary individual nursing tasks are recorded on a daily basis (usually once per shift); LEP is is recorded retrospectively and PRN is prospective.

Strength and weaknesses

This study has several weaknesses. First, the used cross sectional design does not permit inferences of causality regarding the relationships between rationing, other major organisational and background variables and patient outcomes. Second, the geographic and cultural specificity of the sample (a convenience sample of Swiss acute care hospitals) and the hospital inclusion criteria limit the generalizability of the findings, especially regarding smaller facilities (<100 beds). Since 11 of the 19 hospitals invited to participate in the RICH Nursing study declined to participate, either because of limited resources or for political reasons, the levels of rationing in other Swiss hospitals could actually be much higher. Given the unavailability of a complete list of nurses in Switzerland, it was impossible to select a random sample of Swiss nurses. The use of non-randomized samples is a very common strategy in outcome research, as well as in cross-country studies, due to limited resources or the unavailability of such lists. However, in this program some of these shortcomings were also balanced, to some extent, by strengths. First, the inclusion of all eligible patients and nurses in the participating hospitals, coupled with high response rates from both samples, provide a precise depiction of implicit rationing of nursing care and its associations with outcomes in these settings. Furthermore, analyses of data at the unit and individual levels, for patients and nurses, considerably increased the power of the study.

A further weakness is the use of nurse-reported patient outcome data, instead of outcome data generated by more objective data sources. This might have led to memory biases. Given the data situation in Switzerland, which is characterized by a lack of regularly reporting of nurse sensitive patient outcomes (e.g., only two of the included hospitals regularly collected data on pressure ulcers), tightly-restricted research access to databases, (e.g., Group 'Verein Outcome', collected regularly in the member hospitals data on patient falls, pressure ulcers, etc.), and the lack of alternative data sources, this method offered the only possibility to collect similar outcome data in all participating hospitals. Nevertheless, at least one study is currently underway to test the validity of nurse reported data against hospital patient outcome records. In one such study, nurse-reported patient fall data and fall incident reports correlated significantly with official records regarding the last year, both for injurious and non-injurious falls. Therefore, nurse reports appear to be a valid source of patient fall data [25]**.** Finally, the study's key variables were assessed over three different time periods (over the past year for nurse-reported patient outcomes, over the past seven working days for rationing, and over the most recent shift for the patient-to-nurse staffing ratio), which may influence the associations seen in the bivariate and multivariate analysis.

However, due to the demonstrated importance of rationing of nursing care as an empirical factor, is it highly recommended to consider it alongside the other system factors in studies on patient outcomes, safety and quality of care.

Identified rationing thresholds scores for nurse- and patient-reported outcomes

Due to the negative effects shown in the second study even of low rationing levels on patient outcomes, coupled with the fact that only 4% of participating nurses reported not having needed to ration at least one of the 20 listed necessary nursing tasks (BERNCA instrument) in the last seven working days (rarely, sometimes, or often), the aim of the third study was to define clinically meaningful rationing threshold levels for the studied outcomes regarding BERNCA instrument scores. To gain a fuller understanding of the underlying connections between rationing and the five nurse-reported adverse events, two separate dichotomizations were tested. For the first, in which nurse reports of adverse event frequencies of 'rarely', 'sometimes', or 'often' were contrasted against 'never'. Any score of nurse-reported rationing above '0' was associated with significantly elevated risks for five of the six reported negative events (the exception being patient falls). For the second, responses of 'sometimes' or 'often' were contrasted against 'rarely' or 'never,' the same basic pattern was revealed, although the identified thresholds for elevated risk of frequent adverse events were approximately one half point higher. These results indicate that not all patient outcomes appear to react to rationing in the same way. However, certain patient outcomes were particularly sensitive, including nosocomial infections, pressure ulcers and patient satisfaction, which showed significant negative effects with any consistent reports of rationing (scores of 0.5). Nevertheless, confirming the rationing thresholds defined here will require further studies in other countries. These will require representative samples ideally with prospective designs, which will permit controls for nurse and patient background variables, while permitting inferences of causality.

Strengths and weaknesses

The rationing threshold levels determined here were defined using survey data derived from a cross-sectional convenience sample of hospitals, nurses and patients of the RICH Nursing study, which are subject to certain weaknesses, as described in chapter *Associations between rationing, other organizational factors and patient outcomes*. This limits the generalizability of the defined rationing thresholds and does not allow causal inferences. However, the two dichotomization approaches used for the definition of the rationing thresholds revealed the same basic pattern, which suggests some robustness

Rates and risk of sharps injuries in hospital nurses across four countries

An additional aim of this research program was to compare sharp-device injury rates among hospital staff nurses across four Western countries. To address this aim, the fourth study was conducted using cross-sectional data (1998-1999) of the IHOS study regarding more than 34,000 nurses in acute care hospitals in the United States, Canada, the United Kingdom and Germany. The results show striking differences among the four countries' injury rates, as well as in the adoption and use of related safety devices. The lowest sharp injury rates were recorded in the U.S., where hospitals appear to have benefited in recent years from increased risk awareness and adoption of improved safety technologies [26,27]. On the other hand, Germany's relatively slow adoption of safety equipment may explain why its sharp injury rates were the highest of the four. These results indicate that a broader diffusion, more comprehensive training, and more stringent enforcement of occupational safety and health regulations would further decrease sharp injury rates in the surveyed countries.

Strengths and weaknesses

In interpreting this study's results, it is significant that in the U.S. and Canada random nurse samples were used, while convenience samples were necessary in the U.K. and Germany. However, since nearly 400 hospitals from four countries were included, the results might be more representative than from studies using smaller samples. Furthermore, it has to be considered that the data used were collected approximately ten years ago, since which several interventions for the improvement of personnel safety have been launched in all of the involved countries, including Germany [28-32]. Limitations or weaknesses of this study arise primarily from the use of self-reported data over a one-year period, which may have led to memory bias. Also significant was the respondents' possible lack of familiarity with types of equipment and terminology listed in the questionnaires, which may have led to errors in safety-engineered equipment reporting. However, statistics based on reports to institutional officials are also subject to separate biases. There are indications that the reporting of sharp-device injuries is related to factors including workload, perception of injury severity, and opinions on whether reporting will improve safety [33]. This might explain the high estimated numbers of unreported cases, which ranged from 22 to 75 percent [29,31].

10.2 Conclusions and perspectives

Contributions of this research program to the available evidence

With the inclusion of eight hospitals and 1338 nurses and 779 patients, this research program is the largest nursing outcome study ever conducted in Switzerland. It was developed under the conditions provided in Switzerland, where no comprehensive registry exists of nurses employed in Swiss hospitals, no regularly studies report nurse sensitive outcomes, and financial and personnel resources are very limited for this kind of research. Given this challenging data situation, we have had to make maximum use all available data and resources. This program is the first to provide data on several patient outcomes, collected in different hospitals in a similar way. Together with the collected organizational variables (e.g. rationing, quality of the nurse work environment, staffing) these have already been used by the nurse administrators of the participating hospital for benchmarking and to introduce appropriate interventions where necessary. Furthermore, it was the first time associations between organizational system factors and patient outcomes had been studied in Switzerland.

This research program makes the following contributions to the international evidence regarding organisational system associations with patient outcomes:

First, for the new empirical measure of implicit rationing of nursing care, a concise definition and a conceptual framework have been provided, building upon that of the IHOS. It also extends the IHOS methodology, integrating implicit rationing of nursing care and describing its interrelationships with patient and nurse outcomes, as well as with other organisational system factors and background variables. In accordance with the framework, the newly developed BERNCA instrument provides a reliable, valid and easily applicable measurement of this factor in acute care hospitals.

Second, the program's results highlight the importance, with regard to patient health and safety, of the newly-identified organizational system factor of implicit rationing of nursing care, which appears to be directly linked to patient outcomes, as well as reflecting processes in acute care nursing and conditions on the front lines of care delivery. Studying such rationing may help explain and control the affects of patient–to-nurse staffing ratios and nurse work environment factors on patient outcomes.

Third, the identified rationing threshold levels (0.5 and 1.0) provide parameters for clinicians, administrators and policy makers to track negative effects of low resources, or difficulties in allocating those resources, on patient outcomes, and to respond accordingly whenever rationing

exceeds tolerable levels. Further, the threshold levels can be used to determine the minimum staffing and skill mix levels necessary to achieve desired patient outcomes.

*Fourth***,** the high sharp injury rates over the last year among certain groups of hospital staff nurses across the four participating countries, which appears to be reduced by the adoption of safety devices, indicate the need for a wider dissemination of safety technology, as well as the introduction and stronger enforcement of occupational health and safety regulations.

Corroboration of results

The significant associations shown here for the first time between implicit rationing of nursing care and patient outcomes, as well as the strongly suggested dose-response relationship between rationing and the deterioration of patient outcomes, require corroborating international studies in acute care settings with different levels of patient acuity and complexity. Such research should incorporate prospectively collected longitudinal data on staffing and outcomes sensitive to nursing care. This should enable the linking of rationing, patient acuity and complexity levels with precise unit-level nurse staffing measures, while permitting causal inferences about the identified interrelations between the studied system factors.

More knowledge on underlying processes and influencing factors of rationing of nursing care

Given the demonstrated relevance of using rationing of nursing care as an empirical factor regarding the quality of patient care and safety, along with the shortage of knowledge on its underlying processes, studies are needed to develop a deeper understanding of the decision making, clinical judgement and triage strategies nurses use to prioritize their care and allocate scarce resources to their patients. Further, research is needed regarding other organisational system factors and background variables and their influence on rationing levels. The results of this program indicate that the quality of the nurse work environment, particularly the adequacy of staffing and resources, but also the workload, may be significant correlates of rationing. As a qualitative study indicated, besides inadequate staffing or poor staff allocation, factors such as the time required for a nursing intervention, coping mechanisms, ineffective delegation; habit (tasks omitted once become easier to omit the following day), can all lead to omitted nursing care [10]. Mixed-method approaches (e.g., in which collected qualitative data on nurses' decision making processes, clinical judgement and triage strategies, are linked with prospectively collected quantitative data on rationing) and specific analytical techniques may be appropriate strategies for the confirmation and further investigation of the interrelationships indicated here.

Studies using standardized measures of nurse staffing, skill mix levels and patient outcomes

A general problem in the current outcome research is the widespread use of cross-sectional designs, often incorporating small, non-representative samples which lead to limited results. However, the limited availability of research resources, including appropriate and comparable databases, makes it difficult and challenging to go beyond such designs. Another obstacle research is the use of non-standardized nurse staffing measurements (e.g., number of registered nurse hours worked per patient day, or hours worked per patient day by all staff) and the use of patient outcome data assessed and collected with different methods (e.g., nurse reports (from memory), patient discharge files, direct observation, national databases). This limits the comparability of the data and may be responsible for inconsistencies in the available evidence. Furthermore, many studies use data on staffing levels, working conditions and patient and nurse outcomes assessed at the hospital level. There are strong indications that unit level assessment of such variables would better reflect the type and dose of staffing and the dose-response relationship between staffing, working conditions, and, one assumes, rationing, on patient and nurse outcomes [21,22,34].

Consequently, it is vital that future research use more refined and, if possible, standardized, nurse staffing measures. This will allow them to capture some part of the complexity of the concept of workload and ensure the comparability of their results. The measurement units of 'nursing hours per patient day' and the 'proportion of RNs to total nursing staff', which received the highest consensus scores in an international expert rating [35], appear to be appropriate valid measures of the number of nursing staff and skill mix levels.

Unfortunately, due to the current data situation, the use of standardized patient outcome data is a more distant objective. Nevertheless, it is important to develop minimum nurse data sets, incurporating nurse sensitive patient outcome data, including patient and nurse background variables (e.g., co-morbidities, case mix, complexity and acuity of the patients; education and experience level of the nursing staff) [5,36]. Some countries have already started to construct such minimum nurse data bases [37,38]. These sets can be used in future studies to link rationing and other major organizational variables with nurse sensitive patient outcome data at the unit level, while allowing analysts to control for patient and nurse background variables.

A European Union Framework 7, Health (FP-7-Health-2007) project: 'Nurse Forecasting: Human Resource Planning in Nursing' (RN4CAST), which is currently in preparation, will also use standardized measures of nurse staffing and patient outcomes. This project, coordinated by the Centre for Health Services and Nursing Research, of the Katholieke Universiteit Leuven, involves in the consortium institutions from 11 EU Countries (including the Institute of Nursing

Science, University of Basel, Switzerland, co-investigators Schubert and De Geest) and 4 Non-EU. The project should expand typical forecasting models with factors that take into account how features of work environments and qualifications of the nurse workforce impact nurse retention, productivity and patient outcomes.

Interventions to resolve nurse safety issues and the growing nurse shortage in hospitals

The results of the fourth study, confirming those of other research, indicated that although safer technologies and safety-engineered equipment has been at least partly adopted; sharp-device injuries are still very frequent adverse events among hospital nurses, carrying the risk of exposure to blood-borne pathogens [39,40]. Alongside the growing worldwide nurse shortage [41-43], this risk highlights the importance of caring for nurses and providing them with safe and desirable working conditions to encourage them to stay in the profession. The same conditions will make the profession more attractive for young people. The US magnet hospital approach seems to be a viable approach for European hospitals to provide nurses with high-quality work environments and a safe, attractive workplace, and may offer a solution to the developing nurse staffing crisis [44]. Magnet hospitals are characterized by, for example, a system of autonomous, self-managing operations at the unit level, supportive nursing management, adequate staffing and skill mix levels, support and recognition of nurses' contributions, as well as involvement in decision making regarding patient care and hospital policy [45,46]. Such hospitals have been shown to achieve substantially more favorable nurse outcomes (higher nurse job satisfaction, lower burnout and needlestick-injury rates), as well as more favorable patient outcomes [14,47-49]. These results are supported by increasing international evidence which indicates strong relationships between high-quality nurse work environments, higher nurse staffing levels and lower nurse work-related outcomes [50-53]. Considering the strong relationship shown in the current research program between the new empirical system factor of implicit rationing of nursing care and the studied patient outcomes, it would be valuable to explore the associations between such rationing and nurse job satisfaction, nurse burnout and work-related injury rates.

10.3 Further steps planned in this research program

This research program is still in progress. The following steps are either underway or planned to expand existing knowledge of rationing and other system factors affecting patient and nurse outcomes.

- To investigate the associations between rationing and major organizational variables and mortality and failure-to-rescue rates in Swiss acute care hospitals, using risk-adjustment models, similar to those used in the IHOS study
- To evaluate the levels of job satisfaction, emotional exhaustion, and work related injuries (back injuries, chronic and acute back pain, needlestick injuries) in Swiss acute care hospitals, along with the association between implicit rationing of nursing care and these nurse outcomes. A study on the frequency of work-related acute and chronic back injuries among Swiss Nurses is also in preparation
- To evaluate the validity of other nurse-reported outcome data currently in use. A study to test the validity of nurse reported pressure ulcer data is in preparation.
- To evaluate the validity and reliability of the revised BERNCA instrument.
- To act as Swiss co-investigators for the EU FP7 RN4CAST project, establishing and validating methodology to forecast the demand and supply of healthcare human resources in nursing at the national level for the next 10 to 30 years, addressing the volume and quality of nursing staff, as well as the quality of patient care.

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Appendix

1 Basel Extent of Rationing of Nursing Care (BERNCA) Instrument

Basel Extent of Rationing of Nursing Care (BERNCA) Fragebogen

FRAGEN ZU PFLEGEHANDLUNGEN UND PRIORITÄTENSETZUNG

Die in diesem Abschnitt gestellten Fragen beziehen sich auf notwendige pflegerische Massnahmen oder Therapien, die aus **ZEITMANGEL**, **ARBEITSÜBERLASTUNG** oder **KOSTENGRÜNDEN** nicht durchgeführt oder ungenügend durchgeführt werden konnten. (*Bitte kreuzen Sie das Zutreffende an*).

Wie oft ist es Ihre letzten 7 Arbeitstagen vorgekommen dass.... (Fragen 1- 5)

1. UNTERSTÜTZUNG IN DEN ATLs	Nie	Selten	Manchmal	Oft
a) ..Sie bei Patienten eine notwendige Ganz- oder Teilwäsche und / oder Hautpflege nicht durchführen konnten?	☐	☐	☐	☐
b) ..Sie bei Patienten eine notwendige Mund- und / oder Zahnpflege nicht durchführen konnten?	☐	☐	☐	☐
c) ..Sie bei Patienten, nicht wie erforderlich das Essen eingegeben konnten?	☐	☐	☐	☐
d) ..Sie Patienten nicht mobilisieren oder lagern konnten?	☐	☐	☐	☐
e) ..Sie Patienten länger als eine halbe Stunde in Urin, Stuhlgang oder Erbrochenem liegen lassen mussten?	☐	☐	☐	☐
f) ..Sie ein schmutziges Bett nicht frisch beziehen konnten?	☐	☐	☐	☐
2. GESPRÄCH - BEGLEITUNG – ZUWENDUNG	Nie	Selten	Manchmal	Oft
a) ..Sie Patienten nicht die notwendige emotionale und psychosoziale Unterstützung und Begleitung anbieten konnten z. B. im Umgang mit Unsicherheit und Angst, dem Gefühl von Abhängigkeit?	☐	☐	☐	☐
b) ..Sie mit Patienten oder Angehörigen ein notwendiges Gespräch nicht führen konnten?	☐	☐	☐	☐
3. FÖRDERUNG - ANLEITUNG - SCHULUNG	Nie	Selten	Manchmal	Oft
a) ..Sie bei Patienten kein Toilettentraining / Kontinenztraining durchführen konnten und ihm deswegen Inkontinenzeinlagen geben oder einen Dauerkatheter einlegen mussten?	☐	☐	☐	☐
b) ..Sie bei Patienten keine aktivierende und / oder rehabilitierende Pflege durchführen konnten?	☐	☐	☐	☐
c) ..Sie Patienten oder seine Angehörigen nicht anleiten oder schulen konnten z. B. Insulin – Injektionen, Verhalten oder Umgang mit krankheitsspezifischen Symptomen (Hypoglykämie, Atemnot etc.)?	☐	☐	☐	☐
d) ..Sie Patienten und / oder Angehörige von pflegerischer Seite her nicht genügend auf den Spitalaustritt vorbereiten konnten?	☐	☐	☐	☐
4. ÜBERWACHUNG - SICHERHEIT	Nie	Selten	Manchmal	Oft
a) ..Sie Patienten nicht so häufig überwachen konnten, wie es ärztlich verordnet war oder aus ihrer Sicht notwendig gewesen wäre?	☐	☐	☐	☐
b) ..Sie verwirrte Patienten, die Sie nicht genügend beaufsichtigen konnten, fixieren und / oder Beruhigungsmittel verabreichen mussten	☐	☐	☐	☐
c) ..Ein Arzt bei akuten oder plötzlichen Veränderungen des Gesundheits-zustands eines Patienten nicht persönlich oder erst mit grosser Verspätung vorbei kommen konnte?	☐	☐	☐	☐
d) ..Patienten, die geläutet haben mehr als 5 Minutenhaben warten müssen?	☐	☐	☐	☐
e) ..Sie keine angemessene Händehygiene haben durchführen konnten?	☐	☐	☐	☐
5. DOKUMENTATION	Nie	Selten	Manchmal	Oft
a) ..Sie bei Schichtantritt keine Zeit hatten, sich anhand der Pflegedoku-mentation über die Patientensituation ausreichend zu informieren?	☐	☐	☐	☐
b) ..Sie bei Patienten eine Pflegeplanung nicht erstellen oder aktualisieren konnten?	☐	☐	☐	☐
c) ..Sie die bei Patienten die durchgeführte Pflege nicht genügend dokumentieren konnten?	☐	☐	☐	☐

May 10, 2008

Curriculum Vitae

NAME: Maria Schubert

BIRTH DATE: November 23, 1960

ADRESSES:

Business: Institute of Nursing Science
University of Basel
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Switzerland
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Home: Friedensgasse. 19
CH-4056 Basel
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CITIZENSHIP: German

Education

Graduate education

2003-present — PHD CANDIDATE,
Institute of Nursing Science, Medical faculty
University of Basel, Switzerland
Thesis supervisor (chair): Prof. De Geest, University of Basel, CH
External mentors: Prof. Clarke, University of Toronto, CA
Prof. Aiken, University of Pennsylvania, US

Study Visits Abroad as Part of Ph.D. education

May 2004 (1 week): Center for Health Outcomes and Policy Research, School of Nursing, University of Pennsylvania, USA.

March 2003 (3 weeks): Center for Health Outcomes and Policy Research, School of Nursing, University of Pennsylvania, USA.

1998-2001 — MASTERS IN NURSING SCIENCE (part time)
Faculty Health Science, University of Maastricht, Netherlands
Center for Advanced Education for Health Professional, Aarau
(WE`G - Weiterbildungszentrum für Gesundheitsberufe) Aarau, Switzerland.

Undergraduate education

1996-1998 — DIPLOMA CLINICAL NURSE SPECIALIST, LEVEL II (HöFa 2) (part time)
Center for Advanced Education for Health Professional
Swiss Nurses Association (SBK Bildungszentrum) Zurich
Zurich, Switzerland

1994-1996 — DIPLOMA CLINICAL NURSE SPECIALIST, LEVEL I (Höfa I) (part time)
(Schule für Höhere Fachausbildung in Pflege, Stufe 1- HöFa 1)
University Hospital Zurich
Zurich, Switzerland

1990-1992 — SPECIALIZATION IN INTENSIVE CARE (part time)
School for Intensive Care, University Hospital Zurich
Zurich Switzerland

1982-1985 — PROFESSIONAL TRAINING IN NURSING (Nursing Diploma)
University Hospital of the Westfälischen Wilhelms University
Münster, Germany

Other relevant professional training

2007 — Cumulative Didactic Certificate
(Sammelzertifikat Hochschuldidaktik)
Faculty Teaching [Ressort Lehre], University of Basel, Switzerland

Appointments and Positions

Academic

January 2002 to present	Institute of Nursing Science (part time) University of Basel	Research Associate

Non-Academic Clinical Appointments

May 2006 to present	Department of Anesthesia (part time) Surgical Intensive Care Unit University Hospital Basel Basel Switzerland	Advances Practice Nurse (ANP)
2000-2002	Department of Surgery-Neurosurgery University Hospital Zurich Zurich Switzerland	Clinical Nurse Specialist
1999-2000	Department of Internal Medicine-Dialysis University Hospital Zurich Zurich Switzerland,	Staff Nurse
1997-1999	Department of Surgery-Neurosurgery Intensive Care Unit University Hospital Zurich Zurich Switzerland	Staff Nurse
1996-1997	Department of Internal Medicine University Hospital Zurich Zurich Switzerland	Staff Nurse
1992-1996	Department of Surgery, Casualty Surgery Intensive Care Unit University Hospital Zurich Zurich Switzerland	Staff Nurse
1990-1992	Departments of Intensive Care Intensive Care Units: Cardio-Surgery, Seriously Burned, Casualty Surgery University Hospital Zurich Zurich Switzerland	Staff Nurse
1988-1990	Department of Internal Medicine University Hospital Zurich Zurich Switzerland	Staff Nurse
1987-1988	Department of Dermatology University Hospital Zurich Zurich Switzerland	Staff Nurse,
1985-1987	Department of Ophthalmology University Hospital of the Westfälischen Wilhelms University, Münster, Germany	Staff Nurse

Licensure and certification

1988	Nursing License, Switzerland
1985	Nursing License, Germany

Membership professional and scientific organizations

2002 to present	Member Swiss Association for Nursing Science (ANS), [VFP = Verein zur Förderung der Pflegewissenschaft und –forschung Schweiz)], Rheinfelden, Switzerland 2005-2007 Subgroup ANS: Project group Swiss Research Agenda for Nursing (SRAN), patient outcome / quality of hospital care expert
1995 to present	Member Association of Clinical Nurses Specialists, Switzerland (PES = Pflegeexpertinnen Schweiz)
1988 to present	Member Swiss Nurses Association

Research Grants

Contracts / Grants

4. Sermeus, W., van den Heede, K., Lesaffre, E. (Belgium), Kinnunen, J. (Finnland), Busse, R., Wörz, M. (Germany), Mantas, J., Diomidous, M., Liaskos, J., Frigas, A., Zikos, D. (Greece), Scott, A., Matthews, A., Staines, A. (Ireland), van Achterberg, T., Schoonhoven, L., (Netherlands), Brzostek, T. (Poland), Moreno- Casbas, T. (Spain), Tishelman, C., Brommels, M., Ekman, I., Gustavsson, P. (Sweden), De Geest, S., **Schubert, M.,** (Switzerland), Rafferty, A., Griffiths, P. (United Kingdom), Aiken LH, Clarke SP (Pennsylvania, United States), Shaibu S., (Botswana), Liu, H. (China), Klopper, H. (South Africa). Nurse Forecasting: Human Resources Planning in Nursing (RN4CAST), EU 7th Framework, HEALTH-2007-3.2-4. European Commission, budget requested: 3.000.000 EURO, (funded April, 2008).

3. Schubert, M., Clarke, S.P., De Geest, S. RICH Nursing study - final step, analysis of the Swiss mortality data 2007 – 2008**,** Nora van Meeuwen- Häfliger Stiftung. Direct costs (30.000 CHF).

2. De Geest, S., **Schubert, M.**, Abraham, I., Sloane, D.M., Clarke, S.P, Aiken, L.H. Rationing of Nursing Care in Swiss Hospitals and Its Effects on Patient Outcomes and Nurse Shortage. Swiss Federal Office for Health (formerly Swiss Federal Office of Social Insurance), 2003-2004. Direct costs: 190.000 CHF (125.000 US$).

1. De Geest, S**, Schubert, M**, Sloane, D.M., Clark, S.P, Aiken, L.H. Literature review: Implicit rationing of nursing care in Switzerland, Swiss Federal Office for Health (formerly Swiss Federal Office of Social Insurance), 2002 – 2003. Direct costs (49.000 CHF).

Contracts / grants submitted

1. Vernazza, P, Diem P, Stettler, C., **Schubert, M**., Villinger, P. (Main Investigators), Researcher future nested cohort projects: Telenti, A., De Geest, S., Brändle, M., Cerny, T., Rickli H, Hellermann, J., Siegrist CA, Burnand B, Helminger A, Balmelli C, Fierz W, Daneel S. (Researcher future nested cohort projects). Swiss Health Professional Cohort (SHPC), Swiss National Foundation, budget requested: 3.700.000 CHF, starting date January 2009, Project time frame 10 years (Submitted January 2008).

Publications

Peer reviewed journals

6. Schubert, M., Wehrli, M., Spirig, R. Erstellung eines Portfolios zur Entwicklung einer operativen Intensivstation zu einem Kompetenzzentrum für Intensivbehandlung. *Pflege* (accepted).

5. Schubert M., Glass T.R., Clarke S.P., Aiken L.H., Schaffert-Witvliet, B., Sloane, D.M., De Geest S. (2008). Rationing of nursing care and its relationship to patient outcomes: The Swiss extension of the International Hospitals Outcome Study. *Int J Qual Health Care*, April, 1-11).

4. Schubert, M., Glass, T.R. Clarke, S.P., Schaffert-Witvliet, B., De Geest, S. (2007). Validation of the Basel Extent of Rationing of Nursing Care Instrument. *Nurs Res, 56*(6), 416-424.

3. Clarke, S. P., **Schubert, M**., Korner, T. (2007). Sharp-device injuries to hospital staff nurses in 4 countries. *Infect Control Hosp Epidemiol, 28*(4), 473-478.

2. Schubert, M., Schaffert-Witvliet, B., De Geest, S. (2005). Effects of cost saving strategies and staffing levels on patient and nurse outcomes. A literature review. *Pflege, 18*(5), 320-328.

1. De Geest, S., Claessens, P., Longerich, H., **Schubert, M.**, and the International Clinical Leadership Group (2003). Transformational Leadership: Worthwhile the investment! (Editorial) European Journal of Cardiovascular Nursing, 2, 3-5.

Other journals

6. Schubert, M., Schaffert-Witvliet, B., DeGeest, S. (2008) Effects of Rationing of Nursing Care in Switzerland. *Rivista per le Medical Humanities,6*(2) 96-98.

5. Schubert M., Schaffert B., De Geest S. (2004). Leadership, Patient Outcomes and the Quality of Care. International Nurse. 17, 4.

4. Schubert M., Schaffert B., Suter- Hofmann F., De Geest S. (2004). Die RICH - Nursing Studie: Der Schweizer Zweig am grossen internationalen Baum der Magnethospitalforschung, Inselbote 2.

3. Aiken, L.H., Kesselring, A., **Schubert, M.** (2003) Arbeitszufriedenheit und Behandlungsresultate „Support ist wesentlich für Pflegequalität", Krankenpflege, 5 10-12.

2. Schubert, M., Schaffert, B. (2003). Kommentierung des Artikels von Aiken LH et al, JAMA: Oct. 23 / 30 2002, Vol. 288 No 16 : p. 1987-93 „ Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction", Informed-screen, January 1.

1. Schubert, M., Tschamper, U., De Geest, S. (2002). Arbeitszufriedenheit der Pflegenden und Patientenergebnisse, **Gazetta**interna, Hauszeitung des Kantonsspitals Basel, Universitätskliniken, 2/02.

Publications submitted or in progress

3. Mayberry, L., **Schubert, M.,** Gennaro, S., Clarke, S.P. DeGeest, S., "Work-Related Acute and Chronic Back Injuries Among Swiss Nurses (in progress).

2 Tschumi, B., **Schubert, M**., Schwendiman, R., Kressig, R., De Geest, S. Frequencies of falls in Swiss hospitals: Concordance of nurses' estimates compared to fall incident reports-a correlational descriptive study. *Int J Nurs Stud* (submitted).

1. Schubert, M., Clarke, S.P., Schaffert-Witvliet B., Glass, T.R., De Geest S. Identifying thresholds for relationships between impacts of rationing of nursing care and nurse- and patient-reported outcomes in Swiss hospitals: A correlational study. *Int J Nurs Stud* (submitted).

Research reports

4. Schubert, M., Schaffert-Witvliet, B., De Geest, S., Glass T.R., Aiken, L.H., Sloane, D.M., Clarke, S.P., Abraham, I., "RICH-Nursing Study – Rationing of Nursing Care in Switzerland = CH, Effects of Rationing of Nursing Care in Switzerland on Patients' and Nurses' Outcomes, Final Report, the Swiss Federal Office of Public Health, January 2005.

3. Schubert, M., Schaffert-Witfliet, B., De Geest, S., Interim report (2): RICH – Nursing Study, submitted Swiss Federal Office of Public Health, September 2004.

2. Schubert, M., Schaffert-Witfliet, B., De Geest, S., Interim report (1): RICH – Nursing Study, submitted Swiss Federal Office of Public Health, January 2004.

1. Schubert, M., De Geest, S. Implicit Rationing in Nursing Care in Switzerland a Reality? Literature review, (Implizite Rationierung in der Pflege in der Schweiz eine Realität?), Swiss Federal Office of Public Health, previously Swiss Federal Office for Social Assurance, 2003.

Other Reports

1. Schubert, M., Spirig, R., De Geest, S. (2003). Die Auswirkungen des Stellenabbaus im Pflegebereich (Argumentationspapier). Institute of Nursing Science, University of Basel, Switzerland.

Theses

Master's thesis (2001)

"Implementation of Basal Stimulation in the Intensive Care: Observation study: Investigation of the communication behavior of intensive care nurses by caring for patients with impairments of perception and of consciousness". [Umsetzung von Basaler Stimulation in der Intensivpflege Eine Beobachtungsstudie zur Untersuchung des Kommunikationsverhaltens von Intensivpflegepersonen bei der Betreuung von bewusstseins- und wahrnehmungsbeeinträchtigten Patienten] University of Maastricht, Netherlands, Center for advanced Education for Health Professional (WE`G), Aarau, Switzerland.

Presentations

International

12. Schubert, M., Schaffert-Witvliet, B., Glass T.R, De Geest, S., „Personalabbau und Rationierung in der Pflege, RICH Nursing Studie", Symposium, Verband Bundesarbeitsgemeinschaft Leitender Pflegepersonen e.V. (BALK) Landesgruppe Bayern, Günzburg, Germany, April, 2008 (invited presentation).

11. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S., „Zu wenig Pflege kann sich für den Patienten nachteilig auswirken", Frühjahrstagung Verantwortung im Pflegemanagement, Verband Bundesarbeitsgemeinschaft Leitender Pflegepersonen e.V. (BALK) Landesgruppe Baden- Württemberg, Herz-Zentrum, Bad Krozingen, Germany, February 22, 2008 (invited presentation).

10. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S. „Die Ergebnisse der Schweizer RICH – Nursing Studie" Wieviel Pflege braucht das Land?, Tagung Deutscher Pflegerat, Berlin, Germany, May 12, 2007 (invited presentation).

9. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S. „Rationalisierung und Rationierung – (k)ein Ausweg aus der Krise", Forum Stationsleitungen 2007 – Führen mit Perspektiven", Ulm, Germany, März 29, 2007 (invited presentation).

8. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S. „Kosten- und Personalreduktion -Auswirkungen auf die Gesundheit der Patienten und Pflegekräfte - Internationale Studienergebnisse“, 4. Gesundheitspflegekongress, Hamburg, Germany, October 27, 2006 (invited presentation).

7. Schubert M., Schaffert-Witvliet B., Glass T.R., De Geest, S. “Rationing of Nursing in Switzerland The RICH Nursing Study the Swiss Branch of the International Hospital Outcomes Study”, ISQua Conference, London, United Kingdom, October 24, 2006 (invited presentation).

6. Schubert M., Schaffert-Witvliet B., Glass T.R., De Geest, S., „Ergebnisse RICH –Nursing Studie – Rationing of Nursing in Switzerland Studie“, presentation of the findings RICH Nursing Study international conference for applied nursing research, Hall, Austria, June 23, 2006 (invited presentation).

5. Schubert M., Schaffert-Witvliet B., Glass T.R, De Geest, S. „Ergebnisse RICH – Nursing Studie – Rationing of Nursing in Switzerland Studie“, presentation of findings RICH Nursing Study, general meeting German Nursing Association, (Deutscher Berufsverband für Krankenpflege (DBFK)), National Association Bavaria, Munich, Germany, April 26, 2006 (invited presentation).

4. Schubert M., Schaffert-Witvliet, B., Glass T.R, De Geest, S. „Gibt es einen Zusammenhang zwischen impliziter Rationierung von Pflege und den Patientenergebnissen?“, presentation of the findings RICH Nursing Study, Workshop, German network for quality development in nursing (Deutsches Netzwerk für Qualitätsentwicklung in der Pflege (DNQP), Berlin, Germany, February 24, 2006 (invited presentation).

3. Schubert M., Schaffert- Witvliet, B., Glass T.R, De Geest, S. “The RICH-Nursing Study: The Swiss branch at the big international tree of magnet hospital research”, Conference European Nurse Directors Association (ENDA), Vienna, Austria, October 7, 2005 (invited presentation).

2. Schubert M, Schaffert-Witvliet, B.; De Geest, S., „Kosteneinsparungen im Gesundheitswesen und deren Auswirkungen auf den stationären Pflegebereich, International Seminar: Oncological Nursing – Advanced Practice, European Oncology Nursing Societey (EONS) St Gallen, Switzerland, 2004, October 1 (invited presentation).

1. Schubert M., Schaffert-Witvliet, B.; De Geest, S., „Implizite Rationierung in der Pflege – Eine Realität?“, National Conference of the Austria Nursing Association (ÖGKV), Linz, Austria, May 27, 2004 (invited presentation).

National

22. Schubert, M., Schaffert-Witvliet, B., Glass, T.R, De Geest, S. „Ripercussoni del razionamento delle cure infermieristiche in Swizzera, 4. Simposio della Commissione di etica dell’ EOC (COMEC) in Lugano, Switzerland, March 7, 2007 (invited presentation).

21. Schubert, M., Schaffert-Witvliet B., Glass, T., De Geest, S. „Ergebnisse RICH –Nursing Studie – Rationing of Nursing in Switzerland Studie“, Presentation of the findings of the RICH Nursing Study, SBK Congress, Swiss Nursing Association, Lucerne, Switzerland, May 16, 2006 (invited presentation).

20. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S. „Ergebnisse RICH –Nursing Studie – Rationing of Nursing in Switzerland Studie“, Presentation of the findings of the RICH Nursing Study, annual general meeting, Swiss Nursing Association, Section SG TG AI AR , Wil SG, Switzerland, March 30, 2006 (invited presentation).

19. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., De Geest, S. „Ergebnisse RICH –Nursing Studie – Rationing of Nursing in Switzerland Studie“, Presentation of the findings of the RICH Nursing Study, annual general meeting, Swiss Nursing Association Section AG – SO, Olten, Switzerland, March 29, 2006 (invited presentation).

18. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. De Geest, S. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”. Presentation of findings to the nursing management of Hospital D, Switzerland, February 9, 2006 (invited presentation).

17. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F., De Geest, S., “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Workshop: Interpretation of the findings and derivation of measures, nursing management Hospital C, Switzerland, January 12, 2006 (invited presentation).

16. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F., De Geest, S., “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital A, Switzerland, December 7, 2005 (invited presentation).

15. Schubert, M., Schaffert-Witvliet, B., Glass, T.R., Suter- Hofmann, F., De Geest, S. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Workshop: Presentation of findings to the nursing management of Hospital B, Switzerland, November 23, 2005 (invited presentation).

14. De Geest, S., **Schubert, M**., Schaffert-Witvliet, B., Glass, T.R., Aiken L.H., Sloane D.M., Clarke S.P., Abraham I. (2005): Rationing of Nursing: The RICH- Nursing Study”, Conference Rationing of Nursing, Basel Switzerland, September 30, 2005 (invited presentation).

13. De Geest, S., **Schubert, M.,** Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital D, Switzerland, September 19, 2005 (invited presentation).

12. De Geest, S., **Schubert, M.,** Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital H, Switzerland, September 13, 2005 (invited presentation).

11. De Geest, S., **Schubert, M**., Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann F. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital G, Switzerland, September 8, 2005 (invited presentation).

10. De Geest, S., **Schubert, M.**, Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital B, Switzerland, August 23, 2005 (invited presentation).

9. De Geest, S., **Schubert, M**., Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. “Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study”, Presentation of findings to the nursing management of Hospital F, Switzerland, July 12, 2005 (invited presentation).

8. De Geest, S., **Schubert, M.**, Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F., "Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study", Presentation of the findings to the nursing management of Hospital A, Switzerland, June 2, 2005 (invited presentation).

7. De Geest, S., **Schubert, M.,** Schaffert-Witvliet, B., Glass, T.R., Suter-Hofmann, F. "Ergebnisse RICH Nursing Study – Rationing of Nursing in Switzerland Study", Presentation of findings to the nursing management of Hospital C, Switzerland, June 2, 2005 (invited presentation).

6. Schubert, M, Schaffert-Witvliet, B., De Geest, S. "Auswirkungen von Rationierung von Pflege im Gesundheitswesen", Impulse, Institute of Nursing Science, University Basel, Switzerland, Department of Clinical Nursing Science, University Hospital Basel, Switzerland, April 26, 2005 (invited presentation).

5. Schubert, M., Schaffert-Witvliet, B., De Geest, S. "Auswirkungen des Stellenabbaus im Pflegebereich", Mittagsveranstaltung, University Hospital Zürich, Switzerland, April 14, 2005 (invited presentation).

4. Schubert, M., Schaffert-Witvliet, B., De Geest, S. „Wirksam pflegen trotz knapper Ressourcen: die Evidenzlage", Congress for Nephrology, Basel, Switzerland, September 18, 2004 (invited presentation).

3. Schubert, M., Schaffert-Witvliet, B., De Geest, S. „Patientenzufriedenheit, Arbeitszufriedenheit und Burnout beim Pflegepersonal", Annual General Meeting Swiss Nursing Association, Section Basel, Switzerland, March 17, 2004 (invited presentation).

2. Schubert, M., Schaffert-Witvliet, B, De Geest, S. „Implizite Rationierung in der Pflege – Eine Realität?" Colloquia, Institute of Nursing Science, University of Basel, Switzerland, November 10, 2003 (invited presentation).

1. Schubert, M., Schaffert-Witvliet, B., De Geest, S. Abraham I., Aiken, L,H., Clarke, S.P, Sloane, D.M., „Auswirkungen von Restrukturierung und möglicher Rationierung in der stationären Pflege in Schweizer Spitälern auf Ergebnisse von Patienten und Pflegepersonen" Poster presentation, National Conference of the Swiss Nursing Association (SBK), Montreux (Switzerland), June 19 / 20, 2003 (Poster).

Non Scientific Presentations

4. Schubert, M. "Magnetspitäler", Fachinput, University Hospital Basel, Switzerland, June 25, 2007, (invited presentation)

3. Schubert, M. "Magnetspitäler", Fachinput, University Hospital Basel, Switzerland, February 8, 2007, (invited presentation)

2. Schubert, M., Results of the Rationing of Nursing in Switzerland (RICH Nursing) Study, meeting of experts, Department of Health, St. Gallen, Switzerland, November 15, 2006 (invited presentation).

1. Schubert, M. (2006) „ Results of the Rationing of Nursing in Switzerland (RICH Nursing Study)", Panel discussion, University of Basel, Switzerland, April 4, 2006 (invited presentation)

Reviewer and editorial activities

Since 2000-present	Member Editorial Board Pflege: Die wissenschaftliche Zeitschrift für Pflegeberufe Verlag Hans Huber, Bern

Organizations of Workshops or Scientific Conferences

September 30th 2005	Conference Rationing of Nursing in Basel, Switzerland Member of the organizing committee Institute of Nursing Science, University of Basel in collaboration with the International Hospital Outcomes Study Group (L. Aiken)m Centre for Health Outcomes and Policy Research, University of Pennsylvania, USA

Teaching / Education

Academic

Summer semester 2007-present	Patient Safety, Quality of care and Ethic Co-teacher, lectures, seminars Master's Degree of Nursing Science curriculum Institute of Nursing Science, University of Basel, Switzerland
Winter semester 2003-present	Introduction in quantitative research methods I Co-teacher, lectures, seminars Master's Degree of Nursing Science curriculum Institute of Nursing Science, University of Basel, Switzerland
Summer semester 2003-present	Introduction in quantitative research methods II Co-teacher, lectures, seminars Master's Degree of Nursing Science curriculum Institute of Nursing Science, University of Basel, Switzerland
Winter Semester 2002 / 2003	Scientific Writing Course Co-teacher in seminars Master's Degree of Nursing Science curriculum Institute of Nursing Science, University of Basel, Switzerland
2002-present	Student Advisor and Student Mentor Advice of students, support of students in proposal writing and masters thesis Member of the Master's committee 2002-2004 B. Schaffert–Witvliet 2005-2007 F. Suter-Hofmann 2005-present M. Boillat-Bernbach Institute of Nursing Science, University of Basel, Switzerland
2002	Member of the qualification committee Diploma thesis E. Imhof, School of Health [Fachhochschule für Gesundheit], Aargau, Switzerland

Non-academic

2004 / 2005 / 2006	Course: Research methods: lectures Centre for Health Professionals [Bildungszentrum für Gesundheitsberufe (BZG)], Solothurn, Switzerland
2004/ 2005	Course: Research methods: lectures (6 hours in 2 year) Vocational School for Health Services [Berufsschule im Gesundheitswesen, BIG], Basel, Switzerland