

Problem focused Integration of Information, Quality and Process Management with Empirical Research: the Example of the Essen Interdisciplinary Pressure Ulcer Project

Jürgen Stausberg^a, Gabriele Bartoszek^c, Birgit Lottko^c, Knut Kröger^b, Wolfgang Niebel^c,
Helmut Schneider^d, Irene Maier^e

^a Institute of Medical Informatics, Biometry & Epidemiology, Medical Faculty, University of Duisburg-Essen, Germany

^b Department of Angiology, University Clinics Essen, Germany

^c Department of General and Transplant Surgery, University Clinics Essen, Germany

^d Central Information Unit, University Clinics Essen, Germany

^e Nursing Director, University Clinics Essen, Germany

Abstract

Issues of information management, quality management, process management, and empirical research are often seen independently from each other. In the Essen interdisciplinary pressure ulcer project, they were integrated to establish a synergy between quality of care, economics and research. The electronic documentation of events and supplementary information was done with the hospital wide patient administration system. Feedback and automatically requests were used for quality improvement. Codes for reimbursement are generated from the clinical documentation. Research studies had been based on the routine documentation. Prerequisite was the cooperation of all relevant groups, nurses, physicians, informaticians, theoreticians and medical controller. In the future, it will be necessary to extend the approach to other relevant nursing problems and to replace the redundant documentation (paper-based as well as electronic) by an electronic health record.

Keywords: Cost Control, Hospital, Information Management, Pressure Ulcer Quality Control

Introduction

In the past and often today, hospital management practice, and management theory is split in different parts. Information management, i.e. selection, introduction, maintenance, and evaluation of computer-based applications, is done by computing centers aiming at an optimal logistic of medical and business data. Quality management is oriented towards patient outcome using education and training, guidelines and standards, risk and fault analysis for quality improvement. Process management started in industry aiming at a cost effective use of available resources. Randomized clinical trials are the gold standard of

research, offering some kind of an artificial design neglecting a wide range of real world implications. Concerning main problems in nursing practice as pressure ulcer and fall, we propose an integration of different views in two axes. First, the above mentioned different management approaches have to be combined with research issues to attain relevant progress in complex nursing problems. Second, projects have to be inherently interdisciplinary as a prerequisite for successful problem solving. In the following, we will present the Essen interdisciplinary pressure ulcer project as an example for the integration in both axes.

Problem

Pressure ulcer is a frequent and significant problem in health care, even for hospitals [1]. Studies revealed point prevalence rates of 11.1 % for Germany [2], 10.1 % for Netherlands [3], 10.3 % for UK [4], 9.5 % and 15.4 % for US [5,6]. The National Pressure Ulcer Advisory Panel (NPUAP) reported rates from 10 to 18 % in the late 20th century [7].

Substantial costs had been calculated for pressure ulcer treatment. For example, mean excess charges of 10,845 US dollar had been published for the Patient Safety Indicator (PSI) decubitus ulcer [8]. Pressure ulcer is also a serious event for patients. Patients with pressure ulcer showed an excess mortality of 7.2 % in a case-control-study matched for diagnosis related group (DRG), sex, white or non-white race, and age within 10 years [8].

A pressure ulcer as a frequent, cost expensive, and preventable medical injury was consequentially added to quality assessment initiatives. The risk-adjusted rate of pressure ulcer is one of 23 PSI of the Agency of Healthcare Research and Quality in the US [9]. In Germany, pressure ulcer status is part of the national quality assurance program for hip fracture, hip prosthesis, knee prosthesis, and heart surgery (specification available at <http://www.bqs-online.de/> from the National Agency for Quality Assurance).

Pressure ulcer is also a legislative issue and often seen as nursing error [10].

The project

The University Clinics Essen provide about 1250 beds with 50,000 inpatient cases a year. They cover most of the medical specialties with special emphasis on cancer treatment, cardiology and transplantation. In research and education, they are part of the University of Duisburg-Essen. In the end of 2002 the interdisciplinary pressure ulcer project was started. The project team comprises groups with different interests, skills, and knowledge:

- Nurses responsible for pressure ulcer prevention focusing on quality improvement and legislative issues
- Physicians responsible for pressure ulcer treatment interested in clinical trials
- Informaticians responsible for information and communication technologies (ICT) offering services
- Theoreticians responsible for methodological issues interesting in new research findings
- Medical controller responsible for optimization of clinical processes interested in reduction of costs and increment of revenues

With some adaptations due to changing resources and interests, the interdisciplinary pressure ulcer project was integrated in the routine provision of health care services by the university clinics until today.

Electronic documentation

In the University Clinics, pressure ulcers had been an important part of the systematic nursing assessment and documentation before the project start, based on paper. The electronic recording of information on pressure ulcers for this project started spring 2003 in parallel to the paper-based patient record. It covers all inpatients with the exception of five wards for obstetrics, particular one-day-admissions, and dialysis. The data are directly entered by nursing staff within the patient administration system *medico//s* from SiemensTM, which is used in the clinics for patient admission, transfer, and discharge as well as for documentation of diagnoses and procedures. Forms had been implemented in *medico//s* for pressure ulcer status at admission, risk factors at admission separately for adults and children, and status, prophylaxis, and treatment in case of a new event. The stages proposed by the European Pressure Ulcer Advisory Panel (EPUAP, see <http://www.epuap.org/puclas/index.html>) had been used for an optional grading in the first year, the stages of the German classification of diagnoses since the second year. Also with the second year, the electronic recording of risk factors was skipped due to limited resources. The current risk assessment is still paper-based.

Quality control of documentation

The completeness of documentation is checked weekly and reported to the senior nurse of each ward. Monthly, data quality is communicated to the department's nursing director.

To access the validity of the project documentation two nurses experienced in wound assessment and wound management were recruited for a cross-sectional survey in the first year (pressure ulcer team). Monday through Friday, the pressure ulcer team visited a set of wards, which had been selected randomly, and examined the present patients. Once visited, a ward could not be selected again until one complete assessment round had been finished. The team was equipped with a laptop providing an application for the recording of the pressure ulcer status, implemented with Microsoft Access 2000TM. Due to limited resources, the validation was ended after the first project year. In the end of 2005 it started again to guarantee high data quality in the future.

Quality improvement

Feedback is regarded as an important mean to improve quality of care routinely [11]. Period prevalence and incidence rates are calculated each quarter and summarized in a report for the departmental nurse. It could be used for detecting trends within a ward, compared with external rates like the PSI, or used for benchmarking of similar departments or wards. These reports were started in mid 2003 and are continuously used.

In a direct link between data acquisition and action, *medico//s* sends a request to a special wound consultancy service automatically, if a pressure ulcer stage 2 and higher had been recorded. This enables wound experts to offer support in pressure ulcer treatment regularly.

The decubitus team offers support additionally. In visiting randomly selected wards, the team detects problems in pressure ulcer prevention as well as pressure ulcer treatment. Noticeable problems could be discussed immediately with the responsible nurses and/or the wound consultancy service asked for advice.

In parallel to the project, a local adapted national standard for pressure ulcer prevention [12] had been introduced ward by ward.

Economics

In Germany, Diagnosis Related Groups (G-DRG) were introduced in 2003. Secondary diagnoses are used as a severity criterion for the definition of DRGs. A comprehensive and valid documentation of all diagnoses including complications is therefore a prerequisite for a correct reimbursement. In our University Clinics, coding of diagnoses and procedures for reimbursement is done by physicians. A comparison with the project documentation reveals a noticeable underreporting of pressure ulcers in the DRG-documentation with a relevant loss in revenues. Therefore, the decision was

made to translate the information within the project documentation automatically in diagnoses codes and offer them to the physicians. Starting with the beginning of 2005, this procedure closes the gap between the project and the DRG-documentation.

In our data, we could reproduce the results of an increased length of stay in patients with pressure ulcers in a case-control design. Further studies are on the way to substantiate that phenomenon.

In consequence of our project, the order of special mattresses was changed. Previously information on mattresses use contains solely the cost center. To enable an automatic matching between clinical data and use of supporting means the case number was added to the order form and the paper-based form replaced by an electronic one in the hospitals' intranet.

Research

Our first attempts focused on valid rates for pressure ulcer frequency in our hospital. The results had been published elsewhere [13]. As far as we know, we were the first who compared point prevalence rates from a cross-sectional validation survey with period prevalence rates from routine documentation. Further research includes several issues:

- Pressure ulcer and intensive care [14]
- Quality of the local used risk scale in comparison to standards as the Norton or Braden scale [15]
- Reliability of pressure ulcer diagnoses
- Comparison of different turning schemes in the prevention of pressure ulcers
- Effect of supporting means in the treatment of high stage pressure ulcers

Conclusions

The Essen interdisciplinary pressure ulcer project demonstrates that information, quality, and process management could be combined with empirical research. The initial concept was systematically introduced in nursing routine. The integration shows positive effects for all management issues. Multiple use of data raises the acceptance of the service provided by the Central Information Unit. Quality management is enabled to detect worse events realtime without any necessity of additional data acquisition. Reimbursement was improved by using routine data. The comprehensive database with information on diagnoses and procedures of all inpatients is a valuable source for retrospective analyses. It could also be used to generate research hypotheses as well as to select patients for prospective trials.

Some problems remain.

- As long as the paper-based patient record is used, electronic documentation data acquisition generates additional workload in most cases.
- As consequence, even in our project the recoding of pressure ulcers in the project documentation is still incomplete.

- Having a couple of problems potentially included in such a project, who set the priorities and what are the consequences for problems not included?

For the future, it will be necessary to extend our project to other nursing problems (and of course, physicians' problems) and to force the replacement of the paper-based with an electronic health care record. Then, the presented methodology will be a self-evident part of hospital care.

Acknowledgements

We are very grateful to all nursing staff for their engagement in the recording of the data as well as for the good daily care provided to patients in risk of pressure ulcer.

References

- [1] Moss RJ, La Puma J. Pressure sores: more than meets the eye. *The Journal of Clinical Ethics* 1990; 1: 304-05.
- [2] Mertens E, Tannen A, Dassen T. Dekubitusrisiko und Dekubitusprävalenz. *Die Schwester Der Pfleger* 2003; 42: 526-31.
- [3] Bours GJJW, Halfens RJG, Lubbers M, Haalborn JRE. The development of a national registration form to measure the prevalence of pressure ulcers in the Netherlands. *Ostomy/Wound Management* 1999; 45: 28-40.
- [4] Starling M. Pressure sore prevention project improves practice. *Nursing Times* 1990; 86: 40-1.
- [5] O'Brien SP, Wind S, Rijswijk van L, Kerstein MD. Sequential biannual prevalence studies of pressure ulcers at Allegheny-Hahnemann University Hospital. *Ostomy/Wound Management* 1998; 44: 78S-89S.
- [6] Whittington K, Patrick M, Roberts JL. A national study of pressure ulcer prevalence and incidence in acute care hospitals. *J Wound Ostomy Continence Nurs* 2000; 27: 209-15.
- [7] Cuddigan J, Berlowitz DR, Ayello EA. Pressure ulcers in America: prevalence, incidence, and implications for the future. An executive summary of the National Pressure Ulcer Advisory Panel. *Advances in Skin & Wound Care: The Journal for Prevention and Healing* 2001; 14: 208-15.
- [8] Zhan C, Miller MR. Excess length of stay, charges, and mortality attributable to medical injuries during hospitalization. *JAMA* 2003; 290: 1868-919.
- [9] Agency for Healthcare Research and Quality. *AHRQ Quality Indicators - Guide to Patient Safety Indicators*. Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Pub. No. 03-R203. Revision 3 (January 17, 2005).
- [10] Heinemann A, Lockemann U, Matschke J, Tsokos M, Püschel K. Decubitus ulcer in the dying: epidemiological, medicolegal and ethical aspects.

- Dtsch med Wochenschr 2000; 125: 45-51 (in German).
- [11] Bates DW, Pappius EM, Kuperman GJ, Sittig D, Burstin H, Fairchild D, Brennan TA, Teich JM. Measuring and Improving Quality Using Information Systems. In: Cesnik B, McCray AT, Scherrer J-R, eds. MedInfo 98. Amsterdam: IOS, 1998: 814-8.
- [12] Deutsches Netzwerk für Qualitätsentwicklung in der Pflege - DNQP, Hrsg. Expertenstandard Dekubitusprophylaxe in der Pflege. Fachhochschule Osnabrück, 2000.
- [13] Stausberg J, Kröger K, Maier I, Schneider H, Niebel W, for the interdisciplinary decubitus project. Pressure ulcers in secondary care: incidence, prevalence and relevance. *Advances in Skin & Wound Care* 2005; 18: 140-5.
- [14] Kröger K, Stausberg J, Maier I, Schneider H, Niebel W. Preexisting risk factors in intensive care patients with pressure ulcers. *Intensivmedizin und Notfallmedizin* 2005; 42: 270-4 (in German).
- [15] Lottko B, Bartoszek G, Maier I, Stausberg J, Dahlmann C. Der Essener Dekubitus-Score - ein Einschätzungsinstrument zur Dekubitusgefährdung. *Zeitschrift für Wundheilung* 2004; 9: 180-2.

Address for correspondence

PD Dr. med. Jürgen Stausberg
Institute for Medical Informatics, Biometry and Epidemiology
Medical Faculty, University of Duisburg-Essen
Hufelandstr. 55, 45122 Essen, Germany
Tel.: +49 201 723 4512,
Fax: +49 201 723 5933
E-mail: stausberg@uni-essen.de