

Interface flow process audit: using the patient's career as a tracer of quality of care and of system organisation

Prof. Dr. Jean-Pierre Unger, Prince Leopold Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium. Jean-Pierre Unger, MD, PhD is senior lecturer at the Prince Leopold Institute of Tropical Medicine, Antwerp, Belgium and a specialist in health service organisation.

Dr. Bruno Marchal, Prince Leopold Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium. Bruno Marchal, MD, MPH worked for two years as medical officer and for a further four years as a hospital medical superintendent in a rural district in Kenya. He is currently research assistant at the Department of Public Health, Prince Leopold Institute for Tropical Medicine, Antwerp, Belgium.

Dr. Sylvie Dugas, Prince Leopold Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium. Sylvie Dugas, MPH (1996, Institute of Tropical Medicine of Antwerp, Belgium) has had 6 years of field experience in health services organisation in Zimbabwe and Guinea, 1 year of experience as a consultant in international public health and 5 years of academic experience (teaching, research and technical support in the field) at the department of public health of the Institute of Tropical Medicine in Antwerp.

Dr. Marie-Jeanne Wuidar, Marconi Medical Centre, Rue Marconi 85, 1180 Brussels, Belgium. Marie-Jeanne Wuidar studied social sciences at the Free University of Brussels from 1968 until 1972. She obtained a PhD in medicine in 1980. From 1980 onwards she worked as a general practitioner in the Marconi Medical Centre of integrated health. In 1980 and 1981 she participated in the organisation of the primary health services of the city Yanbu in Saudi Arabia.

Dr. Daniel Burdet, Forest Medical Centre, Rue du Curé 9, 1190 Brussels, Belgium. Daniel Burdet is general practitioner working in a multidisciplinary primary care team in Brussels, where he is also leading the Quality Improvement, Healthcare Management and Study-Development departments. He is also working in the 'Fédération des Maisons Médicales et Collectifs de Santé Francophones' (Brussels) as a collaborator in the Study-Research, Quality Improvement and Health Promotion departments.

Dr. Pierre Leemans, Hôpital Molière, Rue Marconi 142, 1190 Brussels, Belgium. Pierre Leemans has been working as a medical doctor for almost 20 years. He has been working as a practical trainer at the ULB since 1991. He has responsibilities in the local organisation of general practitioners in Forest/St. Gilles.

Dr. Jacques Unger, Centre Hospitalier Tubize Nivelles, Avenue de Scandiano 8, 1480 Tubize, Belgium. Jacques Unger, MD 1973, PhD 1983. Head of the Thyroid Unit Academic Hospital 1987-1994, Head of the internal Medicine Department César de paepe 1994-1997, Molière 1997-2001, Professor of Endocrinology 1990-1994 and of Internal medicine 1998-2001.

Corresponding author: J. -P. Unger, Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium, Tel: 00 32 3 247 62 54, Fax: 00 32 3 247 62 58, e-mail: jpunger@itg.be

Abstract

Objectives: This case study aims to demonstrate the method's feasibility and capacity to improve quality of care. Several drawbacks attached to tracer condition and selected procedure audits oblige clinicians to rely on external evaluators. Interface flow process audit is an alternative method, which also favours integration of health care across institutions divide.

Methods: An action research study was carried out to test the feasibility of interface flow process audit and its impact on quality improvement. An anonymous questionnaire was carried out to assess the participants' perception of the process.

Results: In this study, interface flow process audit brought together general practitioners and hospital doctors to

analyse the co-ordination of their activities across the primary-secondary interface. Human factors and organisational characteristics had a clear influence on implementation of the solutions. In general, the participants confirmed that the interface flow process audit helped them to analyse the quality of case management both at primary and secondary care level.

Conclusions: The interface flow process audit appears a useful method for regular in-service self-evaluation. Its practice enabled to address a wide scope of clinical, managerial and economical problems. Bridging the primary-secondary care gap, interface flow process audit's focus on the patient's career combined with the broad scope of problems that can be analysed are particularly powerful features. The methodology would benefit from an evaluation of its practice on larger scale.

Keywords

Medical audit, integration, quality of healthcare, patient case management

Introduction

In recent years, quality of care has become a top priority on the policy agenda in many countries. In the UK, this concern resulted in the introduction of the clinical governance concept [1]. Although audit has been firmly established as a key element of clinical governance in the NHS and in various quality assurance initiatives in other countries, audits in which the audit loop is effectively closed remain rather rare [2]. Indeed, despite the enthusiasm of policy makers for quality assurance and improvement, health professionals in all countries and across all types of health systems proved hard to support these efforts [1].

The barriers to implementing effective audits have been well described: lack of resources, lack of expertise or support in audit design, problematic relationships between audit team members and organisation-related impediments (lack of co-operation between management and clinicians, lack of clarity about lines of authority and accountability, lack of time, organisational culture, ...). Other factors include divergent views of the participants on the objectives of audit and their general attitude towards audit [3] [4] [5] [6]. Shekelle [1] summarises it well: resistance to quality improvement programmes is rooted in professionals' distrust of the criteria by which quality is measured, the perception that audit and other quality improvement initiatives primarily aim at blaming health professionals and the fact that resources almost never follow the imposed responsibility to take on additional time-consuming duties. But as important, the author points to the fact that there are no

role models on how to implement effective quality improvement programmes.

The manner and degree to which professionals of different levels are involved in audit may have an influence on the degree of ownership and usefulness of the results. Medical audit was conceived in the US as an instrument to assist health professionals to analyse and evaluate clinical care. Initially, in one-way audit, an external form of audit, specialists of one group investigated the quality of care offered by another group [7]. The literature offers numerous examples of one-way audits of general practice, led by specialists (for example in the domain of obstetrics [8], diabetes [9] and hypertension [10] and vice-versa. Clinical audit, where multidisciplinary teams of health professionals aim to improve quality of care, may be more effective in bringing about change within organisations by surpassing the narrow borders of specific specialities.

Second, the focus and range of the audit design may have consequences for its relevance from a systems perspective. Clinical microsystems can be defined as small groups of health professionals and providers responsible for care for a well-defined population. The structure and strategies of microsystems have an influence on health system performance and on patient outcomes. Despite this, management of healthcare human resources mostly focuses on the individual level or on the level of work units defined by professional occupation when dealing with design of units or analysis of performance [11].

In this paper, we would like to present our

experience with interface flow-process audit, which integrates two models of audit. Creating links across the primary and secondary care interface is getting increasingly more attention in Belgium and other countries, as it is recognised that improved streamlining of the patients' careers may have a positive impact both on quality of care and on cost containment [3] [12]. This concern is taken into account by the *Interface audit* component, that has been defined as "complete audit cycles conducted by professionals from both primary and secondary care working together as a team to improve quality" [13]. Any aspect concerning the interface between first line and second line can be subject of audit: referral systems, co-ordinating chains of care, communication between hospitals and general practitioners, etc. [14]. This type of audit may have the potential benefit of strengthening the clinical microsystems, in that its health professionals analyse the journey of the patient through the system with the aim of improving quality of care.

The second component of interface flow process audit is based on the flow-process model, which is used to identify the hurdles a patient meets during his journey through the health system. As such, it should add the patient's perspective to the auditing process. "The stages in the patient's use of the service are broken down into steps. The problems a patient may encounter at each step are identified, studied and solutions looked for. This emphasis on the patient's perspective makes flow-process audit particularly valuable" [15]. We would however say it offers the patient's perspective rather indirectly, as the patient is usually not participating in person.

The interface flow process audit uses critical incidents as an entry point for auditing local health systems. Critical incidents, sometimes referred to as significant events, are unforeseen, rare and not necessarily negative events occurring in the course of a case management [16] [17]. Their detection and analysis may allow systematic failures of a process or an organisation to be identified, similar to the principles underlying root cause analysis, a technique widely used in the US health care industry and non-healthcare industries to find and eliminate the cause of a quality problem in an effort to prevent its

recurrence. The interface flow process audit has already been used to improve the quality of patient care in different settings [16], but to our knowledge not yet as a method to improve (local) health system organisation.

This paper aims at presenting a proof of concept, by describing an interface flow process audit analysis of a single patient's case history to demonstrate the method's feasibility and its capacity to improve quality of care. Secondly, this report also aims to demonstrate interface flow process audit's capacity to improve and rationalise the organisation of local health services and specifically the co-operation between primary and secondary care professionals. Indirectly, all these factors will have an impact on quality of care [18].

Methods

The research project started in 1998 with the establishment of a team of hospital physicians of a general hospital in Brussels and general practitioners regularly referring patients to this hospital [19]. All team members participated voluntarily in this action research study. This team greatly coincided with an existing clinical microsystem. The number of participants varied between 15 and 20 attendants per session. On average, 10 general practitioners and 2 hospital staff participated. Since 1998, 10 case management histories have been audited.

Initially, a staff member of the Department of Public Health of the Prince Leopold Institute of Tropical Medicine, Antwerp (ITM-A) led the audits. Later on, a team member took over the leadership of the audit team.

The researchers' role was to facilitate and introduce the audit methodology, to encourage critically questioning of the actual process and the integration of public health criteria in decision making and finally to advice the team on organisational changes to improve quality of care and service organisation. The researchers were public health specialists rather than clinicians, but having ample experience in general health service organisation.

A technical support and co-ordination team was set up to ensure follow-up of the proposed changes, to check their

implementation and to prepare the audit meetings. This team met monthly and included two local general practitioners, the head of the hospital's internal medicine department and two researchers of the ITM.

The case outlined below was selected by the general practitioners of the audit group. The patient's case analysis required five sessions of one hour each (one per month). Standard questions were identified for the following domains: 1. First-line health and non-health services; 2. Clinical decision-making and diagnosis; 3. Choice of treatment; 4. Nursing; 5. Type of hospital admission; 6. Global evaluation of the results; 7. Synthesis.

After two years of group work based on interface flow process audit, the perception of the audit members regarding the methodology itself as well as its process and results were collected through an anonymous questionnaire. The objective was to make a participatory assessment that would guide the further development of the audit process. A questionnaire, to be completed and returned anonymously, was sent to 16 participants. It probed the perception of the general practitioner/specialist collaboration and the acquisition of public health concepts during the interface flow process audit.

Case report

Mrs DM, a 75-year-old female patient, consulted her general practitioner because of malaise and dyspnea. She was known to have a history of myocardial infarction, hypertension and hypercholesterolemia. She had undergone a total left hip replacement. At that moment, she was on treatment with spironolactone, citalopram bromhydrate, dipyridamole, omeprazole, prazepam and fenofibrate. The general practitioner made a preliminary diagnosis of pulmonary embolism. He decided to check D-dimer levels, which were found to be at 3.323 ng/ml (normal value <500 ng/ml). The patient was hospitalised three days later.

On admission in the emergency ward, the patient complained of dyspnea, epigastric pain, nausea and vomiting. On physical examination she was found to have pain on palpation of the left side of the thorax. She had no temperature and her blood pressure was 110/80 mm Hg. A gastroscopy showed no abnormalities. D-dimer were checked

again and now found to be at 4.274 ng/ml. On re-examination, a second emergency ward doctor strongly considered pulmonary embolism as the diagnosis. Subsequently, an arterial bloodsample showed hypoxaemia (P02 = 51 mm Hg) and hypocapnia (PC02 = 25 mm Hg). The treatment started included administration of oxygen (from day 0 to day 7) and enoxaparin followed by acenocoumarol. A ventilation/perfusion (VP) scan was done and described by the radiologist as "consistent with" a pulmonary embolism. The patient was admitted to the internal medicine ward. An echocardiograph showed mild dilatation of right cavities, mild pulmonary artery hypertension, mild hypertrophied cardiomyopathy of the left ventricle and no dilatation and good contractility of this ventricle. The rib cage X-ray suggested a fracture of the 10th rib. A pelvic ultrasound scan was done on the 9th day of hospitalisation, but was negative. Duplex ultrasound scan on the 10th day of the leg veins did not show any sign of deep venous thrombosis.

The patient was recovered well and was discharged on the 11th day. Acenocoumarol and the pre-hospitalisation treatment were continued at home. One year after discharge, anti-coagulation therapy was stopped without any recurrence of pulmonary embolism.

Description of the process of the interface "flow-process" audit

In this section, we describe briefly the process of the audit for the four domains covered by this case's audit: 1) *Primary care services*, 2) *Clinical decision making and diagnosis*, 3) *Choice of treatment* and 4) *Type of health service utilisation*. For each domain, we selected a 'typical' question that emerged. We summarise the content of the discussion and the response, and finally the solution that was proposed and its implementation.

Primary care services

Question: Why didn't the general practitioner act on his diagnosis of pulmonary embolism?

Discussion and response: The hospital laboratory sent the results of the D-dimer

test to the general practitioner with a delay of three days. Due to his workload, the general practitioner had not called the laboratory for these results. This points a communication problem across the primary-secondary care interface.

Proposed solution: The laboratory IT system should distinguish between urgent and non-urgent tests requested by external general practitioners by using a specific marker. The results should then be phoned promptly to the general practitioner.

Implementation: This proposal has been implemented, but some delay is still occasionally observed.

Clinical decision making and diagnosis

Question: Why were D-dimer requested in the emergency room before the tentative diagnosis of pulmonary embolism was put forward?

Discussion: Only the negative predictive value of this test in excluding pulmonary embolism is of interest. For this purpose, the Elisa method for measuring D-dimer (opposed to the latex method currently used in the hospital) can increase the negative predictive value of the test [20].

Response: The D-dimer test is carried out systematically in the emergency ward, because a temporary research procedure resulted erroneously in a permanent rule.

Proposed solution: This test should be removed from the routine list. It should only be used to exclude pulmonary embolism. In addition, the laboratory should be asked to change the test method (ELISA instead of latex)

Implementation: The D-dimer test was removed from the routine lab test list of the emergency ward. The Elisa technique is currently used. However, the D-dimer (latex method) test is still unduly asked for in some instances, pointing to the difficulty to diffuse and to have accepted new diagnostic protocols.

Choice of treatment

Question: Was the suffering of the patient sufficiently taken into consideration?

Discussion: Some complaints of the patient (nausea, vomiting and dizziness) were not

monitored during her stay, nor was there any symptomatic treatment started. Furthermore, the masking effect of omeprazole on gastric complaints was not considered. Analysis of the format of the commonly used hospitalisation file and the answers to the audit questions indicated that for the doctors it was difficult to relate chronologically the evolution of the complaints and symptoms, the results of the tests and the response to treatment. Vital parameters were monitored by the nurses on a chart kept in the nursing file, because it was thought that for legal reasons separate medical and nursing records were mandatory in Belgium. Checking the legislation showed that a single integrated hospitalisation file is legal [21].

Response: If the patient's complaints and symptoms had been taken into account systematically, correct and timely symptomatic treatment would have been given. However, the current file system impairs combining information from both nursing and medical files. The follow-up of a patient admitted for acute problems remains an issue for debate within the hospital, as it was noticed that after the acute phase, attention for other, chronic or less urgent, complaints tends to be insufficient.

Proposed solution: Merging the nursing and medical files would allow better assessment of the patient's health status and the impact of treatment. The integrated file should facilitate the day-to-day case management. For example, it was suggested that one single table could be used to monitor relevant signs, complaints and laboratory results. The patient's problems should be clearly listed, as well as the different diagnoses. This should be used to define parameters to be monitored daily. The file design should also facilitate the writing of the discharge letter to the general practitioner. These suggestions were to be offered to the doctors in charge of the computerisation process of hospitalisation files.

Implementation: So far, this proposal has been implemented partially (e.g. integration of monitoring of vital signs and relevant laboratory data in the medical file).

Type of health service utilisation

Question: Could hospitalisation have been shortened or even avoided?

Discussion: On day 7, nasal oxygen administration was stopped and only two tests were performed after that. The leg duplex ultrasound scan, which was performed only on the 9th day, was questioned precisely because it had been performed late. The pelvic ultrasound scan could have been done after discharge. In fact, the general health status of the patient did not justify a 10 days' admission. Moreover, low molecular weight heparin now makes home care for pulmonary embolism much easier. Once-daily dalteparin therapy for deep venous thrombosis in a hospital-in-the-home setting was shown safe, efficacious and cost effective in protecting against pulmonary embolism [22]. Patients can safely and effectively perform home self-injection under professional supervision [23]. For patients with acute proximal deep vein thrombosis, treatment at home with low-molecular-weight heparin is less costly than hospital-based treatment with standard heparin [24].

Response: Hospitalisation could have been reduced to six days.

Proposed solution: Leg Ultrasound Scan should not be requested when the ventilation/perfusion scan results indicate a high probability of pulmonary embolism. Screening for cancer as a cause of pulmonary embolism should be carried out as an outpatient procedure. In Brussels, the detailed indications for home care in the management of pulmonary embolism remain to be studied.

Implementation: Leg Ultrasound Scan is more carefully ordered. Patients now undergo a pelvic ultrasound scan to screen for pelvic tumours on outpatient basis after discharge. However, suspected cases of pulmonary embolism are still all admitted to the hospital.

Results

Outcome of the audit

In this particular audit, shortcomings were identified at different levels. Concerning

quality of clinical care, it was seen that in the clinical decision making process the patient's complaints and symptoms were not considered sufficiently. Non-relevant tests with a long waiting list contributed to an unacceptable length of stay. Regarding service organisation, weaknesses identified include delays in delivering urgent results to general practitioners, inefficient use of diagnostic tests (automatic request of D-dimer test, inappropriately used Leg Ultrasound Scan, uninformative ventilation/perfusion scan results), the use of an inappropriate laboratory technique (latex D-dimer test) and inadequate training of staff in the emergency unit.

This analysis was followed by measures to improve quality of care: differentiating urgent from non-urgent tests regarding the feedback of the results, the introduction of Elisa D-dimer tests and the standardisation of reporting of ventilation/perfusion scan results. The interface flow process audit enabled some gaps between actual medical practice and best practice to be filled by continuous medical education in domains such as clinical epidemiology, rationalisation of disease control and utilisation of evaluation criteria (cost-efficiency, patient's viewpoint and uncertainty).

Perception of the audit by the participants

Eleven members returned a complete form, eight out of the twelve general practitioners and three out of the six hospital specialists. Among the aspects felt as positive, the improvement of communication between professionals from the two levels of care clearly stood out. A second positive point was that, through interface flow process audit, doctors' awareness of the notion of health care system and of their role in this system increased.

Regarding the methodology of interface flow process audit, the majority of respondents found that it allowed them to analyse the quality of patient's management in general practice (6/11) and in hospital (7/11). Nine out of eleven respondents said that due to their participation to the audit, they have introduced practical improvements in their patient case management.

However, the respondents pointed out

some areas for improvement. They found that even if the methodology is very effective in identifying problems, the following steps of analysis and mostly of formulation and implementation of solutions were still not developed adequately. They also highlighted that the process was so far too hospital-centred and too physician-centred.

Discussion

Interface Flow Process Audit offers a number of theoretical advantages over traditional designs of audit. It enables evaluation of quality of care in a comprehensive manner, allowing identification of a wide range of problems across organisational borders, as opposed to the tight focus of tracer condition audit.

The interface flow process audit proved to be an initiative that "usefully explores the possibilities of supporting development of guideline-retrieval systems customised for individual general practitioners or practices" [25]. This too contrasts with tracer condition audit, which often results in an unmanageable amount [26] of insufficiently used [27] [28] guidelines, designed without the involvement of their assumed users.

The method uses the patient's career and the definition of quality of care according to Baker's recommendation [5]. However, while based on the technical skills of the participants, it was also able to mobilise external expertise and literature to define quality standards when needed.

Finally, in this study, interface flow process audit brought together general practitioners and hospital doctors to analyse the co-ordination of their activities across the primary-secondary interface. All health professionals involved in this audit felt stimulated to internalise public health criteria for decision making by taking an active role in evaluation of quality of care and in improving health service organisation. This stands in sharp contrast with tracer condition audit, in which the dominating role of the tracer disease's specialists reduces the impact of the general practitioners and general specialists. The participants confirmed that the interface flow process audit helped them to analyse the quality of case management both at primary and

secondary care level. This suggests that the method avoided one category of professionals being judged by another on the basis of standards that are not shared by both parties. Furthermore, improved contact between general practitioners and hospital specialists helped to strengthen local care structures in a country - Belgium – that lacks any decentralised administration to co-ordinate health care and facilities and, until recently, incentives to stimulate collaboration between specialists and general practitioners. While interface flow process audit would be easier to implement in well-structured health systems such as Health Maintenance Organisations or North European health services, we believe that this points that it can stimulate and strengthen system links across the primary-secondary care divide in any setting.

However, this study also raised a number of issues that proved difficult to resolve. First, human factors and organisational characteristics had a clear influence on implementation of some solutions. Implementing interventions across departmental boundaries has proven to be difficult. In this case, insufficient communication channels and the relative autonomy of the different departments (radiology, laboratory, the emergency ward, the hospitalisation unit and the hospital management team) impeded effective and complete implementation of the proposed solutions.

In particular the introduction of clinical guidelines for pulmonary embolism could have been effective in reducing length of stay and the number of tests, resulting in better care for the patient and in contributing to cost control. Their implementation was hampered by lack of ownership. Enlarging representativity of the audit team could perhaps have resulted in a wider acceptance of the proposed measures.

Interventions requiring modifications in reimbursement patterns are particularly difficult to introduce, as this falls under the authority of the Ministry of Social Affairs. But even at the level of single departments, differing (professional) interests may impede change. For example, suggested reorganisations at odds with the physicians' timetable met resistance.

Second, the Ministry of Social Affairs may need to introduce some incentives for doctors to participate in audits: in Belgium, general practitioners and quite some hospital specialists operate as independent, private professionals. Their involvement in audits represents a certain opportunity cost.

Third, interface flow process audit assumes the perspective of the patient only indirectly by assessing his journey through the health system. However, in this study, only medical doctors participated in the audit, in contrast with other interface audits. This may have avoided the group splitting up into professional categories, a pitfall mentioned by Eccles, but it probably also reduced the diversity of approaches. Nurses, for instance, are more likely to detect hidden complaints and problems the patient is facing.

Fourthly, the method's capacity to reorient medical practice towards a patient-centred style of management better addressing the patient's needs further exploration.

Finally, in the case reported, interface flow process audit required the presence of an external public health expert (1/4 full time equivalent), raising questions about sustainability and reproducibility. We expect that in the near future some of the audit team members will have sufficient experience with public health methods and the audit techniques to become themselves the initiators of other audit groups. Continuous medical education initiatives, such as local groups of continuous medical education in Belgium could take advantage of the methodology. It would require structural changes as it needs some interdisciplinary-shared responsibility and scientific guidance geared to both clinical and managerial points of view. In Belgium, this scientific support is available not only in universities, but also in professional associations and trade unions.

Conclusion

Interface Flow Process Audit paves the way to regular in-service use of a self-evaluation method aimed at improving the quality of care and of service organisation. Bridging the primary-secondary care gap, its focus on the patient's career combined with the broad scope of problems that can be analysed are powerful features.

Annex - Questions examined during the flow process audit

First-line health and non-health services

Was there any patient's delay in consulting? Was the care offered comprehensive, i.e. bio-psycho-social? Was the care continuous? How has the process enhanced the autonomy of the patient? How was the suffering of the patient dealt with? Was the patient appropriately referred to the hospital? Was a proper differential diagnosis defined? Was the care effective and efficient? Was an appropriate team of professionals managing the case? Were non-medical (social, etc.) services adequately used? What services were used following discharge? How was prevention and promotion personalised for this patient?

Clinical decision-making and diagnosis

Which requested tests were of doubtful usefulness? Which tests were forgotten? Are there reasons for believe that some tests were carried out badly (paradoxical results, for example). Were there any cheaper alternatives that should have been considered? Was the power of the signs and symptoms strong enough to make diagnosis? Were certain laboratory tests or medical imaging unnecessary? Was the use of tests during the course of the illness justified by the illness? Are there reasons to suspect false positives (for example, ineffective treatment) or false negatives (diagnosis delayed, unexplained death, repeated tests with discordant results)? Considering the symptoms, were the important diseases eliminated (i.e. dangerous, not spontaneously self-limiting disease, causing considerable suffering or leading to death)? Were evidence-based medicine sites and the literature in general used?

Choice of treatment

What was the hypothetical diagnosis? What result was one hoping to achieve? Was there congruity between the treatment and the diagnosis? Was treatment up to the norms described in the literature? Did one forget to deal with the suffering and

problems experienced by the patient by concentrating solely on the aetiology of suffering? How effective was the treatment (side effects - iatrogenic – avoidable)? Did an avoidable complication, a sequel or a death happen? Could the same result have been achieved more rapidly? What were the signs and symptoms used to evaluate this? Was there any scope for reducing medication (duplication, doubtful efficacy of certain drugs, etc.)? Were there cheaper alternatives to the drugs used?

Nursing

Were there any critical incidents that might suggest poor quality of nursing (treatment badly or incompletely administered, delay in the execution of orders, sterilisation errors, nosocomial infections, etc.)? Were there any known psychological problems that could have been avoided with better nursing care?

Type of hospital admission

Was admission delayed? Was the length of stay too short or too long? What could have been done to reduce the length of stay (better collaboration from the family, improving equipment at the primary care level, better work organisation, and earlier access to a specialist, etc.)? Was the choice of department (emergency ward, outpatient clinic, medical ward, surgical ward) appropriate? What measures were taken on discharge? How can the hospital contribute to strengthening primary care in order to improve the quality of the

implementation of these measures?

Global evaluation of the results

How to assess the treatment results (out-patient follow-up, at primary care or hospital level) in terms of the general state of the patient (deceased, cured, appropriate continuing care) and of the evolution of the dominant symptom (disappeared, improved, identical, increased). With hindsight, was the treatment useful (does either the general practitioner or the health centre possess the techniques used by the hospital)? With hindsight, what were the justifications for admission? Could a better result have been obtained had there been better collaboration from the family? better equipment? training for the doctor? easier access to a specialist? better work organisation? preliminary operational research? technical supervision? Was the psychological distress properly addressed?

Synthesis

How to assess the measures undertaken to correct or improve the system?

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