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Medication Review: Human Factors Study Aiming at Helping an Acute Geriatric Unit to Sustain and Systematize the Process

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Abstract. *Background:* Medication Review (MRev) has been implemented in many hospitals to improve patient safety and well-being. However, it seems sometimes difficult to implement, maintain and systematize this process, especially when key-elements are absent. This study focuses on the analysis of a MRev process implemented in an Acute Geriatric Unit (AGU) which, at the time of the study, had no Computerized Physician Order Entry (CPOE) and no sufficient staff to - normally - support the process. *Objective:* This study describes the MRev process as existing in the AGU with a particular focus on the preparatory MRev meeting phase and presents our recommendations to maintain and optimize it. *Methods:* Human Factor experts have collected and analyzed data during MRev process by interviews, shadowing observations and video recording from April to October 2014 at Lille University Hospital. *Results:* MRev process consists of three phases (meeting preparation, MRev meeting and patient discharge) and includes seven main tasks for which actors, documented supports, outcomes and difficulties are identified. Although allocating a fulltime pharmacist for the AGU would solve several problems, the main realistic recommendations concern training for junior and senior actors according to their roles and the improvement of some tasks processes. *Conclusion:* Despite less than optimal conditions as compared to those recommended by the literature, the observed AGU performs an efficient review based on well designed tools and processes.

Keywords. Medication review, human engineering, organizational case studies, acute geriatric unit.

Introduction

Medication Review (MRev) process is increasingly implemented in hospitals in order to reduce and prevent Adverse Drug Events (ADEs) and maximize patients' benefit during care transitions [1]. This process is described in the literature pointing at its positive clinical impact (e.g. decreasing medication errors, better patient compliance) [1-3] and its facilitators (e.g. multidisciplinary team, use of electronic-based support, presence of a leader) [2-3]. Furthermore, medication reconciliation process is

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considered as a necessary step to perform a qualitative MRev [3,4]. Nevertheless, both processes are also considered difficult to implement and to maintain by healthcare institutions. Barriers are identified, most of them related to Human Factor (HF) aspects (e.g. turnover, lack of resources, absence of leadership, unfamiliarity with procedures, no access to patient information, no multidisciplinary approach, no Computerized Physician Order Entry (CPOE)) [3-7]. According to these elements, adopting a HF approach makes sense in order to analyze and optimize the process.

We present here a case study of the implementation of a MRev process in an Acute Geriatric Unit (AGU) characterized by chronic lack of pharmacy resources and no available CPOE. This AGU (academic hospital of Lille) started the MRev process implementation in January 2014 in order to improve the continuity of care between hospital and home return. In line with the MRev leader expectations, the aims of the present study were (i) to formalize the MRev process and identify each role and associated actors along with their contribution to decision making and (ii) to identify room for improvement in order to propose guidance to improve, maintain and routinize the process in the AGU.

1. Methods

This study was conducted from April to October 2014 at the University Hospital of Lille (France), a 3500-bed hospital. It was carried out in a 28-bed AGU. Data were collected by three HF experts through several methods to cross-check data (Table 1):

- exploratory interviews to understand clinician's goals and personal perception of the MRev process. Interviews were based on the 5Ws method (Who, What, Where, When, Why) and were audio-recorded.
- shadowing observations; HF experts took field notes on information gathering and documentation and communications between involved clinicians.
- observations of MRev meetings, supported by field notes.
- individual debriefing interviews where clinicians were confronted to documentation forms and asked to explain the rationale behind information gathering and documentation.

Table 1. Number, duration and participants involved for the four methods.

	Exploratory interviews	Shadowing observations	MRev meeting observations	Individual interviews
Number	6	7	18	4
Duration	4h15mn	40h45mn	16h45mn	1h15mn
Actors implicated	2 geriatricians 1 pharmacist 2 pharmacy students 1 nursing manager	2 geriatricians 3 pharmacy students 2 nurses	Multidisciplinary team	1 geriatrician 1 pharmacist 1 resident physician 1 pharmacy student

All data were transcribed and analyzed in order to understand and describe the collective decision making process during the MRev meeting. The analysis identified actors, roles, aims, tasks, workflows and information flows, and barriers and facilitators.

2. Results

2.1. Description of the MRev Process

In the AGU, medical and pharmacy staff are both involved in the MRev process although it's mainly led and supported by medical staff. At the time of the study, in terms of medical resources, up to 7 physicians (3 geriatricians and 2 to 4 residents) were involved in the MRev process. Each resident is more specifically in charge of a portion of the AGU's patients (25 to 50 % depending on their number). Two geriatricians act as MRev leader. Clinical pharmacy resources are limited to about 10 hours per week, distributed over 1 senior pharmacist (5 hours) and 2 residents (about 2h30mn each). This time is dedicated exclusively to the MRev process. It happens quite often that pharmacists put in extra working hours to complete their tasks. Additionally 3 pharmacy-students (4th and 5th year) do their internship in the department where they work two days a week. Their time is also entirely dedicated to MRev. Turnover time is 6 months for residents and 3 months for students.

MRev concerns all patients to be discharged from hospital. However, patients here play a minor role: 80% of them are not in a position to provide information needed for MRev or to benefit from therapeutic education cause of chronic or acute severe dependency, delirium, cognitive disorders, visual or motor deficits, depression, etc.

A form (named *MRev support*) has been elaborated during the eight first months of the MRev project to support the process. It is continuously documented for each patient from the admission in the AGU to the end of the MRev meeting. It collects information about patient's contacts (e.g. community pharmacist, family, GP), a geriatric synthesis including patient demographics (e.g. gender, age, place of residence) and patient conditions (e.g. undernutrition, dementia, falls, dependence), essential medical antecedents specifying information sources and reliability, the clinical pharmacy information (e.g. weight, albumin, renal function, allergy, crushed drugs, swallowing disorders, medication use process at home i.e. how and when the treatment is taken by the patient), a compliance score (the Girerd score), the Best Possible Medication History (BPMH) and the list of medication to be added for the discharge treatment.

There also exists a *pharmacist medication checklist* including the BPMH (copied out from the MRev support) and the hospitalization treatment (recovered from the Medication Administration Record (MAR)) as well as the prescription analysis and comments. It is only documented and used by pharmacists.

Three main phases have been identified to characterize the MRev process as it is implemented in the AGU: (1) meeting preparation (declined in five tasks (T1 to T5)), (2) MRev meeting and (3) patient discharge. Each phase is characterized by specific tasks, main actors, filled supports and outcomes (Table 2).

1. MRev preparation. The BPMH is mainly established (T1) by pharmacy students when a new patient is admitted in AGU. They identify as precisely as possible the medications taken before AGU's admission, i.e. medications taken at home or administered in the emergency department or other unit. They carry out this task by interviewing/phoning/reviewing several sources: the patient, their family, the GP, the community pharmacist, specialized physicians, prescriptions, medical letters. In parallel, they also document the clinical pharmacy section on the MRev support and the compliance score (Girerd score) (T2). Both tasks (T1 and T2) are easier when patients come from a medical unit/retirement home than from their own home. Then, twice a week, a MRev leader lists patients to be discharged (T3) in the upcoming three days

(no discharge during weekend). No specific support is allocated for the listing; it can be documented on a sheet of paper or a paperboard. When the listing is completed, each resident physician documents the MRev support (T4) for their patients concerned by discharge; they document patient's general information, medical antecedents and the geriatric synthesis. In parallel, a pharmacist (senior or resident) gathers information about listed patients and copies on the pharmacist prescription support the patient's BPMH and hospital treatment (T5). S/he compares and analyses both lists of medication in order to prepare the MRev meeting. The pharmacist focuses on potential ADE's, therapeutic justification of each drug and assesses the treatment's adequacy to the patient condition and also prepares questions and comments to be addressed during MRev meeting.

Table 2. Three main phases of MRev process including tasks, actors, documented supports and outcomes (Tasks T1 and T2, and tasks T4 and T5 can be respectively carried in parallel).

Main phases	Tasks	Main actors	Filled support	Outcomes
1. Mrev preparation	(T1) Establishing BPMH	Pharmacy students	MRev support	Necessary data for MRev meeting
	(T2) Retrieving information on clinical pharmacy and calculation of the Girerd score	Pharmacy students	MRev support	
	(T3) Identifying and listing patients to be discharged in the upcoming 3 days	MRev leader	No specific support (temporary document)	
	(T4) Documenting the geriatric summary and medical antecedents	Resident physicians	MRev support	
	(T5) Comparing the BPMH with the hospitalization treatment and checking for potential ADEs	Pharmacists (resident and/or senior)	Pharmacist medication checklist	
2. MRev meeting	Reviewing medications for each patient	Medical and pharmacy staffs	MRev support	BPMDDP and justifications
3. Patient discharge	Writing patient discharge letter	Medical staff	Discharge letter	Discharge letter with BPMDDP and justifications

2. MRev meeting. It involves three main actors: the pharmacist, the resident physician in charge of the patient(s) and the leader (geriatrician) of the meeting. Each participant relies on his/her own support: the MRev support for the leader, the patient record and especially medications prescription and administration record for the resident, and the prescription checklist for the pharmacist. This allows for triangulation of information. The meeting is organized as follows: (i) the resident presents the patient: age, gender, reason for hospitalization and evolution, home life, future after discharge and clinical information specific for the patient. During the presentation: the leader eventually completes the MRev support if necessary with missing or relevant information; s/he and the pharmacist ask several questions to complete their understanding of the patient case. (ii) Then, the leader spells out loud each drug of the BPMH and the resident answers with "continued", "stopped" or "modified"; for stopped or modified drugs, the leader asks "why", the pharmacist may add comments and the leader ultimately documents the final decision. (iii) Next, the resident mentions

each medication added during the hospitalization and whether it has been reevaluated or not and justifications for this modifications. For each medication discussed, the leader makes the final decision in case of disagreement between the participants. The MRev support is then used to establish the Best Possible Medication Discharge Plan (BPM DP), i.e. the new treatment with continued, modified and also stopped medications and justifications for all changes, to be integrated in the discharge letter.

3. Patient discharge. The patient discharge letter is written by medical staff. It includes the discharge summary and the BPM DP. It is directly addressed to the GP and sometimes also given to the patient.

2.2. Identified Problems (with Causes and Consequences) and Recommendations

Despite the fact that the AGU has no CPOE and is chronically understaffed (as regards geriatrician and pharmacist resources), the MRev team succeeded in implementing an efficient enough process. Nevertheless, this study highlights several problems and associated causes which bring about four main negative consequences on MRev process (Table 3).

Table 3. List of consequences, associated problems and causes recorded during observations.

Consequences	Problems	Causes
Meeting cancellation	Key actors missing (leader or pharmacist)	Understaffing
	BPMH not documented on the MRev support	Pharmacy students turnover
Unreviewed patient	Patients listing incomplete (unidentified patient for the MRev meeting)	Unplanned discharge Task performed by MRev leader (suboptimal task allocation) Lack of shared dedicated support
	BPMH incomplete or not reliable Missing information in clinical pharmacy section on the MRev support	Pharmacy students turnover Difficulties to retrieve information
Diminution of MRev quality	Patients listing incomplete (patient identified just before the meeting; prescription analysis cannot be done)	Suboptimal task allocation Lack of shared dedicated support
	Geriatric summary and medical antecedents not documented on the MRev support	Resident physicians turnover Lack of time of resident physicians Perceived as a double documentation task by resident physicians
Diminution of MRev process efficiency	Time of students' task learning	Students and residents turnover

Two transversal causes have been identified: understaffing and turnover. Understaffing causes lack of resources and difficulties to allocate tasks among actors. The turnover generates lack of expertise and understanding about MRev issues among newcomers (students and residents). Although the allocation of a clinical pharmacist for the AGU could solve most of the identified problems, one of the MRev leaders stressed that this solution is impossible for many administrative and financial reasons. More realistic recommendations have been proposed to the AGU.

Regarding actors: (i) include a well-documented training session upon their arrival, guided by a pharmacist expert and a leader in order to explain them the MRev process and its medical and organizational consequences; (ii) train a third or a fourth leader to lead the meeting and help systematizing the MRev process at each phase when main leaders are absent; (iii) secure a half-time resident pharmacist position.

Regarding tools: (iv) provide a shared dedicated support (e.g. whiteboard, IT tool) to complete patients listing and avoid omissions; (v) recover automatically patient data (e.g. past and current treatments, medical history) to make pharmacy student's or resident physicians' investigation easier.

3. Discussion

This HF study aimed to formalize the MRev process and to suggest guidance to improve, maintain and systematize it in the AGU. Although the unit is characterized by a chronic lack of pharmacy resources and no available CPOE, AGU staff succeeds in reviewing patients effectively. Indeed, they have created and continuously improved paper-based tools (e.g. MRev support, Pharmacist medication checklist) and procedures (e.g. face to face MRev meeting between key actors) during the first months after MRev process implementation. However, understaffing along with students' and residents' turnover affect significantly the quality, the efficiency or even the organization of the MRev meeting. Recommendations have been proposed, some being difficult to implement and others already adopted.

This HF study on the MRev process is valuable. Most of problems identified by the literature were observed and more precisely described with their associated causes and consequences on the process. It also highlights the adaptability of the AGU staff despite the lack of resources and the possibility to carry out the MRev process without CPOE. There are two main limits in this study: (i) the study is focused on one specific AGU, recommendations cannot be extended to all hospitals; (ii) beyond the clinicians experimenting the process, there is a need to collaborate also with hospital stakeholders (e.g. administrators and internal patient safety and quality departments) to be able to provide efficient recommendations. This preliminary study introduces an international work on the MRev process aiming at identifying and generalizing the socio-technical factors determining this work process. The ultimate purpose is to be able to suggest adapted recommendations depending on specificities of different work contexts.

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