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Individualising drug dispensaries in a university hospital

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Summary

Background: In hospitals and other healthcare institutions drugs are routinely stored in designated satellite areas on the wards. Often ad hoc decisions are made by clinicians and nurses regarding drug type and quantity to be stored. As a result the number of different drugs and drug packages in storage tends to increase, which may lead to inefficient drug handling and become a potential risk factor in the medication control process. Based on an extended analysis of drug inventories on three different wards it was hypothesized that a ward-individualised formulary (WIF) can halve the number of different drugs and drug packages in a drug dispensary and hence reduce bound capital, money lost through expired drugs, and facilitate safer drug handling. The interdisciplinary intervention described here took place on three 40-bed wards in a 700-bed university hospital housing patients in general internal medicine, haematology, nephrology and oncology.

Methods: A WIF was defined by including all drugs from the hospital formulary ordered at least three times in the past six months. A pharmacist, a nurse and a clinician reviewed the inclusion list of drugs and clinicians were strongly encouraged to prescribe drugs primarily from the WIF. Drugs excluded from the WIF were removed from the drug dispensaries and the number of included drug packages stored in the remote dispensaries was reduced according to their order history. Drug inventory on the wards was monitored from February 2004 to April 2006.

Results: The initial drug dispensary inventories on wards A, B and C consisted of 2031, 1667 and 1536 packages with 943, 897 and 831 different drugs valued at € 83 931, € 44 590 and € 57 285.–, respectively. After adjusting the drug dispensaries according to the WIF drug dispensary inventories on wards A, B and C consisted of 808 (–60%), 600 (–64%) and 485 (–68%) packages with 415 (–56%), 334 (–63%) and 376 (–55%) different drugs valued € 28 012 (–67%), € 10 381 (–77%) an € 17 898 (–69%). The overall reductions of the number of packages, the different drugs and the drug value were comparable (>50%) and remained low during the entire observation time (A: 18 months, B: 13 months, C: 8 months).

Conclusion: Rearranging dispensaries by individualizing the drug inventory according to the needs of the ward by introducing a WIF is a valuable means to significantly (>50%) reduce [1] the number of drug packages, [2] the number of different drugs stored and [3] the capital bound in drugs. The positive effects of the WIF are supported by the interdisciplinary interaction of the different professional groups involved in the medication process. The leaner drug dispensaries offer optimal basic conditions for introducing new IT-based systems to further increase the safety of the medication process.

Key words: drug inventory; internal medicine; ward dispensary; ward-individualised formulary (WIF); economics; cost reduction

Introduction

In hospitals and other healthcare institutions drugs are routinely stored in designated satellite areas on the wards. Often ad hoc decisions are made by nurses and clinicians regarding drug type, variety of dosing strength and quantity to be stored. As a result the number of different drugs and the number of drug packages stored in ward dispensaries tends to rise, potentially leading to inefficient drug handling and posing a greater potential risk factor in the medication control process. Furthermore economic factors such as bound capital, money lost through expired drugs and time-consuming drug handling on the wards may become notable. Recently Jordan et al. [1] and

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Trapnes et al. [2] showed in pilot studies that selective management interventions on ward dispensaries could reduce the number of different drugs and drug packages significantly.

Hospital formularies are a well-established means to keep the number and variety of different drugs used at a confined level [3]. A positive consequence arising from this targeted restriction is cost savings and possibly increased medication safety [4]. In larger hospitals the effects of formularies sometimes remain limited due to the many medical specialities and hence the broader spectrum of drugs. Therefore it appeared promising to further individualise an existing hospital formulary according to the individual needs of specialist clinical wards.

Based on an extended analysis of drug inventories on the wards it was hypothesized that ward-individualised formularies (WIF) can halve the number of different drugs and drug packages in a drug dispensary and hence reduce bound capital and possibly facilitate drug handling.

Against this background we expanded our previously conducted exploration and conducted an interdisciplinary intervention on three medical 40-bed wards in our tertiary 700-bed university hospital housing patients in general internal medicine, haematology, nephrology and oncology.

Methods

Ward Individualised Formulary (WIF): A WIF was defined for three medical wards (A, B, C) as follows. Drug dispensaries were inventoried. All drugs from the hospital formulary ordered at least three times in the preceding six months were included in a preliminary WIF. A pharmacist, a nurse and an attending clinician reviewed the drugs included and excluded, according to their own professional experience. Emergency drugs such as epinephrine were retained in the WIF, although rarely needed. A finalized WIF was published and distributed to each ward as an A5 formatted print version.

Drug dispensary: All drug dispensary holdings were adjusted to the individualised WIF and surplus drugs were returned to the central hospital pharmacy. Concurrently with this measure the management of the drug dispensaries were optimised using a kanban-like system in the drug dispensary [5]. This system enables the personnel to clearly recognise the commercial name, the price and the number of packages of a particular drug to be stored in a designated storage area within the drug dispensary and defines order modalities. To further simplify the order processing all drug names from the WIF were included in a paper-based ordering list of the ward.

Information, training and implementation: All clinicians and nurses were informed about the project and trained how to utilise the WIF in their daily routine. The print-version of the WIF was handed to the staff of the wards. The WIFs were renewed every 6 months to take account of changes (new drugs, new personnel, etc.) Clinicians were strongly encouraged to prescribe primarily drugs from the WIF. The nursing and pharmacy staff mutually reorganised the drug dispensary according to the WIF.

Intervention and observation period: Six weeks after initial rearrangement of the drug dispensary on the wards the practicability of the procedures was assessed based on an empiric survey. Thereafter a periodic check was kept on each drug dispensary. The observation period is currently 18 months for ward A, 13 months for ward B and 8 months for ward C.

Results

The initial drug dispensary inventory on ward A, B and C consisted of 2031/1667/1536 packages with 943/897/831 different drugs valued at € 83 931/44 590/57 285. After adjusting the drug dispensaries according to the WIF drug dispensary inventory on ward A, B and C consisted of 808 (–60%)/600(–64%)/485(–68%) packages with 415(–56%)/334(–63%)/376(–55%) different drugs

Table 1

Number of different drug packages before and after introducing the ward-individualised formulary (WIF).

Ward	Before WIF (100%)	After WIF (%)	Control 1 (%)	Control 2 (%)	Control 3 (%)
A	2031	808 (–60)	998 (–51)	922 (–55)	808 (–60)
B	1667	600 (–64)	679 (–59)	ongoing	ongoing
C	1536	485 (–68)	560 (–64)	ongoing	ongoing
Mean	1745	631 (–64)	746 (–57)		

Table 2

Number of drugs before and after introducing the ward-individualised formulary (WIF).

Ward	Before WIF (100%)	After WIF (%)	Control 1 (%)	Control 2 (%)	Control 3 (%)
A	943	415 (–56)	437 (–54)	422 (–55)	409 (–57)
B	897	334 (–63)	371 (–59)	ongoing	ongoing
C	831	376 (–55)	384 (–54)	ongoing	ongoing
Mean	890	375 (–58)	397 (–55)		

Table 3

Bound capital (€) before and after introducing the ward-individualised formulary (WIF).

Ward	Before WIF (100%)	After WIF (%)	Control 1 (%)	Control 2 (%)	Control 3 (%)
A	83 931	28 012 (–67)	44 134 (–47)	29 948 (–64)	27 042 (–68)
B	44 590	10 381 (–77)	13 130 (–71)	ongoing	ongoing
C	57 285	17 898 (–69)	16 733 (–71)	ongoing	ongoing
Mean	61 935	18 763 (–70)	24 666 (–60)		

valued € 28 012 (–67%) / 10 381 (–77%) / 17 898 (–69%) (see tables 1–3). The overall reductions of the number of packages, the different drugs and the drug value were comparable (>50%) and remained low during the entire observation time (A: 18 months, B: 13 months, C: 8 months).

The empiric survey revealed that locating drugs in the drug dispensary was explicitly facilitated and returns of excess drugs to the hospital pharmacy were reduced. The WIF was generally well accepted by the clinicians, however prescribing according to a WIF led to supplementary work and was sensed as more labour-intensive.

Discussion

The demands for improved drug utilisation and the ubiquitous financial constraints in health care institutions require re-evaluation of traditional ways of storing and dispensing drugs in hospitals. A decade ago broad discussions in the US led to a complete re-design of the medication process by introducing automated medication distribution systems (AMDS) on the wards [6]. As a consequence drug inventories were dramatically reduced, computer-based drug dispensing improved medication safety permitting documentation of the medication process and allowed direct medication billing to the patient. The cost-benefit of AMDS is well documented [6–8]. More recently AMDS were supplemented with computerised physician order entry systems (CPOES) allowing a universal documentation of the entire medication process. In Switzerland traditional dispensing and prescribing habits, self-conceptions of professional groups or the torpidity of large institutions currently hamper re-evaluation and re-design of the medication process in hospitals, hence only scattered attempts to improve the medication process are under way [9, 10]. The most-expressed fears were the restricted prescribing liberty and the feared out-of-stock situation on the ward. Empiric observations and erratic reports prompted an initial conservative effort to institute a more transparent medication process by re-evaluating drug handling on a single ward drug dispensary (ward A). As a result of this initial effort it was hypothesized that ward-individualized formularies (WIF) can effectively reduce the number of different drugs and drug packages in a drug dispensary and hence reduce bound capital, money lost through expired drugs and facilitate safer drug handling. The inclusion of additional wards (ward B and C) and the expanded observation time (currently up to 30 months) confirmed the above-mentioned hypothesis and our observation in a previous pilot study [1]. The cost savings in our studies were significantly higher than in other studies (48% in *Trapnes et al.* [1] and 17% in *Litzinger et al.* [11]). It is presumed that our interdisciplinary approach (nurse, clinician and pharmacist) to deliberately reduce the drug inventory in a universally transparent manner accompanied by actual information and training for rotating doctors and new staff on how to use the WIF led to a lasting improvement of all monitored parameters. Unquantified parameters such as space-savings, simplified drug handling and ordering procedures were also very positively perceived.

We argue that the introduction of a WIF is a practical means to reduce the costs of the hospital medication distribution process. This is also a useful systematic introduction to prime all professional groups involved in this process for future developments in drug distribution technology. The AMD and CPOE systems both require lean drug dispensaries and truncated formularies – clinicians should become familiar with the practice setting sooner rather than later.

Conclusions

Rearranging dispensaries by individualising the drug inventory according to the needs of the ward by introducing a WIF is a valuable mean to reduce (a) the number of drug packages, (b) the number of different drugs stored and (c) the capital bound in drugs significantly (>50%). The positive effects of the WIF are supported by the interdisciplinary interaction of the different profes-

sional groups involved in the medication process. The lean drug dispensaries offer optimal basic conditions for introducing new IT-based systems to further increase the safety of the medication process.

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