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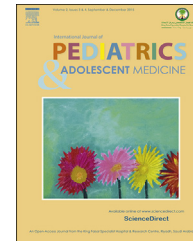


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ORIGINAL RESEARCH ARTICLE

Improving Medication Reconciliation compliance at admission: A single department's experience



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Quality;
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Abstract *Background and objectives:* The objective of this research is to improve compliance of the medication reconciliation process at the time of patient admission in the Department of Pediatrics at King Faisal Specialist Hospital and Research Centre, Riyadh, Kingdom of Saudi Arabia using an innovative evidence-based approach.

Materials and methods: Most of the recent efforts at our institution to revamp the medication reconciliation process have failed. Thus, we implemented an innovative evidence-based approach to improve the compliance of the reconciliation process at admission. This approach focused on the Department of Pediatrics at King Faisal Specialist Hospital and Research Centre (KFSH&RC). We established specific educational and monitoring programs that were run over a two-month period, from June to July 2015. The educational program consisted of focused hands-on daily interactive training sessions presented to a small group of residents, i.e., 5–6 residents per session, for a period of one week. One resident was identified as a "Super-User" to provide ongoing support for the other residents involved in the process. A close monitoring process was also implemented, which included daily follow up and encouragement from three assigned consultants. In addition, periodic independent audit report results prepared by Healthcare Information Technology Affairs (HITA) were communicated to the Department of

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Pediatrics regarding physician compliance in the medication reconciliation process.

Results: Physician compliance for admission medication reconciliation documentation in ICIS ranged from (0–15%) between the first quarter of 2012 and the first quarter 2015, we designated the official hospital audit for the first quarter of 2015 as a baseline audit report. We implemented our initiative during the months of June and July 2015. During that time, there was a gradual improvement in the number of admission medication reconciliations reported by the independent audits of our general Pediatrics Ward (B1), which represents the majority of pediatric admissions. The 57% of 26 patients had medication reconciliation completed by the first report dated 16 June 2015. This percentage improved to 92% out of a total of 13 patients at the last report on 12 July 2015. This consistent improvement also occurred in other areas where pediatric patients were admitted including the B3-1 (from 88% to 90%), the NICU 1 (from 83% to 100%) and the NICU 2 (from 90% to 100%).

Conclusions: By structuring and implementing intensive educational and monitoring programs, a marked improvement in the compliance of medication reconciliation at the time of admission for the pediatric patient population was achieved. We believe that our department-based results would be generalizable if a similar hospital-wide programme was to be rigorously implemented. Copyright © 2015, King Faisal Specialist Hospital & Research Centre (General Organization), Saudi Arabia. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Medication related errors at admissions and the discharge of patients at health institutions are common and preventable [1–3]. One of the best measures to prevent these errors is the use of an accurate medication reconciliation process that integrates the effort of different health care providers [4,5]. Medication reconciliation improves patient safety and reduces the risk of medication error by ensuring that health care providers and patients have an up-to-date list of the medications that a patient is taking [6].

The Joint Commission has defined medication reconciliation as “the process of comparing a patient’s medication orders to all of the medications that the patient has been taking.” Medication errors may include omissions, duplications, dosing errors, or harmful drug interactions. This process should be performed at every transition of care in which new medications are ordered or existing orders are rewritten [7].

King Faisal Specialist Hospital and Research Centre (KFSH&RC) is a tertiary care center located in Riyadh, the capital city of Kingdom of Saudi Arabia. It is a 894-bed medical institution that has been accredited by the Joint Commission International Accredited (JCIA) academic medical facility. KFSH&RC receives referrals from across the nation in multiple disciplines. It is well known in the fields of Oncology, Organ Transplantation, Cardiovascular Diseases, Neurosciences and Genetic Diseases.

Furthermore, KFSH&RC has well established training programs in multiple medical and allied health specialties [8].

One of the major departments at KFSH&RC is the Department of Pediatrics. There are more than ten sections with more than 44 physicians all delivering state of the art medical care as well as providing a friendly educational environment to trainees. Annually, the Pediatric department admits approximately 3000 inpatient cases and about the same number of outpatient cases.

From primary prevention to advanced tertiary care, the Department of Pediatrics provides up-to-date and state-of-the-art child health care [8]. The historical background of King Faisal Specialist Hospital in regard to medication reconciliations can be summarized as follows:

- 20 January 2010 – Medication Reconciliation functionality was available in the Cerner Millennium Integrated Clinical Information System (ICIS), an electronic patient records system used at KFSH&RC.
- Between 2010 and 2014, the ICIS Medication Reconciliation functionality proved to be non-user friendly and was not used due to this fact.
- In 04 September 2014, HITA improved this system and launched the Enhanced Medication Reconciliation, a much needed user-friendly version.

2. Objective

To improve the compliance of the medication reconciliation process at the time of admission to the Department of Pediatrics.

3. Materials and methods

We reviewed the medication reconciliation process at the Department of Pediatrics at KFSH&RC. Physician compliance for admission medication reconciliation documentation in ICIS ranged from (0–15%) between the first quarter of 2012 and the first quarter 2015, according to official audits completed by the Quality Management Department at KFSH&RC. The audit process starts by selecting a random representative sample from the total number of quarterly admitted patients. The target is to audit six charts per consultant, as applicable. The length of stay for the selected random sample of patients should be from 3 to 10 days (Table 1).

The “Improving Medication Reconciliation” working group was established by the Department of Pediatrics Quality Team to examine potential factors affecting non-compliance during the medication reconciliation process and to find solutions for improvement. The rationale of specifying only one department was twofold; by focusing on areas under our direct and daily control we could better understand the challenges faced by physician end-users.

The group was set to meet weekly to discuss and evaluate the implementation process. It consisted of the following:

- Quality Director of the Department of Pediatrics
- Residency Training Program Director
- Pediatric Consultant Staff representative
- Healthcare Information Technology Affairs (HITA) representative
- Quality Assurance Department representative
- Head nurses of the Pediatric Wards
- Pediatric resident representative
- A biostatistician

Most of the recent efforts at our institution to revamp the medication reconciliation process have failed (Table 1). Thus, the working group designed and implemented an innovative approach to improve medication reconciliation. This approach is twofold:

Table 1 Department of Pediatrics – medication reconciliation report.

Clinical documentation report 2012	Q1	Q2	Q3	Q4
Total number of charts reviewed	12	51	36	34
Admission Medication Reconciliation documented	0%	12%	15%	13%
Reconciliation on transfer documented (by the receiving physician)	na	50%	na	0%
Clinical documentation report 2013	Q1	Q2	Q3	Q4
Total number of charts reviewed	58	43	45	54
Admission Medication Reconciliation documented	6%	0%	0%	0%
Reconciliation on transfer documented (by the receiving physician)	100%	na	na	na
Clinical documentation report 2014	Q1	Q2	Q3	Q4
Total number of charts reviewed	43	52	34	40
Admission Medication Reconciliation documented	0%	0%	0%	5%
Reconciliation on transfer documented (by the receiving physician)	na	na	na	na
Clinical documentation report 2015	Q1	Q2	Q3	Q4
Total number of charts reviewed	36			
Admission Medication Reconciliation documented	0%			
Reconciliation on transfer documented (by the receiving physician)	na			

Compliance Rate: $\leq 75\%$ = Severe deficiency; 76%–89% = areas for improvement; $\geq 90\%$ = Compliant.

1. We formed a working group with multiple members from different support areas in the hospital; these focused efforts were planned to potentially give us more control over the process at the departmental level. This focused working group can be used as a model to lead the way and motivate other departments at KFSH&RC.
2. We designed and implemented an evidenced-based systematic method of improvement. The following steps were used to improve the process of medication reconciliation at our department; the effectiveness of some of these steps have yet to be evaluated [9]:
 - 2.1. We clearly defined the steps of the reconciliation process to the concerned parties during the focused educational sessions; in addition, a general introductory lecture was given to all staff before the focused sessions started.
 - 2.2. We clearly identified responsibilities for the process across the three disciplines generally involved: medical, pharmacy, and nursing.
 - 2.3. We defined an explicit time frame for the completion of the educational and close monitoring processes, which was 2 months starting June 1, 2015.
 - 2.4. We designed and provided educational sessions for the residents involved in the process.
 - 2.5. We carefully designed and implemented a monitoring process including close observation by three assigned consultants. We also trained a super-user and requested periodic audit reports by the HITA specifically made for this project.
 - 2.6. We obtained the support of Department of Pediatrics physicians and nurses.
 - 2.7. Finally, we obtained executive leadership support for our initiative. We were able to encourage the main players to actively participate in the design and implementation of our initiative.

Participating in this initiative was very challenging because providers were already burdened by clinical work. However, we were successful at obtaining full Department of Pediatrics executive leadership support for this program.

Our first step was to design and implement an education campaign through lectures and focused hands-on training for a group of no more than 5–6 residents. One super-user (a resident who was assigned to be the departmental reference to receive and handle any clarification from the end users in the department) was identified and trained intensively to assist the medical staff at all occasions.

A main part of the project was to closely monitor compliance with the process. A HITA representative with a nursing background was asked to provide reports on compliance every two weeks that were specifically tailored for and used by this project. These audit reports were based on a random electronically based screening process for all pediatric inpatients at different time periods.

Three consultants were asked to review these reports once received by the group and to nudge the residents/staff who relinquished their duties to try to improve their efforts.

Once nurses in the general Pediatrics Wards completed the nursing part of the medication reconciliation process, they reminded and encouraged physicians to complete the

reconciliation process, thereby supporting the medical part of the medication reconciliation process.

4. Inclusion criteria

All patients admitted to the Department of Pediatrics during the study period, i.e., June–July 2015, were eligible for this study.

5. Exclusion criteria

- Pediatric patients who were not cared for by the Pediatric Department
- In-patient transfers to the Department of Pediatrics

This project was reviewed and approved by a member of the Department of Quality Management at KFSH&RC.

6. Results

From 16 June to 12 July 2015, a major improvement in compliance with the medication reconciliation process had been noticed for the admitted patients in Pediatrics departments (Fig. 1). One member of the research group belongs to HITA and had no direct contact with the patients and had no influence on the residents performing the medication reconciliation; this member conducted four audits through ICIS. From 0 to 15% of physician compliance for admission medication reconciliation from first quarter of 2012 up to first quarter of 2015 (Table 1), we managed to improve this figure to 96%. As demonstrated in Table 2, there was a gradual marked improvement in the number of patients with completed medication reconciliation upon admission. For example, on the B1 floor, which is the major area of admission for Pediatrics, 57.6% of the total number

of patients had medication reconciliation performed for them in the first report from the 16th of June. In the July 12th report, this percentage improved to 92.4%. A similar improvement occurred in other pediatric areas, including the B3-1 (from 88.8% in the first report to 90% in the second), the NICU 1 (from 83.4% to 100%) and the NICU 2 (from 90% to 100%). For more details, please refer to Table 2. These findings indicate that most of the patients admitted to the Pediatrics floors had their admission medication reconciliation properly performed, and the trend increased gradually over time. This improvement places the Department of Pediatrics first among all hospital medical departments.

Despite our eminent success, we faced many challenges. For example, the distribution of patients in the B1 area, where other services admit their pediatric patients under their care, created conflict for the team and required extra work to exclude these patients from consideration. Another challenge was conducting the study in the B3-2 area, where pediatric patients represent a very small percentage, which required extra work from the team to identify and follow pediatric patients. The discrepancy among the types of patients between the wards may also have played a role in the discrepancy among the compliance rate for admission medication reconciliation. Finally, pediatric patients were admitted to other non-pediatric areas, and the study team had to extend extra efforts to track them.

7. Discussion

Improving the quality of patient care is the core aim of all healthcare institutions. One way to improve the quality of patient care is to have clearly written policies and procedures that regulate the working process; one of the hospital policies at KFSH&RC pertains to the need to complete medication reconciliations for all patients.

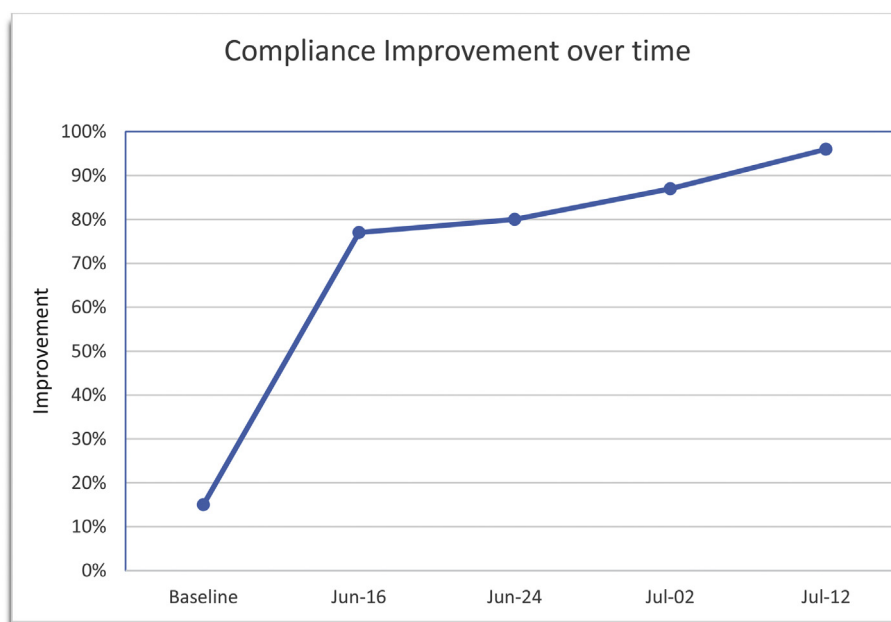


Figure 1 Admission medication reconciliation compliance improvement over the project time.

Table 2 Audit results from different areas within the Department of Pediatrics by the audit date.

Areas	June 16		June 24		July 2		July 12	
	Total	Completed	Total	Completed	Total	Completed	Total	Completed
	N	N (%)	N	N (%)	N	N (%)	N	N (%)
B1	26	15 (57.6)	27	22 (81.4)	22	20 (90)	13	12 (92.4)
B3-1	9	8 (88.8)	10	8 (80)	7	6 (86)	10	9 (90)
B3-2	1	1 (100)	1	1 (100)	7	3 (44)	2	2 (100)
NICU 1	18	15 (83.4)	13	10 (77)	14	14 (100)	14	14 (100)
NICU 2	10	9 (90)	10	8 (80)	11	9 (82)	8	8 (100)
Total	64	49 (77)	61	49 (80)	61	52 (87)	47	45 (96)

Unfortunately, physician compliance to the medication reconciliation process was very poor despite multiple attempts to make this process more user-friendly. Our aim at the Department of Pediatrics was to initiate the focused efforts of a core team of leader physicians with the support of other non-medical departments, such as HITA. In doing so, we expected to have more control over and the ability to monitor the medication reconciliation process. Once we succeeded in this attempt, we then expanded it to the whole hospital. Over two months of extensive, evidence-based efforts, including education and monitoring, we were able to significantly improve compliance during the medication reconciliation process at admission.

Due to our limited resources available for auditing, only medication reconciliation at the time of admission was audited by HITA. Further results will follow, including compliance at the time of transfer and discharge. As soon as the official hospital audit is released, we believe that this improvement will have a snowball effect that starts from one department and builds upon itself, becoming larger and capable of encompassing the whole hospital. Our success at this stage occurred due to many factors, including the clear commitment of the core team for improvement, the cooperation of our residents across the Department, the learning abilities and commitment of our staff as well as the full understanding of our research team of the need of medication reconciliation to improve the care of our patients.

This significant improvement in the overall compliance rate at admission can be explained by the initial very poor scores, which were mainly due to a lack of awareness by the majority of our staff regarding the importance of medication reconciliations rather than ignorance and technical difficulties, and once awareness was increased by education and close monitoring, stakeholder compliance improved.

8. Conclusion

The use of an evidenced-based initiative to improve medication reconciliation at admission, which relied on structuring intensive educational and monitoring programs, achieved a significant improvement in compliance. We predict that this initial local success will continue and will have a snowball effect that begins at our department and builds upon itself, becoming larger and eventually resulting in a hospital-wide improvement in compliance.

Conflict of interest

The presentation of the information that the authors are involved with promotes quality and improvement in health care and will not promote any specific business interest. The authors have declared that no conflict of interest exists.

Ethical approval

Approved for publication by the office of research affairs, in KFSH&RC with Publication Number: 2150209.

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