Global Journal of Management and Business Research: a Administration and Management
Volume 15 Issue 13 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Improving Patient Medical Record Organization in a Hospital Intensive Care Unit in Rwanda

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Methods

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GJMBR - A Classification : *JELCode : D24, D73*

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Improving Patient Medical Record Organization in a Hospital Intensive Care Unit in Rwanda

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Results

The satisfaction increased for physicians (P=0.004) and nurses (P=0.001). The time to locate clinical information decreased 50% (P=0.029). The hospital accreditation scores for the medical records-related standards increased 72% (P=0.026).

Discussion

The project demonstrates that a well-organized system can save time, increase staff satisfaction, and be an enabler toward achieving accreditation. Leadership support and staff cooperation are crucial and a thorough assessment, root cause analysis and planning are central to the success of the project.

Keywords: medical records, low income setting, hospital, quality improvement.

I. Introduction

A well-organized and comprehensive medical record is critical to high quality patient care. It can provide complete, accurate and easy access to diagnoses, treatments, results and care plans in chronological order, thus enhancing quality and efficiency of care [Green 2007, Medical Records and the Law 2008, Heller 2009, Dexter 2001, Medical legal aspects of medical records 2010, Wager 2013, Tierney 2001, Biondich 2003, Bleich 1985,Teviu2012]. Worldwide trend toward digitalizing medical records has spread to some resource-challenged settings [Teviu2012, Fraser 2007, Anokwa 2014, Lewis 2012, Piette 2012, Blaya 2010, Black 2011, Oh2005]; nevertheless, due to the lack of infrastructure, paper-based medical records will remain the norm in many settings.

Although medical records play a central role in the documentation and communication of critical patient care information among interdisciplinary health care professionals [Green 2007, Medical Records and the Law 2008, Heller 2009, Dexter 2001, Medical legal aspects of medical records 2010, Wager 2013, Tierney 2001, Mann 2003, Aziz 2002, Kerry 2006, Danquah1997], studies have indicated that medical record systems in low-income countries are lacking. In Ethiopia, only 14% of returning patients could locate their medical records and only 6.5% of medical records contained complete patient information [Wong 2009]. In Ghana, 30% of patients have multiple folders [Teviu 2012]. In Pakistan, only 39% of hospital departments recorded 75% or more required information [Aziz 2002]. Other medical records studies found similar problems such as duplication, incompleteness and inaccuracy of clinical information [Aziz 2002, Kerry 2006, Ali 2007]. However, many studies have shown that with relatively little investment from low-income country hospitals, an improved medical records management system can reduce the time to locate patient files, minimize file loss and reduce file duplication and thus cost [Teviu 2012, Wong 2009]. While many studies focused on the benefits of improving medical record systems in resource-limited countries [Teviu 2012, Aziz 2002, Kerry 2006, Wong 2009], few have examined the impact of changing the individual paper medical record's organization, structure and display once the basic system principles (unique medical record) are in place.

Accordingly, we sought to assess the impact of re-organizing the individual paper medical record on clinician time to access individual patient clinical information as well as on clinician satisfaction. We studied this issue in a government hospital in Rwanda as part of the Human Resources for Health (HRH) program. HRH is a national initiative to build Rwanda's health care workforce sponsored by USAID and directed by the Rwandan Ministry of Health [Binagwaho 2013].HRH uses a peer-mentorship model, partnering United States and Rwandese physicians, nurses and hospital managers to build capacity. Findings of this study can be helpful to policy makers, clinicians, and researchers seeking cost-effective ways to improve the efficacy of the individual paper medical record as a part of enhancing the availability of patient care data for improving both quality of clinical care and monitoring capability in low-income settings.

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II. Methods

a) Setting

In 2013, intensive care unit (ICU) staff in the largest referral and teaching hospital in Rwanda recognized that clinicians have difficulty locating and tracking information in the patient's file. In Rwanda, the inpatient medical record was a staple-bound paper booklet with no possibility to add extra or remove unused pages. Any information not included in the booklet, for example radiology reports, was either stapled to the booklet or inserted into the booklet loosely, making it almost impossible to keep the inserts in chronological order. Often, they became detached and/or lost. The bound booklet also made it time-consuming and challenging for clinicians to trend clinical information over time. ICU department physician and nursing leadership, in collaboration with Rwanda's Human Resources for Health (HRH) program [Binagwaho 2013] health management and nursing teams, redesigned the department's organization of individual patient files with the aim to reduce time to locate information in inpatient charts and improve clinician satisfaction.

b) Study Design and Sample

We used a pre- and post- intervention study to examine the accessibility of medical record information before and after the intervention, as well as to measure changes in physician and nurse satisfaction with the new medical record system. In February 2013, we conducted a staff satisfaction assessment and a time study related to accessing medical record information. Reevaluation was done in April 2013, two months after the intervention. All available physicians and nurses agreed to participate in the pre- and post- intervention time study. Specifically, four physicians and nine nurses working in the ICU participated in the pre-intervention time study and four physicians and six nurses in the post-intervention. Thirteen physicians and 18 nurses participated in the satisfaction survey pre-intervention and seven physicians and 12 nurses in the post-intervention. The survey was approved by the hospital IRB.

c) Intervention

A new inpatient medical record system was launched in the ICU in March 2013. The new system included two components: (1) Use a two-ring binder to organize the inpatient chart with divider tabs categorized into the following sections: Orders, Vital Signs, Progress Notes, Medications, Lab, Radiology, Consults, Nursing, ECG, Consent, Blood, Miscellaneous, (2) Design a set of standardized clinical forms. The standardized clinical forms included vital signs, physician orders, discharge summary and others specific to the ICU's clinical needs. The new binder format allows clinicians to record specific clinical information on corresponding standardized forms and insert the forms under the corresponding binder tabs. All similar information can be aggregated under one tab. For example, all patient vital signs are recorded on vital sign forms and placed under the vital sign tab. If a clinician desires to trend vital signs, all vital sign information can be found in one, clearly marked location. In January 2013, assessment, planning, preparation, and baseline measurements were completed. After training all ICU nurses and physicians, the official implementation was in March 2013, and a post-intervention evaluation was conducted in April 2013.

d) Data and measures

We used three measures to compare the pre- and post-intervention changes: physician and nurse satisfaction scores, time to locate information in the medical records, and accreditation assessment scores for 21 medical record-related standards.

Two satisfaction survey forms (Appendix 1 and 2) were created to capture physician and nurse opinions on the medical record. Each survey contains five questions. In Rwanda, although English has become the official language, many hospital staff continue to use French as their working language. In order to accommodate both English and French speakers, the questionnaires were translated from English to French and then back-translated to ensure translation accuracy. The physician survey included five items, each rated on a four-point scale of strongly agree, agree, disagree and strongly disagree. The items were: (1) I can find lab test results in the medical record, (2) I can follow the patient's progress in the medical record, (3) I can find the vital signs in the medical record, (4) I can find the medication administration detail in the medical record, (5) My written orders are usually followed. The nurse survey is identical to the physician survey except that question (5) is phrased as follows: I can find the physician's written orders in the medical record.

To track time for locating medical record, ICU physicians and nurses were asked to locate particular information in a randomly selected medical record and the time to do so was recorded by a HRH US faculty nurse who worked in ICU. Physicians were timed when asked to find the following five items: (1) date of lab ordered, (2) corresponding lab results, (3) the medication order, (4) what medication(s) patient is currently receiving, (5) the patient's last three days' temperature, heart rate and blood pressure. For nurses, they were timed when locating (1) physician's order two days ago, (2) if the order was filled, (3) the medication order, (4) whether the patient is currently receiving the ordered medications, (5) the patient's last three days' temperature, heart rate, and blood pressure. We conducted both satisfaction surveys and time studies during the clinicians' break time so the results would not be affected by their workload.

To measure the adherence with hospital accreditation standards, we used the average scores of 21 medical record-related standards from the Council for Health Service Accreditation of Southern Africa (COHSASA). The hospital is currently pursuing accreditation and has undergone both external and internal assessments over the past three years. The Council for Health Service Accreditation of Southern Africa (COHSASA) conducted an external accreditation assessment in 2010 and an independent consulting firm conducted an internal assessment using COHSASA standards in November 2013. Though COHSASA standards have been modified between 2010 and 2013, we identified and compared 21 medical record-related standards common to both 2010 and 2013 versions. The average scores of these 21 standards from the two baseline assessments were also used to assess changes in ICU (Appendix 3).

e) Data analysis

We employed the Wilcoxon Mann-Whitney test to assess the significance of pre- and post-intervention changes in all measures. All data analysis was conducted using SPSS v.17 statistical software using a significance level of $P<0.05$.

III. Results

There were 13 physicians and 18 nurses participated in the pre-intervention satisfaction survey and seven physicians and 12 nurses in the post-intervention satisfaction survey. There were four physicians and nine nurses participated in the pre-intervention time study; four physicians and six nurses participated in the post-intervention time study. We found the overall satisfaction scores increased significantly from the pre-intervention to the post-intervention time for physicians (29% increase, $P=0.004$) and for nurses (31% increase, $P=0.001$). The overall time for physicians to locate clinical information significantly decreased from 348 to 173 seconds (50% decrease, $P=0.029$). The overall time for nurses to locate clinical information decreased by from 79 to 62 seconds (22% decrease), although the change was not statistically significant (P-value $=0.195$). The COHSASA accreditation scores for the medical records-related standards increased from 47 to 81 (72% increase, $P=0.026$). Results are summarized in Table 1.

IV. Discussion

We found our new medical record format significantly improved clinician satisfaction and significantly reduced the time required for physicians to locate clinical information. We also found a significant improvement in adherence to the COHSASA standards. The implementation cost less than five US dollars per patient bed and required two months preparation to prepare materials and staff training.

Introducing the two-ring binder with divider tabs created an easy solution for clinicians to add extra clinical documents to the patient file in an organized and chronological fashion. As a result, clinicians were able to find and trend clinical results more easily. This is likely to improve quality of care. The intervention also involved creating some standardized clinical forms. The standardized documentation not only allowed easy filing but also provided visual prompts to remind clinicians of important information such as date, time, signature/stamp. For example, with easy access to clinical information and physician orders, nurses can more easily develop or change their nursing care plans accordingly.

Proper medical record management is an important but often overlooked component in facilitating high quality care in hospitals. Many hospital accreditation efforts involve medical record auditing to prove implementation of a policy or guideline. An organized medical record provides an easy medium for clinicians to record and to retrieve clinical information. It also helps auditors search for evidence of compliance. The significant increase in the ICU unit's COHSASA score (2010 vs. 2013) is positive confirmation of the value of the intervention.

A few key lessons were learned during the implementation process. First, unit leadership support is crucial. Without the interest and support of the physician head of department and the nurse in-charge, the project would not have been conceived or implemented. In addition, because all unit staff (physicians, nurses, others) use the medical record daily, their full cooperation is crucial. The ICU staff identified the problem, initiated the conversation with HRH staff and eventually generated interest among the ICU physicians and nurses. We also engaged the involvement of hospital administrators to ensure the hospital supported the project.

Second, thorough assessment, root cause analysis and planning are central to the success of the project. The ICU identified and defined the problem and agreed on an objective. A detailed root cause analysis helped the working team to clearly understand the issues and gaps. A well-planned intervention, with input from physicians and nurses who use the medical records on a daily basis, ensured participation and buy-in.

Third, change management is important. The project met some resistance prior to and during implementation. Some staff members had been using the previous medical record for a long time and were hesitant to change. Clinical staff also raised concerns that the new ICU chart system would deviate from the records used throughout the rest of the hospital. Addressing these concerns required reassurance, support and creativity among the project team as well

as support from hospital leadership. Specifically, we frequently met with all involved staff in the ICU either via group or individual meetings to ensure their understanding of the project as well as to address their concerns. We also engaged hospital administrators to ensure that the hospital permitted the ICU to use a medical record organizing format different from the rest of the hospital. In addition, an HRH nurse mentor from the project team was stationed in the ICU and met regularly with the staff for supervision, reinforcement and real-time problem solving to maximize the continuity and sustainability of the project.

We acknowledge the limitations of our study. The sample size in this study was small and limits the statistical power. The ICU only has five beds and a small number of staff; however we did include all available ICU physicians and nurses in the time study and satisfaction survey. In addition, our study was limited to a single organization. Results may differ in other settings. A long term follow up is needed to assess long term sustainability.

In order to scale-up this project from ICU to other units of the hospital, a proper hospital-wide assessment of likely challenges is needed. Developing innovative strategies to prioritize project scale-up given the hospital's limited financial resources is also necessary. Engaging and mobilizing wider hospital and departmental leadership support is crucial.

The project in the ICU at the referral and teaching hospital in Rwanda demonstrates that a well-organized individual paper medical record system can improve access to patient information, which supports clinical care delivery. Using the new medical record system reduced the time to retrieve clinical information and increased staff satisfaction. It is also an important enabler toward achieving accreditation.

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Table 1 : Summary of results of satisfaction survey, time to locate clinical information and accreditation scores

Satisfaction survey	Mean Score (1 worst - 4 best)	Pre	Post	Change	p-value
Physician	Sample size (n)	13	7	-	-
	I can find lab test results in the MR	2.8	3.7	34%	0.001*
	I can follow the patient's progress in the MR.	2.8	3.7	34%	0.004*
	I can find the vital signs in the MR.	2.8	3.6	29%	0.102
	I can find the medication administration detail in the MR.	2.9	3.6	22%	0.176
	My written orders are usually followed.	2.8	3.6	26%	0.036*
	Overall	14.1	18.2	29%	0.004*
Nurse	Sample size (n)	18	12	-	-
	I can find lab test results in the MR.	2.1	3.7	74%	<0.001*
	I can follow the patient's progress in the MR.	2.5	3.5	42%	0.004*
	I can find the vital signs in the MR.	3.2	3.3	2%	0.902
	I can find the medication administration detail in the MR.	3.1	3.6	17%	0.052
	I can find the physician's written orders in the MR.	3.2	3.8	21%	0.003*
	Overall	13.9	17.6	31%	0.001*
Time study	Mean time (Second)	Pre	Post	Change	P-value
Physician	Sample size (n)	4	4	-	-
	Time to find out date of lab ordered	92	41	56%	0.083
	Time to find out corresponding lab results	55	12	78%	0.034*
	Time to find out the medication order	31	38	-21%	0.468
	Time to find out patient is currently receiving the ordered meds	115	63	45%	0.248
	Time to find out the last 3 days' temp, HR, and BP	55	19	66%	0.058
	Overall	348	173	50%	0.029*
Nurse	Sample size (n)	9	6	-	-
	Time to find out physician's order 2 days ago	38	28	26%	0.237
	Time to find out if the order was filled	14	10	29%	0.398
	Time to find out the medication order	7	8	-14%	0.901
	Time to find out patient is currently receiving the ordered meds	5	5	0%	0.747
	Time to find out the last 3 days' temp, HR, and BP	6	5	17%	1.000
	Overall	79	62	22%	0.195
COHSASA score		(2010)	(2013)	Change	P-value
Average scores of 21 medical record-keeping standards		47	81	72%	0.026*

** Statistical significance at P-value = 0.05*

Appendix 1

Physician satisfactory survey

	With great difficulty	With difficulty	Easily	Very easily
I can find lab test results in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can follow the patient's progress in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can find the vital signs in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can find the medication administration detail in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
My written orders are usually followed.	☐[1]	☐[2]	☐[3]	☐[4]

Appendix 2

Nursing satisfaction survey

	With great difficulty	With difficulty	Easily	Very easily
I can find lab test results in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can follow the patient's progress in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can find the vital signs in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can find the medication administration detail in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]
I can find the physician's written orders in the medical record.	☐[1]	☐[2]	☐[3]	☐[4]

Appendix 3

21 medical record keeping COHSASA standards (common to both 2010 and 2013)

1.	The author can be identified for each patient record entry.
2.	The date of each patient record entry can be identified.
3.	The time of each patient record entry can be identified.
4.	Each patient admitted has an initial assessment that meets organizational policy.
5.	The initial assessment includes health history.
6.	The initial assessment includes physical examination.
7.	The initial assessment includes psychological assessment, where applicable.
8.	The initial assessment results in an initial diagnosis.
9.	The initial assessment results in the identification of the patient's medical, nursing or other healthcare needs.
10.	Assessment findings are documented in the patient's record and are readily available to those responsible for the patient's care.
11.	The planned care is provided and noted in the patient's record.
12.	All procedures and diagnostic tests ordered and performed are written into the patient's record.
13.	The results of procedures and diagnostic tests performed are available in the patient's record.
14.	Re-assessments are documented in the patient's record.
15.	Adverse Drug Reactions (ADR) are observed, recorded and reported through a process and within a time frame defined by the organization.
16.	The medications prescribed for and administered to each patient are recorded.
17.	When a patient is transferred to another organization, the receiving organization is given a written summary of the patient's clinical condition and the interventions provided by the referring organization.
18.	A copy of the transfer summary is available in the patient record.
19.	The healthcare organization agreeing to receive the patient is noted in the patient's record.
20.	A discharge summary, which includes at least items a) to g) in the intent statement, is written, by the medical practitioner when each patient is discharged.
21.	Each record contains a copy of the discharge summary.