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Performance improvement through proactive risk assessment: Using failure modes and effects analysis

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Abstract

Introduction:

Cognizance of any error-prone professional activities has a great impact on the continuity of professional organizations in the competitive atmosphere, particularly in health care industry where every second has critical value in patients' life saving. Considering invaluable functions of medical record department — as legal document and continuity of health care — "failure mode and effects analysis (FMEA)" utilized to identify the ways a process can fail, and how it can be made safer.

Materials and Methods:

The structured approach involved assembling a team of experts, employing a trained facilitator, introducing the rating scales and process during team orientation and collectively scoring failure modes. The probability of the failure-effect combination was related to the frequency of occurrence, potential severity, and likelihood of detection before causing any harm to the staff or patients. Frequency, severity and detectability were each given a score from 1 to 10. Risk priority numbers were calculated.

Results:

In total 56 failure modes were identified and in subsets of Medical Record Department including admission unit dividing emergency, outpatient and inpatient classes, statististic, health data organizing and data processing and Medical Coding units. Although most failure modes were classified as a high risk group, limited resources were, as an impediment to implement recommended actions at the same time.

Conclusion:

Proactive risk assessment methods, such as FMEA enable health care administrators to identify where and what safeguards are needed to protect against a bad outcome even when an error does occur.

Keywords: Hospital, medical record department, quality improvement, risk assessment, risk management

INTRODUCTION

Most businesses nowadays are more inclined to use risk management methods to protect themselves against increased risk aroused from issues such as competition, customers expectancy levels and

changeable situations.[1,2] "Failure mode and effects analysis (FMEA) is a proactive, team based, and systematic approach to know how a process can fail, and how it can be prevented. Its use as a form of industry assessment now has expanded to the health care system"[3] is called healthcare failure modes and effect analysis (HFMEA) — a qualitative method to explore risks to the patient in a specified process and amend potential errors prior to bad outcome occurrence.[4] Moreover, it may be used to detect probable errors reducing the quality level of rendered services throughout the hospital. Contrary to the most of the quality improvement tools, this one does not need sophisticated statistical analysis. FMEA studies could support organizations to improve processes as well as decline potential liability of a less than optimal process.[5]

The head of Medical Records Department should utilize management principles as well as his or her professional experience to guide and control staff activities,[6] most importantly identifying potential problems in the department.[7] One of the critical errors in medical record department is misfiling of a record.[8,9]

In this paper, we used similar studies to reinforce our research. For example, Tilburg *et al*. (2004) used FMEA as a Useful Proactive Risk Analysis tool in Health services, specifically in a Pediatric Oncology Ward, assembled a multidisciplinary team consisting of a team leader, pharmacy, nursing and medical staff and a patient's parent in a pediatric oncology ward.

They made a flow diagram of prescription and administration of chemotherapy. Then, they were identified and evaluated potential failure modes of this process through using a hazard scoring matrix. They found 61 failure modes of which 14 out of them were classified as a high-risk failure mode. Additional recommendations were made concerning non-high -risk failure modes. Most of the recommendations were picked up by the hospital management. The whole processes took seven meetings. Ultimately, they concluded that the systematic approach of HFMEA by a multidisciplinary team is a useful method for detecting failure modes.[10]

Rosmin *et al*. (2004) also used HFMEA to review the process and conditions surrounding the ordering and administration of potassium chloride (kcl) and potassium phosphate (kpo_4) in the intensive care unit in Calgary Health Region (CHR).

Upon further investigation, it was determined that pharmacy technicians in the central production facility of the CHR pharmacy department prepared a dialysis solution for patients receiving Continious Renal Replacement Trapy (CRRT). During the process, kcl was inadvertently added to the dialysis bags instead of sodium chloride (Nacl) solution. According to those findings, they concluded that by changing preparation, manufacturing, labeling and storage procedures for intravenous potassium products, the risk of errors has been drastically reduced.[11]

Similar studies such as Brinn and Lucas (2005), Dominici *et al*. (2005), Yarmohammadian *et al*. (2007) and Burgmeier (2001) also confirmed benefit of FMEA model in reducing risk.[12,13,14] In the globe, According to Thornton *et al*. "HFMEA has been used in the setting of drug ordering, sterilization of surgical instruments and reduction of tubing misconnection as well as in the radiology department."[15] Medical records department as a custodian of health information of any clients or patients encountered to health-care settings is a focal point of monitoring and evaluating every activity performed by health-care staff, and it would support them whenever health centers face lawsuits. Considering most important functions of the medical record department, "Failure Mode and Effects Analysis" utilized to identify the ways of a process can fail, and how it can be made safer.

MATERIALS AND METHODS

The study was aimed to observe and draw the procedural diagrams of any work flows of all processes conducted in medical records department using Visio software. Twelve diagrams were drawn and afterwards implemented the structured approach in assembling a team of experts, employing a trained facilitator, introducing the rating scales and process during team orientation and collectively scoring failure modes. The group brainstormed both failures and their effects. An example would be the failure of "misfiling records" with the effect that the misfiled record will be missed forever. The probability of the failure — effect combination was related to the frequency of occurrence, potential severity, and likelihood

of detection before causing any harm to the staff or patients. Frequency, severity and detectability were each given a score from 1 to 10. Risk priority numbers (RPNs) were calculated as the product of Frequency, severity and detectability scores. Failure mode scores could range from 1 to 1000.

According to the HFMEA guidelines, a team was assembled with 13 regular members and 2 advisors.

A focus group was assembled through a purposive sample of various key informants such as admission, filing clerks, coder, statistician, medical record administrator and hospital administrator in order to include a diverse range of activities and perspectives. Focus group sessions were led by an experienced moderator at the hospital and faculty and were tape recorded. Researchers created a series of detailed process maps of medical record department that documented the flow of information from admitting a patient in ambulatory, emergency or inpatient departments to record keeping. Thematic analyses were used to elicit barriers to effective performances of the department.

Data were analyzed through reviewing, summarizing and associating data to relevant categories using FMEA worksheets. Data were finally recorded in the final forms. To enhance the data quality, member checking was undertaken.

FINDINGS

On the whole, 56 failure modes in Medical Record Department were identified and all RPN scores were calculated and sorted in ascending manner according to 4 units [Table 1].

Most of the failure modes of medical records department were related to processes performed in the admission unit [Table 2]. This emphasized that more the people involved in focus group discussion more failure modes would be recognized, in spite of the presence of experienced personnel and having a relevant academic training professional position. Although most failure modes were classified as high-risk level, limited resources were used to implement the proposed actions synchronously. So, administrator's opinions in emendation failure modes were addressed consequently, based on 5 criteria including power of execution, needed time, required manpower, financial resources and administrator's advocacy. According to this table, all the recommended actions in filing unit were enforceable. Thereafter, failure modes were prioritized in separation of each unit then area charts were drawn to determine severity, occurrence and detectability levels (see Area charts 1–4) and eventually presented them to administrators for their definitive comments.

Chart 1 shows that 96% out of all failure modes in admitting unit were classified in high-risk category and the other were in moderate class.

Chart 2 indicates that, all of the failure modes in filing unit were classified in high-risk category.

Chart 3 shows that, all of the failure modes in coding unit were classified in high-risk category.

Chart 4 indicates that all of the failure modes in statistics unit were classified in high-risk category.

DISCUSSION

The findings indicated that most of the 56 identified failure modes in medical records department would be managed through conducting on-site training courses for medical records personnel, Clinic secretaries and medical staff, and some of them were controllable compiling to administrative guidelines. Inter-departmental coordination was another amendatory action applied to treat the weaknesses using such a proactive and group-based technique either enhance the accuracy of processes or endeavor to eradicate infirmities. Furthermore, these findings indicated implementation of such technique required advocacy of hospital executive managers. The results of the study are in line with Tilburg's findings. Therefore, the present study asserts the aforementioned theory in that study cited “strong support from the hospital management is needed.”[10]

CONCLUSION

Top Managers in medical records department could play an active role in compilation of documentation of procedural guidelines and managing training courses rather than inter-departmental coordination. It seems that education and compiled guidance are subsidiary.

Proactive risk assessment methods, such as FMEA, enable health care organization to identify where and what safeguards are needed to protect against a bad outcome even when an error does occur. On the whole, proactive methods aid organizations to get fewer written complaints and more customers and cutomers satisfaction.

Footnotes

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Figures and Tables

Table 1

Unit	High score	Low score
Admission	640	84
Data organizing	576	56
Coding	192	8
Statistics	490	490

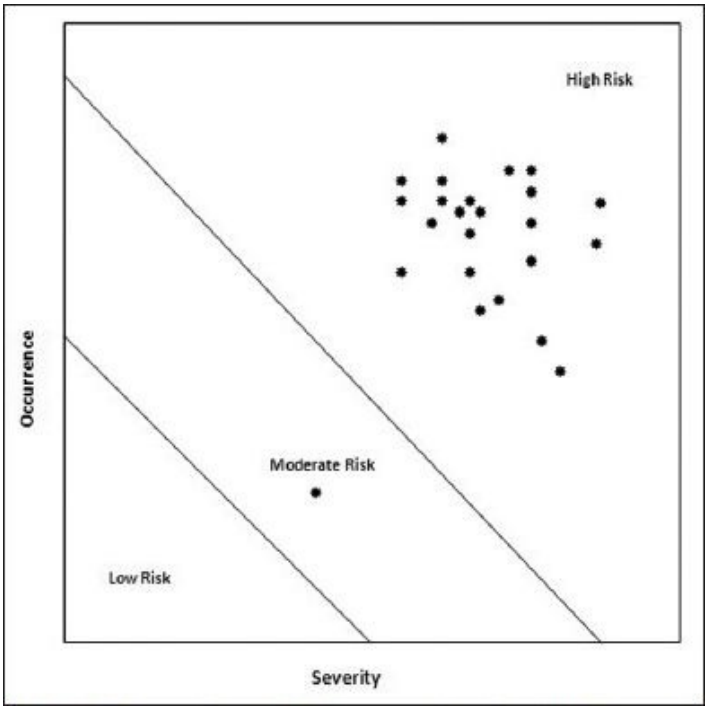
The highest and lowest scores of risk priority number of failure modes per quadruple units

Table 2

Unit	Frequency of failure modes	Risk level (area chart)			Priority (administrator's opinion)			
		High %	Moderate %	Low	1st %	2nd %	3rd %	None %
Admission	24	96	4	—	17	25	21	37
Filing	17	100	—	—	41	35	24	—
Coding	12	100	—	—	8.3	8.3	58.4	25
Statistics	3	100	—	—	—	34	34	32
Sum	56	99	1	—	17	26	34	23

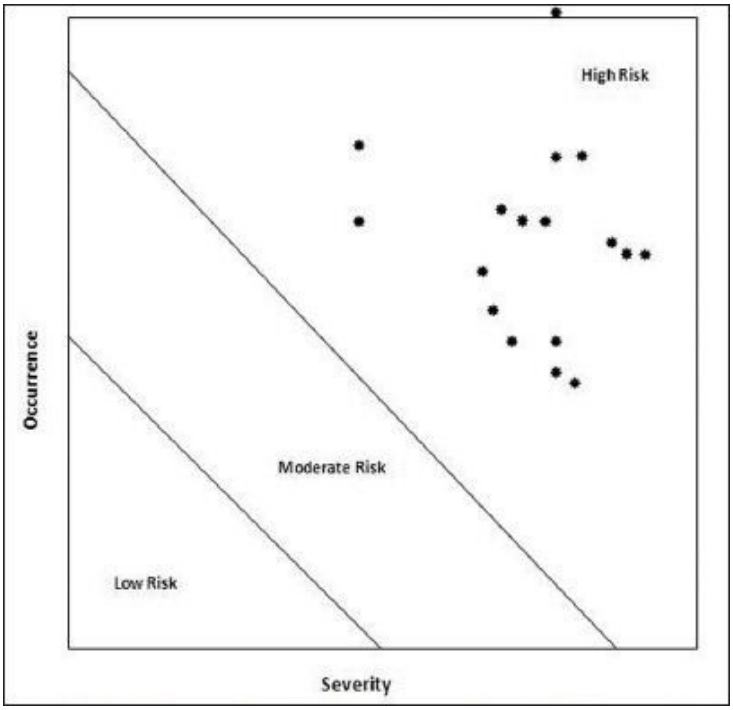
Decision making about implementing recommended actions to control, reduce and omit failure

Chart 1



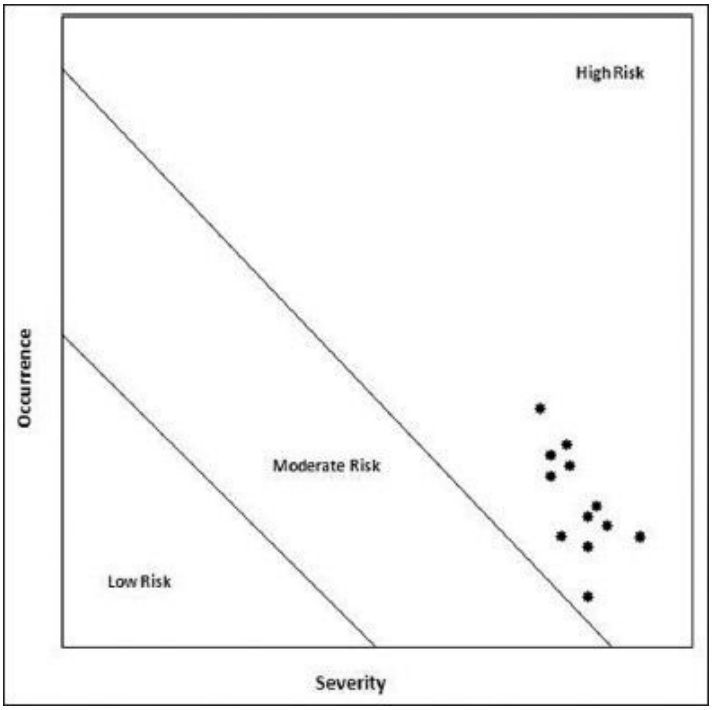
Area chart of failure modes in admission unit

Chart 2



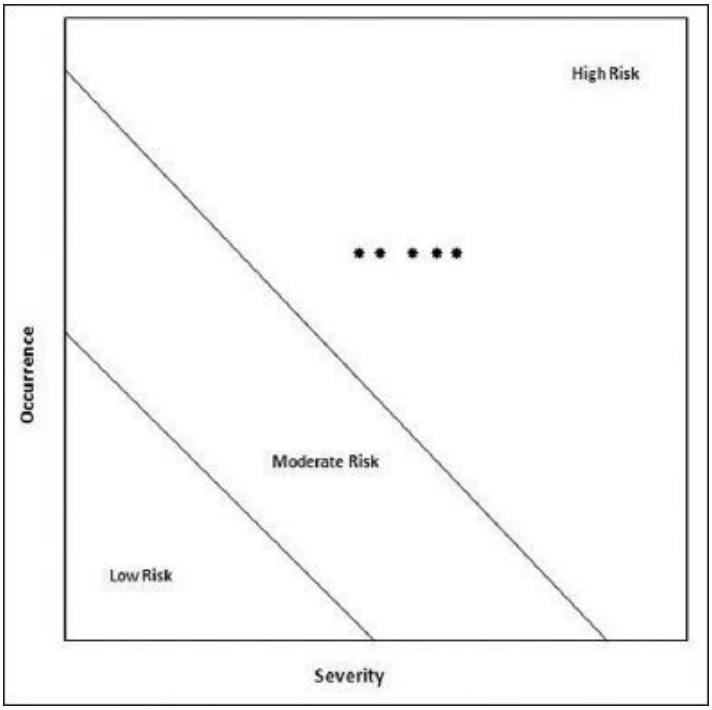
Area chart of failure modes in filling unit

Chart 3



Area chart of failure modes in coding unit

Chart 4



Area chart of failure modes in statistic unit