

The 5M Method as a Tool for Enhancing Hospital Risk Management and Patient Safety

طريقة 5M كأداة لتعزيز إدارة المخاطر وسلامة المرضى

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Abstract:

This research aims to highlight the importance of (5M) method in reducing risks and finding solutions to the problems faced by MEFTAH hospital. To address this issue, we adopted a descriptive approach to present the literature of the study, in which we discussed various concepts related to the study variables. To carry out the practical aspect, we conducted an interview with the hospital's administrative staff and applied the risk management method. As a results we reached through this study is that there are risks with a criticality index reaching 20. As recommendations for the study, a strong risk management system should be established, based on the application of various risk management methods, and it is necessary to conduct training courses in the field of risk management to mitigate them, as well as to improve the quality of services provided by the hospital.

Keywords: : risk, risk management, healthcare.

Jel Classification Codes : H22;H12 ; I1O

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introduction:

Medical errors and hospital-acquired infections have drawn a lot of attention to hospital risk management, particularly in recent years. Although the goal of healthcare interventions is to help people, they can also be harmful. Errors in healthcare and patient safety have grown to be serious issues. Identifying possible hazards and analyzing them in order to put a suitable strategy in place to reduce these care-related risks is an inevitable goal of effective risk management. Since these mistakes result in large losses and expenses, identifying possible risks and evaluating them in order to create a suitable plan to reduce them are essential components of good risk management. And based on that we proposed the problematique:

How can the 5M method improve risk management and patient safety in hospitals?

And in order to answer this problematique we have these hypothesis:

Hypothesis 01: nosocomial infection is a major risk in healthcare services

Hypothesis 02: Utilizing the 5M method in risk management leads to improved prevention strategies and patient outcomes

Study objectives:

- to determine and examine any hospital process failure modes that might have an adverse effect on operational effectiveness and patient safety.
- to assess how well the 5M approach works in hospital settings to lower risks and enhance healthcare quality.
- to provide useful advice on how hospitals can incorporate the 5M approach into their quality control and risk management procedures.

Importance of the study:

- empowering risk management system in hospitals and adopte more effective methode to reduce risks.
- improving healthcar quality services for patient
- improovig risk management process in hospitals

Methodology:

we adopted a descriptive approach to present the literature of the study, in which we discussed various concepts related to the study variables. To carry out the practical aspect, we conducted an interview with the hospital's administrative staff and applied the risk management method(5M) within the institution.

Limits of study:

Spatial limits: MEFTAH hospital

Human limits: managers and administration staff

Tomporal limits: 2022 may to jully

I-Risk concepts and definitions:**I-1Risk definition:**

We can find different difinition of the risk concept: (Hopkin, 2010, pp. 15,16)

The Oxford English Dictionary defines risk as "a chance or possibility of danger, loss, injury, or other adverse consequences," while "at risk" refers to being exposed to danger. In this usage, risk refers to undesirable effects.

However, taking a risk can lead to a great consequence. A third view is that risk is linked to

ambiguity about outcomes.

Consider the example of having a car. Owning a car allows for more mobility and benefits. Owning an automobile involves uncertainties such as upkeep and repair costs. Finally, motor vehicles may be involved in accidents. There are clear bad repercussions that can occur. It's crucial to remember the legal requirements and road laws when driving an auto, Risk is defined as the "effect of uncertainty on objectives" in ISO Guide 73, an international guide to risk-related terminologies. This term is difficult to apply to daily life and seems to presume a certain amount of risk management expertise.

According to the Institute of Internal Auditors (IIA), risk is the possibility that something will happen that could affect the accomplishment of goals. According to the IIA, risk is quantified in terms of likelihood and effects. The term "risk" is defined significantly differently by different disciplines. Health and safety experts define risk as a mix of scale and likelihood, however this may not be adequate for broader risk management objectives.

Managers said that risk is characterized as "any uncertainty or hazard that the organization needs to recognize, assess, and control in order to safeguard its material and immaterial assets and meet the goals outlined in its strategy." (Marmuse & Montaigne, 1989)

I-2- Risk Mapping:

Companies must deal with a wide range of risks, and risk mapping has emerged as the most effective risk management tool. Risk mapping is a concise, visible, and very explicit tool that can provide an unparalleled boost to risk management in businesses during its design and implementation. Implementing such a strategy necessitates previous contemplation on the method and approach to be employed. Risk mapping ranks risks in order of priority and evaluates risk scenarios. (Pourel, Meyrieux, & Perrin, 2016, p. 5)

It depends on significant variables:

Frequency:

Frequency is a metric of occurrence that expresses how many times an event occurs in a certain time period. It seeks to establish whether this risk occurs "often" or "rarely." In general, frequency is determined by reviewing the process (the frequency of the risk-generating activity) and the service's history (data from prior years). (Hurtrel, Beretz, Renard, & Hut, 2012, p. 48)

Severity:

The identification of effects has made it possible to define the severity of complaints regarding "quality of service" for example: (the level of pharmaceutical delivery as perceived by investigators, healthcare units, or promoters) and "safety of operation," or patient therapeutic safety within the framework of clinical trials. (Hurtrel, Beretz, Renard, & Hut, 2012, p. 48)

Detectability

We considered the detection or non-detection possibilities for each failure. Increased detectability leads to higher system security. Detectability was rated as "important" when a control point was integrated into the process, either automatically (e.g., temperature control of refrigerators via recording and alarm linked to the security post) or manually (e.g., systemic or periodic control). It was rated as "low" when there was no control point or the point was uncontrollable. (Hurtrel, Beretz, Renard, & Hut, 2012, p. 49)

Criticality

This is equivalent to combining the risk's severity and chance of occurrence. It is a two-dimensional measure calculated by adding the severity and frequency of the feared occurrence (often their product). $C = F * S$ (Hurtrel, Beretz, Renard, & Hut, 2012, p. 49)

I-3- Risk Classification:

Risk mapping is generally divided into four (4) main categories:(Desroches, Leroy, & Valle, 2006, pp. 65,66)

Low frequency and low severity risks:

These are infrequent dangers with mild and limited implications. This danger causes no concerns for the corporation, which can thus bear it without anxiety. These dangers are classified as "minor risks."

Low frequency and high severity risks:

These are dangers that occur infrequently but have serious consequences. Because of their low frequency, the organization is unable to predict or anticipate their appearance. These risks are devastating for the company and are referred to as "catastrophic risks."

High Frequency, Low Severity Risks:

These dangers occur regularly and have little repercussions. The organization can easily predict and, in some cases, efficiently handle them.

High Frequency and Severity Risk:

These dangers occur frequently and have major consequences. In this instance, they need immediate attention and aggressive management to reduce their damage.

Examples According to Risk Classification

Low Frequency

- Low Severity: Minor Risks (1)
- High Severity: Catastrophic Risks (2)

High Frequency

- Low Severity: Operational Risks (3)
- High Severity: Avoidance (4)

II-. Helthcare risk management concepts:

II-1Risk management hisory:

Risk management is a relatively new company role. Historical milestones provide insight into its evolution. Modern risk management began after 1955. Financial risk management has seen significant evolution since the early 1970s. Risk management no longer solely focuses on market insurance coverage, but also includes other protective measures. After World War I, Large enterprises with diverse physical asset portfolios developed self-insurance to cover modest risks as effectively as insurers. Self-insurance protects against financial losses resulting from unfortunate events or accidents. Self-insurance entails setting up a liquid reserve to cover losses from accidents or market fluctuations. Risk mitigation is a type of self-insurance that reduces the financial impact of natural disasters.(Dionne, 2013, p. 149)

Self-protection practices have also grown increasingly significant. This activity predicts potential losses or costs. This can also impact the allocation of losses before they occur. Accident prevention is the most natural way to protect oneself. Precaution is a self-protection strategy for uncertain situations with unknown probabilities and financial implications. A pandemic is one such event. The management of risk encompasses all protection and preventative activities.(Courbage, Rey-Fournier, & Treich, pp. 185-204)

In the 1970s, financial risk management became a priority for companies like banks, insurers, and other businesses exposed to price changes, including interest rates, stock market returns, exchange rates, and commodity prices.(Dionne, 2013)

II-2- Helthcare risk management definition:

The worst-case scenario at an installation should not have repercussions beyond specific bounds, according to consequence-based safety management, which designs safety systems to ensure this. This is one of two possible safety management philosophies. According to risk-based safety management, also known as risk management, the remaining risk should be examined in light of the hazard's type and probability in order to provide information for additional risk reduction. This suggests that extremely improbable occurrences may be accepted, but not always. Risk management is a well-established instrument with numerous published standards and guidance manuals. It is crucial for effective management and decision-making at all organizational levels. Every department in a business manages risk, whether consciously or unconsciously, with varying degrees of rigor and systematicity. Environmental, public health, and safety departments tend to have more stringent risk management practices. (Berg, 2010, p. 80)

Hospital hazards are the dangers that a patient faces in a hospital setting, which can be attributed to organizational failures, noncompliance with professional best practices, or even patient-related concerns. (Desroches, Leroy, & Valle, 2006, p. 497)

II-3- Risk management process:

Risk management process contains the following steps : (Brault, 2013, pp. 16,17)

a. Identify the risk and establish the context:

Define potential risks or possibilities, their scope, context (social, cultural, data from science, etc.), and connected issues.

b. Assess key risk areas:

Determine the kinds or categories of hazards that need to be handled, as well as significant local and organizational challenges, by analyzing the operational environment assessment's context and findings.

c. Measure probability and impact:

Determine your level of exposure to identified hazards, including their probability and impact, and select the necessary instruments. Examine empirical data as well as the public context.

d. Prioritize risks:

Rank the risks considering risk tolerance, using existing criteria or tools, or developing new ones.

e. Establish outcomes:

Establish the goals and anticipated results for the risks that have been prioritized, both in the short and long term.

f. Choose a strategy:

define a strategy and apply decision criteria that are results-oriented and based on problems or opportunities.

j. Implement the strategy:

Develop a new and good strategy to deal with risks

h. Monitor, evaluate, and adjust:

Gain knowledge of and enhance risk management and decision-making procedures both inside and between functional units. Utilize metrics for measuring efficacy and provide performance and result reports.

III-Case study:

After conducting interviews with the medical and administrative staff in the hospital, as well as using a checklist, we concluded the most common risks they are exposed to, we summarized them in the following table:

Table n°1:Preliminary list of risk

Initial Risk list
prolong reaction times and intensify the situation, sometimes endangering life.
Absence of some equipments and Defective Materiels
unDisplay of Safety Instructions
Patient Nosocomial infection
Spread of Airborne Infections
worsening or decline in a patient's health that could lead to death

Source: established by the authors

III-1-Initial risks in MEFTAH hospital:

Result interpretation:

- prolong reaction times and intensify the situation, sometimes endangering life, that risk concerns the lack of documentation in hospitals which make it difficult to improve quality.
- Absence of some equipments and Defective Materiels, based on the check list and interview we can say it is an important risk to deal with because almost every hospital in Algeria faces that risk.
- unDisplay of Safety Instructions, that risk is one of the risks that we have found based on our interview and check list it comes from the non respect of safety instructions.
- Patient Nosocomial infection is one of the daily risks that hospitals face, it is the patient gets contaminated while getting health services.
- Spread of Airborne Infections is the patient gets infected from each other because of the bad circumstances such as the overcrowding of room which we conducted it also from our list check.
- worsening or decline in a patient's health that could lead to death is getting wrong information about the patient status which can make his health worse.

III-2- Risk assessment frameworks/grids:

In order to identify each risk's criticality and making risk mapping or risk matrix we have the following grids:

Table n°2:grid of frequency

Frequency	
5.Verry likely	One time per week
4.likely	One time per month
3.occasional	One time per quarter
2.rare	One time per semester
1.Verry rare	One time per year

Source: established by the authors based on hospitals documents

Frequency scale from 1 to 5it represents how many times an event occurs in a certain time period

Table n°3: grid of severty

Severty	
5.Catastrophic	unachieved goals more than 80%
4.Major	unachieved goals between 60%and 80%
3.Moderate	unachieved goals between 40% and 60%
2.Minor	unachieved goals between 10% and 40%
1.Insignificant	unachieved goals less than 10%

Source: established by the authors based on hospitals documents

Severty can be identified by the achieved goals or in another werd it can be identified by the services quality.

Table n°4:risks matrix

Serverty\Frequeunc	1.very rare	2. rare	3.occasioal	4.likely	5.Verry likely
5.Catastrophic	5 (Low Risk)	10 (High risk)	15 (High Risk)	20 (High Risk)	25 (Critical Risk)
4.Major	4 (Low Risk)	8 (Mediu m Risk)	12 (Medium risk)	16 (High Risk)	20 (Critical Risk)
3.Moderate	3 (Low Risk)	6 (Mediu m Risk)	9 (Medium Risk)	12 (Medium risk)	15(High Risk)
2.Minor	2 (Low Risk)	4 (Low Risk)	6 (Medium Risk)	8 (Medium Risk)	10(High Risk)
1.Insignificant	1 (Low Risk)	2 (Low Risk)	3(Low Risk)	4(Low Risk)	5 (Low risk)

Source: established by the authors based on hospitals documents

Interpretation:

The risk matrix is commonly used in healthcare facilities to standardize risk grading and provide visual representations of event probability and consequences. This provides a clear insight of how these two aspects impact overall risk, allowing stakeholders to discuss the highlighted issues. (Alam, 2016, p. 19221)

$$\text{Criticality (C)} = \text{Severty (S)} * \text{Frequency(F)}$$

Criticality:

After detecting risks, we must calculate their criticalities using the formula:

$$C = S \times F$$

Where:

- C: Criticality
- S: Severity (scale from 1 to 5)
- F: Frequency (scale from 1 to 5)

The green zone (1- 4), low risk means that the risk has no effect on the process and we can remove it from the risk liste because we can say it has no harm.

The orange zone (5- 12), medium risk means that this risk has an effect on the prossen so we have to take it in consederation treat it and try to minimise it so we can't remove it from the risk list like the previous one but we should pay attention to it.

The red zone (15- 25), high risk this zone has the major risks whit high severty so that risk should be on the top of the risk list and it should be dealed with in first.

Table n°5: Risk Ranking according to its criticality

Risk	criticality
Patient Nosocomial infection	20
Absence of some equipments and Deffective Materiels	16
inconsistent security measures	12
unDisplay of Safety Instructions	4

Source: established by the authors based on intern documents

Result interpretation:

Patient Nosocomial infection or patient's contamination for a criticality impact of 20 considered as the highest danger in our research it could lead even to death some time, that risk is in the red zone wich means that the hospitals administration should react to it immidiately and that by obligating desinfecting rools and training employees on safaty procedures.

Absence of some equipments and Deffective Materiels is a risk that has a criticality valueestimated at 16 wich is the second one, that risk also belonge to the red zone with hight criticality value that should react to it and fine solutions for it for example : all hospitals has one machine from each kind if it it deffected the services are done so as a solution hospitals should buy two machines from the same type one for daily use and one for the case if it get deffected, also they can replace recharge from one to another, and they can also allocate a bigger budget for buying and repparing equipments.

inconsistent security measures have a low value from the previous risks estimated at 12, it belongs to the medium risk zone also we should pay attention to it and react about it, and as the best solution it using tecknology and new ways for keeping security of the both patient and instituion

unDisplay of Safety Instructions with a criticality value estimated at 4 consedered as non important risk belong to the green zone, that risk could be delleted from the risk list or we can propose solution to eliminat it.

III-3- Suggestion improovement measures and actions facing to risk:

After classifying the risk according to its criricality value, we are going to apply the 5M methode on these risks as following:

Table n°6: 5M methode for managing nosocomila infection risk

Risk	F	S	C		Main cause	suggested improuvement actions
Nosocomial infection	4	5	20	envirement	inadequate air quality	air purifiers
				materiels	Using non sterilised materials	the cleaning and sterilization of the materiel before and after use
				methods	Not Wearing gloves while taking blood samples	Do routine maintenance
				manpower	The staff does not follow the recommendations issued by the CLIN	Obligation of follow CLIN guidelines and protocols of the clin
					the staff responsible for maintaining hygiene are not taking necessary precautions	Provide hygiene training for the staff, Surface Disinfection
				machine	/	/

Source: established by the authors

Table n°7:5M methode for managing Absence of some equipments and Deffective Materiels risk

risk	F	S	C		Main cause	suggested improvement actions
Absence of some equipments and Deffective Materiels	4	4	16	enviement	humid environment	Enhance Ventilation Systems
				materiels	/	/
				methods	Lack of daily inspection of equipment and communication between medical staff and managers	statistical monitoring of breakdowns Implementation of a Written Procedure for Medical Equipment Verification
				manpower	Lack of staff competence and knowledge of equipment use	Targeted Training Programs
				machine	severe lack of machinery, and even when available, there is only one machine of each kind.	Allocate a larger budget for repairing the broken machines, and it is also possible to purchase two devices of the same type, keeping one as a backup in case the first one breaks down

Source: established by the authors

Table n°8: 5M methode for managing inconsistent security measures risk

risk	F	S	C		Main cause	Suggested Improvement actions
inconsistent security measures	3	4	12	envirement	/	/
				materiels	/	/
				methods	The absence of security documents	ensuring regular communication about document status and any necessary changes
						Use Technology for Monitoring and Documentation
				manpower	Employees not trained on security documentation prosedure	educate staff on security protocols and familiarize them with key protocols
				machine	/	/

Source: established by the authors

Table n°9: 5M methode for managing unDisplay of Safety Instructions risk

risk	F	S	C		Main cause	Suggested Improvement actions
unDisplay of Safety Instructions	4	1	4	envirement	/	/
				materiels	/	/
				methods	Lack of Awareness	Routine Drills and Practice
					lack of regular maintenance checks	Daily maintenance chek
				manpower	Not following safety instructions	following safety instructions
				machine	/	/

Source: established by the authors

Results iterpretation:

Hypothesis 01 discussion:

After the application of the 5M methode in hospital we found out that nosocomial infection has a hight criticality value estimated at 20, wich confirm u the first hypothesis says that nosocomial infection is one of the major risks in hospital and infirm the opposite hypothesis says that nosocomial infection is not one of the major risks in hospital, also we have been able to identify the main cause of this risk is not respecting the sterilization procedures and non competent employees, and as a solution for this issue we proposed to Obligat the follow CLIN guidelines and protocols and format employees on hygiene .

Hypothesis 02 discussion:

After utilizing the 5Mmethode we we have been able to have suggested action for minimising risks and also remove them from hospitals, as we can see in the previous tables we have solutions for evey risks and by that getting better quality in services, so that make us confirm the seconde hypothesis that says: Utilizing the 5M method in risk management leads to improoved prevention strategies and patient outcomes, and infirm the opposite hypothesis that says utilizing 5M methode in risk management do not leads to improoved strategies and patient outcomes.

Conclusion:

It has been demonstrated that using the 5M method in risk management is a reliable and methodical way to recognize and reduce possible risks in healthcare environments. This method provides a thorough understanding of the causes of risk, resulting in more focused and efficient preventative measures. It does this by examining the five crucial factors: Manpower, Machines, Materials, Methods, and Milieu (Environment).

In this study we demonstrated that hospitals can enhance their operational safety and maintain their patient safety by focusing on the 5M method in analyzing risks,

we conducted also that there is a lot of risks in different categories that hospital faces and the highest with critical value is nosocomial infection, it should be minimized to keep lives safe.

1- Study results:

Nosocomial infection has a high criticality value estimated at 20 considered as the highest critical risk should be reacted to it immediately

The main cause of this risk is not respecting the sterilization procedures and non competent employees, the staff responsible for maintaining hygiene are not taking necessary precautions, inadequate air quality.

As improvement actions for nosocomial infection: do the sterilization routine, forming employees on the CLIN rules and providing a good quality of environment free of airborne infections by applying ventilation system in case of air purifier is defected.

Absence of some equipments and Defective Materials is an important risk with a high value of criticality, that risks main causes are: negligence of employee's duty (daily inspections) and lack of communication between them.

The improvement action for defective materials are: empowering information system by statistical monitoring of breakdowns Implementation of a Written Procedure for Medical Equipment Verification, allocate a larger budget for repairing and buying equipments also Targeted Training Programs for employees.

Inconsistent security measures are a medium risk should be taken in consideration, its main reasons are: The absence of security documents and Employees not trained on security documentation procedure.

The suggested improvement actions for educate staff on security protocols and familiarize them with key protocols are: ensuring regular communication about document status and any necessary changes, Use Technology for Monitoring and Documentation, educate staff on security protocols and familiarize them with key protocols.

Undisplay of Safety Instructions has considered as not critical risk or normal risk we can remove it from risk list because it has no harm on lives and management process.

2- Recommendation:

Based on the results reached, the current study recommends the following:

Hospitals considered as an important sector in society because it has a direct relation with human lives so we should pay attention to its management, managing risks means saving lives.

Every hospital should combine more risk assessment tools for managing risks, for example the 5M with the FMEA to enhance the robustness of risk management strategies.

Implement Regular Training for employees because manpower is one of the effective factor in the management process.

Develop a maintenance schedule for medical equipment and optimizing maintenance to prevent technical failures and ensure continuous availability of critical devices in hospitals.

Conduct regular audits and evaluations to measure progress and make necessary adjustments for continuous improvement

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