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***Review Article***

# A Review of Various Methods of Management of Risk in the Field of Emergency Medicine

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**Keywords:** Emergency medicine department; Risk assessment; Management of risk; Healthcare strategies

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**Abstract**

**BACKGROUND:** The main concept of risk management in the emergency department (ED) contains a broader meaning, so that; it's known as a sudden event or situation which would happen at an uncertain future that has some negative or positive impacts which could be called threat or opportunity respectively. However, the knowledge of risk management could cover the overall procedures involved with administering the planning of risk management, identification, investigation, monitoring and also step by step clinical examination. One of the main tools for preventing adversities is evaluating and management of possible risks.

**AIM:** One of the main objectives of the present study is recognising the most frequent types of the risk happening in the EDs. Moreover, the present study is trying to evaluate the possible risks which could happen among various ED sections.

**METHODS:** Six databases of EMBASE, HubMed, Cochrane Library, MEDLINE, PubMed, CHBD and Goggle scholar were chosen for discovering much-related articles from the year 2005 to 2019. A total number of 68 were chosen finally to be reviewed more precisely based on the main objective of the present study.

**RESULTS:** Precise planning, preparing sufficiently and conducting the process of continuous monitoring are needed for ensuring the fact that any possible risks could be managed through these planned strategies. On the other hand, by modifying the patients' beliefs, anticipations and the available social culture about the importance of risk management issue, the overall objective of the present study could be achieved at higher rates.

**CONCLUSION:** Moreover, because the potential of occurrence of risk in EDs is high and approximately more than half of them are fatal, more precise adequate systematic plans for management of them should result.

## Introduction

The main concept of risk management in the emergency department contains a broader meaning, so that; it's known as a sudden event or situation which would happen at an uncertain future that has some negative or positive impacts which could be called threat or opportunity respectively. However, the knowledge of risk management could cover the overall procedures involved with administering the planning of risk management, identification, investigation, monitoring and also step by step clinical examination. One of the main tools for preventing adversities is evaluating and management of possible risks [1], [2].

Preparing accurate health care programs could yield a lot of advantages to the patient from one point of view, and on the other hand, it could have a lot of side effects and cause various harmful medical events [3]. The process of risk management is identified to be one of the main aspects of decreasing the possibility of happening of various damages at emergency department settings. Anyway, being concern about enhancing the safety of patients is considered to be the main starting motivation for preparing health care and treatment systematic plans [4]. On the other hand, the emergency department is consisting of multiple essential sections which all are dynamic and also susceptible to medical errors within the overall system of health care [5]. In emergencies, there is not a lot of time for critical decision making because it could cause a big delay in making critical decisions and also increase the rate of happening side effects [6]. Based on the data obtained from the previous studies, approximately 10% of patients who presented at EDs would involve a traumatic event that could be prevented easily. On the other hand, nearly

five percent of all happened medical care side effects are related to the EDs [7], [8].

Based on some related studies which have worked on the assessment and control of the available risks in the field of ED, about four percent of mortalities could be barricaded through conducting appropriate health care programs [9]. Moreover, controlling and management of possible risks during the treatment process are considered to be one of the main factors of enhancing the quality of health care programs. For appropriate management of the various levels of risk in ED settings, the most possible risks and problems should be recognised [10].

Through assessment of the most suitable detailed plan for controlling and management of any potential risks and problems and also expanding novel strategies for addressing them, any possible risks in various medical settings like EDs could be easily managed. It should be noted that happening troubles even in the highly precise planned management strategies could occur. However, the efforts for creating the most suitable strategies should not be stopped after happening these kinds of problems [11], [12].

In this regard, the proper diagnosis of potential risks in ED settings like possible abnormalities during the process of radiology or conducting electrocardiograms recognition procedures, other diagnostic errors and possible defeats which would happen during the management of traumas by less specialised doctors during emergency operations conducted on the patients is the initial step in setting up the most appropriate planned strategy [13], [14]. Even though a lot of studies have carried out on the matter of evaluation of risk in emergency department settings, but the type of risks, levels, damages, and potential aetiological factors are not specified precisely. Anyway, the overall kinds of risks, damages, levels, and causes of happening them should be determined and documented adequately. On the other hand, one of the main aims of the present study is to investigate on classifying potential risks, mainly in emergency department settings based on the strategies above [15].

## Material and Methods

For achieving the objectives of the present study in line with collecting the more precise information on the management of possible risks in the EDs setting, a general review around the most recent published literature for conferring the novel position of risk management in ED settings. On the other hand, by application of specified keywords of the Emergency medicine department, Risk management, Management strategies, and Risk assessment the most novel articles from the year 2005 up to 2019 were collected to be reviewed more precisely. Some associated databases of EMBASE, HubMed, Cochrane Library, MEDLINE, PubMed, CHBD and Google scholar were chosen for searching and discovering much-related articles to the objective of the present study. In this regard, at first, a total of 254 articles were recognised that after screening and deleting the articles which were less related to the main objective of this study and also adding some new detected articles from google scholar database, finally 68 articles were selected to be reviewed more precisely. The overall process of finding, screening, deleting and selecting the articles which were applied at the present study was carried out based on the PRISMA method that is presented in Figure 1.

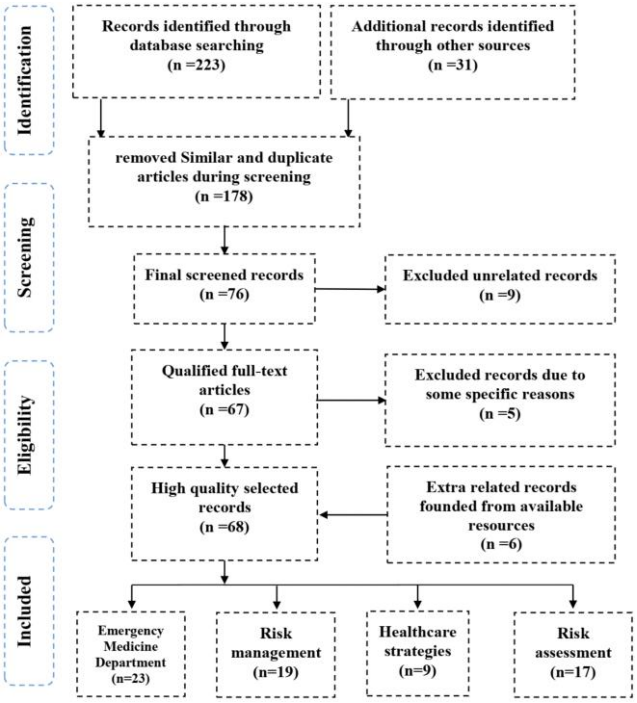


*Figure 1: The schematic diagram of the overall process of selecting the administration of papers at the present study*

## The emergence of risk management issue in EDs

In general, the fundamental objective of the management of risk in ED settings is protecting and improving the overall health condition of patients. However, one of the other objectives could be protecting the emergency staff from any possible risks and damages. Moreover, the procedure of specifying possible risks consists of recognition of the situations which place the patients or the emergency staff in various dangerous positions [16]. On the other hand, because in the last five decades the number of reported risks in emergency departments was not too

high, the number of conducted investigations on this issue was not enough for making standardized recommendations on it which maybe was due to the lack of insufficient knowledge about the issue of risk management. However, happening considerable changes in the social structure during the last decade, provided the opportunity of occurrence new changes within the health care tendency to the issue of risk management [17].

The main factor which should be considered is enhancing the level of social education on the matter of health care strategies, risk management, emergency department settings, and its' related risks and damages. Besides, the ED staff should be aware of the novel produced roles on this issue to be capable of helping patients for reducing the possibility of any possible risks. Based on the requirements of the adequate novel knowledge on the procedure of risk management in ED settings and also the availability of some updated investigations on this matter, a more promising image of providing new health care strategies is has been produced [18]. It should be noted that happening any carelessness could result in adverse outcomes and increase the rate of occurred risks and damages. Based on all aforementioned new matters, the general perspective of risk management has modified to a level that it has become one of the more essential factors that should be available in any ED settings [19].

At the start of planning the procedure of risk management, all essential strategies should be applied as well as the internalising of all related concepts. It should be noted that planning the strategies of management of risks could decrease the rate of the happening of potential risks and damages and more than four-fifths of available problems could be happening due to the lack of appropriate plans in the system, not due to the inefficient and improper actions of the ED staff [20]. The application of these kinds of arranged features could affect adequately at various levels among patients or/and emergency staff for achieving the main objective of decreasing the rate of risks or damages. Recent studies have emphasised that through paying greater attention to the effective basic psychological human factors, earning more knowledge on the nature, mechanisms and also main reasons for the occurrence of risks and damages in various ED settings the rate of possible risks would be decreased significantly [21], [22].

## Recognition and classification of risks

Through specifying the main reasons and sources of occurrence of risks and also determining the overall procedures of risk assessment for more accurate determination of possible damages as well as, their main impact on the health condition of patients a critical step could be carried out in this regard, that would be considered as the initial step. Consequently, any possible risks and damages which could affect the overall health condition of patients as well as, the main causes of happening these kinds of risks and damages should be precisely specified (Table 1).

**Table 1: Recognition and classification of risks. Designed based on the information in the articles [23], [24]**

| Potential risks | | The main causes of happening risks and damages | |
|---|---|---|---|
| | | Obvious | Hidden |
| Patients detected with higher risks | | * | |
| High-risk emergency staff with insufficient expertise | | | * |
| Procedures which contain higher risks | | * | |
| Various ED situations which could cause higher risks | When the staff change their shifts | | * |
| | Unscheduled return of patients after being discharged | | * |
| | Transfer of patient to other health care departments | * | |
| | Being discharged against medical advice | * | |
| | The occurrence of disappeared cases | | * |
| | Availability of responding system of in-hospital emergency | | * |
| | Presence of trainee at EDs | * | |
| | Using telephone advice at emergencies | * | |
| | Application of labels for name and health condition of patients | | * |
| | Reports of examinations carried out on the patient's | | * |

## Evaluation of high-risk conditions

In emergencies based on the overall health condition of patients, various happened disorders at different levels could be specified to be treated in the ED or other medical settings. In this regard, based on the most recent studies carried out recently, as could be seen from the Table 2 various disorders are reported to be the most common damaging ones which must be treated immediately at emergency departments [25]. One of the main kinds of pain that are presented among most patients at the emergency departments is chest pain which could be one of the major critical risk-full problems. On the other hand, the differential diagnosis process for chest pain disorder ED settings are very comprehensive, and all possible causes of this risk are ranging from benign to life-threatening conditions. Even though most of the patients with chest pain who attended emergency departments are not in very life-threatening conditions, the process of immediate and precise diagnosis of their disorder could be very challenging. On the other hand, the improper diagnosis would be very risky and lead to harmful and incorrect therapies which may increase the rate of morbidity and mortality [16], [26].

**Table 2: The most potential disorders which could be presented at emergency departments. Derived following [25]**

| Various types of disorders | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Consciousness level | airway and breathing difficulties | | cardiovascular disease | | Neurological disorders | Gastrointestinal and genitourinary | Trauma | Haemorrhage | Burn | Exogenous intoxication | Skin | Comorbidity disorders | Known or suspected dengue fever | |
| Emergency symptoms | | | | | | | | | | | | | | |
| Unconscious mind | Blue skin and lips (cyanosis) | sleep disorder of Apnea | Absent peripheral pulses | Cyanotic extremities | Seizure during care time | WES [I] | Presence of multiple trauma | Uncontrolled hemorrhagic trauma | Inhalation or/and face | WES | Hives with abnormal breathing sound and considerable breathing problems | The presence of severe hypoglycemia with diabetes (CBG<20) [II] | Existence of shock | Existence of respiratory failure |

I: Without any emergency symptoms: WES; II: Capillary blood glucose (CBG mg/dL) - This test is performed among all patients who suffer from lethargy, seizure, diabetes or/and an altered level of consciousness (LOC).

Some other major conditions and complaints that are at higher risks and frequently could happen in emergency departments include Acute coronary syndrome (ACS), Pulmonary embolism, Aortic dissection (AD), Acute or/and chronic stomach pain, Abdominal aortic aneurysm, Appendicitis, Headache, Subarachnoid haemorrhage (SAH), Stroke, Pediatric fever, Meningitis, Airway problems, Polytrauma, Head injury, Spinal cord injury (SCI), Open wounds, Any bone fractures, Testicular torsion, Extrauterine pregnancy, and Septicemia [27], [28].

Moreover, some other risks related to the operational tasks in the emergency department could be induced from various operations of patients, emergency staff, prepared strategies and conducted procedures during any operations. These operational risks could be consist of some other categories of risks like physical, potential fraud risks, and risks associated with the emergency department environment [29].

However, as mentioned before based on the information of Table 1, the main sources of operational risks are consist of: The emergency department facility, Patients privacy and security, Medical equipment, Safety measures, Availability of credentialing process, the experience of emergency staff, The satisfaction of patients, the availability of telephone, the presence of special patients, Critical roles of discharging, Specific problems, and Examination follow-up [30], [31].

## The main causes of increment of risk in ED settings

Like any other medical settings, conducting operations in the emergency department setting consisting of some special procedures which are carried out during the process of patient care. It should be noted that any operational procedures within the ED setting may be neutralised by some limitations that would increase possible damages and risks and also threaten the safety of patients. Some of the most common causes of increasing the risks and damages during the medical care procedures in emergency department settings are mentioned in Table 3 [32].

**Table 3: Contributing factors which affect the increment of risk in the emergency department settings. Derived in accordance with [26], [34], [35]**

| Affecting factors | Reasons | Strategy |
|---|---|---|
| Deficiency of knowledge | The emergency staff could not be capable of being aware of any possible condition attended the emergency department. | Emergency physicians should be trained as far as possible about emergencies which cause higher risks |
| Unavailability of sufficient history | The lack of adequate documentation of the major key elements of the medical and family history of the patients, social and /or personal history and risk factors. | For compensating these deficiencies, the overall medical history of the patients should be recorded, the overall standardised recommendation of ED risk factors should be prepared, and patients and emergency staff should be justified in this regard. |
| The inability of performing adequate examinations | The lack of enough time due to emergencies for adequate examinations. | The emergency staff should be punctual and immediately perform essential examinations and quickly detect what should they do based on any special emergency. |
| Inability to conducting differential diagnoses | Mainly happen because chart documentation could not adequately reflect the nature of clinical reasoning. | For achieving the most sufficient differential diagnosis, a brief discussion about the main reason for considering this kind of diagnosis must be carried out. |
| The inability of ordering/interpreting proper diagnostic studies | Mainly would happen due to the lack of performing adequate diagnostic studies on the patients even in patients with many adverse outcomes. | Conducting more additional examinations like electrocardiography, performing a lumbar puncture test, carrying out a negative head computed tomography scan, and also performing pregnancy tests for women in emergencies is recommended. |
| Failure to operate accurate diagnosis | Due to the emergencies, performing an accurate diagnosis is not possible always. | Through using all existing equipment and resources, the most accurate diagnosis should be carried out before the disposition of patients |
| Improper treatment | Due to the lack of appropriate diagnosis, a lot of failures would occur during the process of treatment. | Based on the precise diagnosis of patients, emergency disorders appropriate treatment should be considered for any individuals like the application of thrombolytics for treatment of stroke. |
| Improper consulting | The failure of conducting effective consultation with the patient could increase the resulted risks during the care process at ED. | Carrying out appropriate consultations for the existence of any traumas, myocardial infarction, possible bone fractures and also for acute limb ischemia could reduce the rate of happened risks after attending to emergency departments. |
| Failure to admit properly | This failure mainly could occur due to the lack of appropriate diagnosis. | The adequate and precise diagnosis could enhance the potential of proper admission and more accurate of patients in emergency departments and prevent the improper discharge of patients. |
| Improper communication | This mainly would happen due to negligence claims and other allegations of emergency staff and physicians. | For having more effective communication, physicians should explain the reasons, requirements, the time and also the main remedial procedures which should be performed on the patients. |

Moreover, some other risk factors of patients care in ED settings are associated with the absence of timelines which could cause extra physical or/and emotional harms and higher costs of treatment for patients. The process of management of risks in emergency departments mainly involves the

procedural management of patients flow, providing sufficient levels of the emergency staff and also providing necessary arrangements for the reduction of patient care costs. Three main factors could potentially affect the care timeliness in emergency department settings which are mentioned in Table 4 [33].

**Table 4: The potential factors affecting the timeliness of care process in ED settings. Derived following [34], [35]**

| Physician quality | Patient triage | Hospital capabilities |
|---|---|---|
| Medical centres should be capable of covering nearly all required medical specialities for presenting the most essential treatments to the patients. | Conducting the process of mandatory triage may postpone the procedure of care which is necessary for patients which acute disorders. | The capabilities of the medical centre should be at a level which could cover all potential injuries and requirements of the patients. |

## Possibility of recording patients documents

Due to the special nature of ED settings, the process of admission of patients in emergency departments is usually challenging and maybe hard work. In this regard, a lot of effort should be taken into account for the immediate and precise recording of any possible documents of attended patients to the emergency department [37]. This recorded documentation should be accessible in every emergency for the physician to be capable of making the most appropriate remedial decisions for patients. However, these precise documents are the last available health information of patients which could inform the associated healthcare providers about the most appropriate emergency department assessments and treatments and would prevent patients and physicians from any possible risks and damages [38].

The process of documentation of patients initial health condition, overall information of patients' clinical examinations and resuscitation condition and the information on patients' consultation can be very significant for evaluating multiple traumas, the possibility of stroke and also heart attack [35]. However, creating excellent documentation could protect the emergency staff and patients from happening any kind of risks and damages during the care procedure. On the other hand, the documentation with poor information on the health condition of patients, could not effectively improve the care process of patients in emergency departments and may increase the rate of occurred risks and damages [39].

## Effect of Emergency staff performance on the management of risk

Due to the increment of lawsuits related to providing health care services in the last decade, recently the emergency staff and especially physicians are forced to be more aware of any possible risks and damages in this medical setting. Moreover, through conducting precise reviews on this matter for enhancing the performance of physicians and emergency staff and also the quality of care process of patients, any potential risks and damages could be decreased [40]. As a consequence, the major objectives of management of risk and reviewing the potential challenges in this regard are such as; reducing any possible risks and damages to the patients, reducing the rate of exposure to any possible risks and damages for patients and emergency staff and reducing medical costs for patients and the medical department [41].

One more important factor which should be considered is that professional risk managers must be capable of identifying risky and damaging events which would increase the care process costs for both patients and the medical centre. But unfortunately, the lack of appropriate management of risk is one of the main reasons for the increment of the rate of patients who suffer from damages that occurred because of medical negligence [42]. Anyway, for improving the quality of conducting care procedures, the fundamental reasons for happening any possible medical damages or risks should be recognised precisely and then removed. Moreover for producing the more standardised agreement of the major roles of emergency staff and physicians on the process of proper management of risks and its' consequences the following considerations should be taken into account (Table 5) [43], [44].

**Table 5: Some of the most critical steps for improving the role of physicians and emergency staff in the proper management of risk. Derived in accordance with [26], [34], [35]**

| Step | Recommendations |
|---|---|
| I | Recognition and improving the performance of staff and physicians, which could prevent further damages and losses. |
| II | Trying to prevent any possible medical errors and damages by improving accountability and transparency |
| III | Making efforts for decreasing negative costs and consequences for patients, medical centre and physicians |
| IV | Through appropriate management of risk, any possible litigation among physicians and facilities could be managed satisfactorily. |

However, in the situation, when even one of the steps above not be performed appropriately, most of the possible risks of medical centres would be increased. Any medical centres, such as emergency departments should be responsible for any possible hazards and damages to the patients and the staff. Moreover, the responsible physicians and emergency staff have stated that a large share of these happenings would be mainly due to the bias or incompetence training [45]. For achieving the most appropriate standardise recommendation in the

management of care with the lower rate of occurrence of risks and damages, most of the healthcare providers should be capable of monitoring the quality of conducted services through a documented mechanism like a prepared checklist. On the other hand, the associated organisations that provide accreditation services in the medical departments must impose legal documents to the medical centres that could engage them in providing high-quality care [46].

## The effect of staff training

Various studies have recommended conducting comprehensive and precise training on the improvement of the emergency staff confidence in the process of screening patients for detecting any potential risks [47], [48]. As instance, Horowitz et al., [49] through applying a comprehensive systematic assessment for investigating the methods of decreasing the rate of suicide risk among patients, by training 53 inpatient nurse clinicians reported that the rate of patients comfort has enhanced in line with the overall knowledge of the emergency staff which resulted in reduction of the potential of risks. After applying these comprehensive training, the overall knowledge of the staff enhanced as well as a large decrement in happening risks [50]. The availability of a well-trained staff within the emergency department, mainly with specialised training of risk management could be beneficial for the extra decrement of happening damages and risks among patients mainly those with the more dangerous condition. One of the main emergency sections which would face with larger rates of danger is emergency psychiatry which demands a special amount of attention to be protected adequately. However, this objective could be achieved by carrying out precise and standardised training, both emergency staff and patients [51].

In this regard, all the nurses and staff of the emergency department confessed that being trained appropriately could increase the benefits attributed as well as decreasing various possible risks and also could improve the quality of the discharge and the process of follow-up care [52]. Moreover, all of the staff of the emergency department are forced to perform precisely standardised evidenced-based guidelines that are demanded to be carried out permanently that are supervised by its' associated committee. On the other hand, based on the researches carried out by Kirk and Nilsen [53] being informed about the appropriate time and duration for modifying the most common factors which affect happening potential risks and damages could influence the selective options of the corresponding committee of risk management in the emergency department. As an instance, one of the main local triage tools which could be applied effectively for reduction and proper management of possible risks in ED settings is the guidelines of mental health triage scale (MHTS) which developed for the objective of completing the risk management educations adequately [54], [55]. Based on the clinical practice guidelines of the emergency nurses association (ENA), some categorised recommendations are provided to be performed for more accurate management of patients and preventing practical risks and damages (Table 6).

**Table 6: Various levels of practical recommendations for more appropriate management of patients and risks in ED settings. Derived following [24]**

| Level | Recommendations |
|---|---|
| I [High] | This level of recommendation represents precise clinical practices at a high quality which mainly using the grading system of Melnyk and Fineout-Overholt [56]. All of the recommendations at this level are beneficial for the reduction of various possible risks ad damages. Moreover, these high-quality permanent pieces of evidence are in high relevance and applicability to be applied in emergency nursing practices. |
| II [Moderate] | This level of recommendation could represent moderate clinical confidence which could be carried out at the associated medical situations which mainly using the grading system of Melnyk and Fineout-Overholt [56]. Within this category, several inconsistencies would be available in quality evidence which is applicable in emergency nursing practices that could be very effective in decreasing risks and damages to the patients and the emergency staff. |
| III [Weak] | This category of recommendations has nearly unknown or restricted advantages that mainly is grading by using of Melnyk and Fineout-Overholt grading system [Melnyk & Fineout-Overholt, 2014]. This level is generally constructed based on anecdotal evidence, usual practices, some general agreements and/or screening. While there is not a lot of high-quality patient-oriented evidence, their application in emergency nursing practices is highly proved. |
| IV [Not recommended] | Within this category, there is not any exact evidence, or if exist they arise from uncontrolled or poorly controlled studies. On the other hand, some other indications for practical applications which are not proved properly are such as inconsistent evidence, the existence of some evidence of harmfulness, any increment in costs which exceeds the anticipated advantages and also availability of some recommendations which are not relevance to emergency nursing practice without any proven applicability. |

## The effect of health financing support

At the process of risk management, the availability of health financing support for conducting more precise assessments is a critical factor that should be taken into account. Providing reliable financing and insurance could easily protect all assets of the medical centre and consequently, decrease any potential risks and damages. One of the main challenges in this regard is not to be aware of the overall details of the real designed plan for medical insurance coverage [57]. However, the general framework of the insurance plan and also, patients' financial status must be investigated appropriately. In case of happening any risks and damages, the insurance company should be responsible for both patients and emergency staff and protect them financially. So, the health profile of patients should be prepared precisely, and a copy of them should be available to the insurance company [58]. Moreover, the corresponding insurance company must always be accessible to be capable of checking the health condition of the patients and the emergency staff, for eliminating and reducing any possible risks and

damages. In the situations when adequate insurance services are available, the emergency staff and physicians will not bear any additional responsibility for the occurrence of any risks and damages [59].

One more critical factor which should be considered is that any other possible risks that may happen out of clinical settings should be managed properly. In this regard, the patients and also any corresponding emergency staff involved with the process of patient management should be covered by insurance which classified as non-clinical risks [60]. Some other of the possible problems which are at the category of non-clinical risks are such as the risks factors associated with buildings, damages arisen from additional equipment of maintaining furniture and fixture safe, risks related to the process of maintaining equipment and health services safe, risks related to the process of protecting the security of medical centre, additional equipment provided for preventing fire dangers and trying to maintain occupational health and safety (OHS). However, the corresponding insurer company should cover all of these possible aspects of risk [61], [62], [63].

## Risk management perspective

The availability of further investigations around the perspective of risk management of patients in emergency department settings could be very essential for achieving more accurate knowledge on the newest procedures of minimising the potential of happening various kinds of risks and damages to the patients and emergency staff. Through the possibility of the creation of more novel events due to changes to new job positions from one side and also the creation of new medical treatment and equipment in the medical centres from the other side, the possibility of occurrence of more dangerous and risky events would be increased significantly [64], [65].

Consequently, applying more precise investigations depending on advances in treatment and equipment could be demanded shortly. In this regard conducting typological studies could be effective for establishing the documented papers on the fact that the potential risk factors of patients and emergency staff would be changed with the time or not [66]. Additionally, assessment of the process of detection of various kinds of risks which would happen in various departments at the emergency medical settings could provide the potential of recognition of various kinds of risks and damages and also the main source of them to the patients and emergency staff [67], [68].

## Conclusion

There are a lot of risks and damages which could happen in various sections of the emergency department for both patients and the emergency staff. The patients with a higher level of disorders like patients with multiple traumas have a higher potential of being involved with these kinds of risks. For struggling these risks, precise strategies are needed immediately to be performed. On the other hand, because various kinds of risks and damages would be possible in various emergency settings, these kinds of strategies must be appropriate for various patients in various sections of emergency departments.

One of the main challenges which threats the patient's health condition is the potential of affecting various possible risks. The main objective of carrying out the process of management of risk is appropriately controlling the health variables which affect the overall health condition of patients for enhancing the potential of achieving the most appropriate outcomes. Because, the main reasons for happening accidents are a set of known or unknown failures, in this regard conducting standardised approaches for the management of risks in a hierarchical framework could be very effective. One more essential approach in the procedure of conducting more appropriate risk management for any responsible physicians is having or preparing a more accurate trend. Moreover, preparing more accurate and standardised plans which sufficiently are investigated and prepared with continuous monitoring could be very effective in ensuring the proper management of the potential risks and damages to the patients and the emergency staff. For achieving the most appropriate and primary solutions for the management of risks, precise strategies for proper management of the human resource are required to be available for achieving nearly all organic objectives in this regard. The precise implementation of these kinds of strategies is strongly associated with the involvement of patients and the emergency staff within the strategies and also the overall support of administrative and Insurance organisations.

## References

1. Schumacher JA, Gleason SH, Holloman GH, et al. Using a single-item rating scale as a psychiatric behavioural management triage tool in the emergency department. Journal of Emergency Nursing. 2010; 36(5):434-438. https://doi.org/10.1016/j.jen.2010.01.013 PMid:20837212

2. Stacy JP, Adam LS. Improving health and health care efficiency through risk management. Hosp Manag Health Policy. 2019; 3:9. https://doi.org/10.21037/jhmhp.2019.04.02

3. Kaafarani HM, Itani KM, Rosen AK, et al. How does patient safety culture in the operating room and post-anesthesia care unit compare to the rest of the hospital? Am J Surg. 2009; 198:70-75.

https://doi.org/10.1016/j.amjsurg.2008.09.017 PMid:19268901

4. Alireza K, Mohsen P, Hossein M, et al. Patient Safety Climate and Its Affecting Factors Among Rehabilitation Health Care Staff of Hospitals and Rehabilitation Centers in Iran-Tehran. Iranian Rehabilitation J. 2019; 17:39-48. https://doi.org/10.32598/irj.17.1.39

5. Sabahi BM, Shahri S, Kebriaee A, et al. [Patient safety climate in medical centers of Kashan (Persian)]. J Health Promotion Management. 2012; 1:62-72.

6. Rene A, Charles V. Managing risk in hazardous conditions: improvisation is not enough. Amalberti R, Vincent C. BMJ Qual Saf. 2019; 0:1-4.

7. Kyle A. W, Abby M. B, Stephanie N. B. Strategies for reducing medication errors in the emergency department. Open Access Emerg Med. 2014; 6:45-55. https://doi.org/10.2147/OAEM.S64174 PMid:27147879 PMCid:PMC4753984

8. Institute for Safe Medication Practices Special error alerts, 2014. [Accessed February 17, 2014]. Available from: http://www.ismp.org/NAN/default.asp. 2014.

9. Hogan H, Healey F, Neale G, et al. Preventable deaths due to problems in care in English acute hospitals: a retrospective case record review study. BMJ Qual Saf. 2012:737-745. https://doi.org/10.1136/bmjqs-2011-001159 PMid:22927487 PMCid:PMC3436096

10. David RE, Dobreanu M. Risk Management in Clinical Laboratory: from Theory to Practice. Acta Medica Marisiensis. 2015; 61:372-377. https://doi.org/10.1515/amma-2015-0086

11. Hopkin P. Fundamentals of risk management: understanding, evaluating and implementing effective risk management. Kogan Page Publishers; 2018.

12. De Marco A, Thaheem MJ. Risk analysis is construction projects-A practical selection methodology. American Journal of Applied Sciences. 2014; 11:74-84. https://doi.org/10.3844/ajassp.2014.74.84

13. Moy E, Barrett M, Coffey R, Hines AL, Newman-Toker DE. Missed diagnoses of acute myocardial infarction in the emergency department: variation by patient and facility characteristics. Diagnosis. 2015; 2(1):29-40. https://doi.org/10.1515/dx-2014-0053 PMid:29540019

14. HCUP State Emergency Department Databases (SEDD). Healthcare Cost and Utilization Project (HCUP), 2009. Rockville, MD: Agency for Healthcare Research and Quality, 2009. Available at: www.hcup-us.ahrq.gov/seddoverview.jsp. 2014.

15. Thiruganasambandamoorthy V, Rowe BH, Sivilotti MLA, et al. Duration of Electrocardiographic Monitoring of Emergency Department Patients with Syncope. Circulation. 2019; 139:1396-1406. https://doi.org/10.1161/CIRCULATIONAHA.118.036088 PMid:30661373

16. Brucker K, Duggan C, Niezer J, et al. Assessing Risk of Future Suicidality in Emergency Department Patients. Acad Emerg Med. 2019; 26(4):376-383. https://doi.org/10.1111/acem.13562 PMid:30375082

17. Brocal F, González C, Komljenovic D, et al. Emerging Risk Management in Industry 4.0: An Approach to Improve Organizational and Human Performance in the Complex Systems. Hindawi Complexity. 2019; 2019:2089763. https://doi.org/10.1155/2019/2089763

18. Institute of Nuclear Power Operations (INPO). Excellence in integrated risk management; the elements, attributes, and behaviors that exemplify excellence in integrated risk management INPO 12-008, 2013. http://nuclearsafety.info/wpcontent/uploads/2017/03/INPO-12-008-Excellence-in-IntegratedRisk-Management.pdf.

19. Katina PF. Individual and societal risk (RiskIS): beyond probability and consequence during hurricane katrina," in Disaster Forensics: Understanding Root Cause and Complex Causality, A J Masys, Ed., 2016:1-23. https://doi.org/10.1007/978-3-319-41849-0_1

20. Montibeller G, Von Winterfeldt D. Cognitive and motivational biases in decision and risk analysis. Risk analysis. 2015; 35(7):1230-51. https://doi.org/10.1111/risa.12360 PMid:25873355

21. International Risk Governance Council (IRGC). Improving the Management of Emerging Risks, IRGC, Geneva, Switzerland, 2011.

22. Stacey N, Ellwood P, Bradbrook S, et al. Key trends and drivers of change in information and communication technologies and work location. Foresight on new and emerging risks in OSH. Working report. European Agency for Safety and Health at Work (EU-OSHA), 2017.

23. Aline MA, Maria ADSL. Frequent users of emergency services: associated factors and reasons for seeking care. Rev. Latino-Am. Enfermagem. 2015; 23:337-44. https://doi.org/10.1590/0104-1169.0072.2560 PMid:26039306 PMCid:PMC4459009

24. ENA Clinical Practice Guideline Committee. Clinical Practice Guideline of Suicide Risk Assessment. Emergency Nurses Association, 2017.

25. Maria CMB, Arnaldo PB, Antonio JLAC. CLARIPED: a new tool for risk classification in pediatric emergencies. Rev Paul Pediatr. 2016; 34:254-262. https://doi.org/10.1016/j.rppede.2016.02.002 PMCid:PMC5178109

26. Di Pietro P, Lattere M, Villa G, et al. Risk management: medical malpractice and Emergency Department. Minerva Pediatr. 2005; 57:399-409.

27. Mohammad HY, Fatemeh R, Abbas H, et al. Overcrowding in emergency departments: A review of strategies to decrease future challenges. J Res Med Sci. 2017; 22:23. https://doi.org/10.4103/1735-1995.200277 PMid:28413420 PMCid:PMC5377968

28. Robert AB, Patrick LM, Thomas CA. Emergency Room Crowding: A Marker of Hospital Health. Trans Am Clin Climatol Assoc. 2012; 123:304-311.

29. Kim SW, Horwood C, Li JY, et al. Impact of the emergency department streaming decision on patients' outcomes. Intern Med J. 2015; 45:1241-7. https://doi.org/10.1111/imj.12918 PMid:26439095

30. Plebani M. Does POCT reduce the risk of error in laboratory testing? Clin Chim Acta. 2009; 404:59-64. https://doi.org/10.1016/j.cca.2009.03.014 PMid:19298804

31. Guttman A, Schull MJ, Vermeulen MJ, et al. Association between waiting times and short term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. BMJ. 2011; 342:d2983. https://doi.org/10.1136/bmj.d2983 PMid:21632665 PMCid:PMC3106148

32. Vera LR. Electronic health records: Is it a risk worth taking in healthcare delivery? GMS Health Technol Assess. 2015; 11: Doc02.

33. Coverys. Risk management strategies for thriving in the transforming healthcare landscape - white paper [Internet], 2011. [cited 16 April 2014]. Available from: http://www.coverys.com/portal/page/portal/Public%20Site/NewsReleasePDFs/RMStrategiesWhitePaperinLetterhead.pdf

34. Weber EJ, McAlpine I, Grimes B. Mandatory triage does not identify high-acuity patients within recommended time frames. Ann Emerg Med. 2011; 58:137-42. https://doi.org/10.1016/j.annemergmed.2011.02.001 PMid:21514968

35. American College of Emergency Physicians. Managing Risk in Your Emergency Department, 2013. Available at; https://pdfs.semanticscholar.org/e9fc/f980cc9a52fbf00948500124ee5d41faf3ff.pdf.

36. Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: A systematic review of causes, consequences and solutions. PloS one. 2018; 13(8):e0203316. https://doi.org/10.1371/journal.pone.0203316 PMid:30161242 PMCid:PMC6117060

37. Nagree Y, Camarda V. J, Fatovich D. M, et al. Quantifying the proportion of general practice and low-acuity patients in the emergency department. Med J Aust. 2013; 198:612-5. https://doi.org/10.5694/mja12.11754 PMid:23919709

38. Moineddin R, Meaney C, Agha M, et al. Modeling factors influencing the demand for emergency department services in Ontario: a comparison of methods. BMC Emerg Med. 2011; 11:13. https://doi.org/10.1186/1471-227X-11-13 PMid:21854606 PMCid:PMC3175194

39. Lucas R, Farley H, Twanmoh J, et al. Emergency department patient flow: the influence of hospital census variables on emergency department length of stay. Acad Emerg Med. 2009; 16:597-602. https://doi.org/10.1111/j.1553-2712.2009.00397.x PMid:19438415

40. White BA, Brown DFM, Sinclair J, et al. Supplemented triage and rapid treatment (START) improves performance measures in the emergency department. J Emerg Med. 2012; 42:332-28. https://doi.org/10.1016/j.jemermed.2010.04.022 PMid:20554420

41. Chang AM, Cohen DJ, Lin A, et al. Hospital strategies for reducing emergency department crowding: a mixed-methods study. Ann Emerg Med. 2018; 71(4):497-505. https://doi.org/10.1016/j.annemergmed.2017.07.022 PMid:28844764

PMCid:PMC5828915

42. Sofie RM, Anna MC, Mahfood A, et al. Non-emergency department interventions to reduce ED utilization: a systematic review. Published in Academic emergency medicine. 2013.

43. Wylie K, Crilly J, Toloo GS, et al. Review article: Emergency department models of care in the context of care quality and cost: A systematic review. Emerg Med Australas. 2015; 27:95-101. https://doi.org/10.1111/1742-6723.12367 PMid:25752589

44. Cassarino M, Robinson K, Naddy B, et al. Impact of early assessment and intervention by teams involving health and social care professionals in the emergency department: A systematic review. PLoS One. 2019; 14:e0220709. https://doi.org/10.1371/journal.pone.0220709 PMid:31365575 PMCid:PMC6668840

45. Christian MS, Peter J, Jakob LF. Evaluation of emergency department performance - a systematic review on recommended performance and quality-in-care measures. Scandinavian Journal of Trauma Resuscitation and Emergency Medicine. 2013; 21:62. https://doi.org/10.1186/1757-7241-21-62 PMid:23938117 PMCid:PMC3750595

46. Eric R, Andres C, Andrea B, et al. Performance Analysis of Emergency Room Episodes Through Process Mining. Int J Environ Res Public Health. 2019; 16:1274. https://doi.org/10.3390/ijerph16071274 PMid:30974731 PMCid:PMC6480699

47. Horowitz LM, Bridge JA, Teach SJ, et al. Ask suicide-screening questions (ASQ): A brief instrument for the pediatric emergency department. Archives of Pediatrics & Adolescent Medicine. 2012; 166:1170-1176. https://doi.org/10.1001/archpediatrics.2012.1276 PMid:23027429 PMCid:PMC6889955

48. Currier GW, Litts D, Walsh P, et al. Evaluation of an emergency department educational campaign for recognition of suicidal patients. The Western Journal of Emergency Medicine. 2012; 13(1):41-50. https://doi.org/10.5811/westjem.2011.6.6803 PMid:22461920 PMCid:PMC3298199

49. Horowitz LM, Snyder D, Ludi E, et al. Ask suicide-screening questions to everyone in medical settings: The asQ'em Quality Improvement Project. Psychosomatics. 2013; 54:239-247. https://doi.org/10.1016/j.psym.2013.01.002 PMid:23398908 PMCid:PMC3657322

50. Rutledge DN, Wickman ME, Cacciata M, et al. Hospital staff nurse perceptions of competency to care for patients with psychiatric or behavioral health concerns. Journal for Nurses in Professional Development. 2013; 29:255-262. https://doi.org/10.1097/01.NND.0000433150.18384.1c PMid:24060662

51. Murphy E, Kapur N, Webb R, et al. Risk assessment following self-harm: Comparison of mental health nurses and psychiatrists. Journal of Advanced Nursing. 2011; 67:127-139. https://doi.org/10.1111/j.1365-2648.2010.05484.x PMid:20969616

52. Coristine RW, Hartford K, Vingilis E, et al. Mental health triage in the ER: A qualitative study. Journal of Evaluation in Clinical Practice. 2007; 13:303-309. https://doi.org/10.1111/j.1365-2753.2006.00759.x PMid:17378880

53. Kirk JW, Nilsen P. Implementing evidenced-based practices in an emergency department: Contraindications exposed when prioritizing a flow culture. Journal of Clinical Nursing. 2016; 25: 555-565. https://doi.org/10.1111/jocn.13092 PMid:26818380 PMCid:PMC4738684

54. World health statistic. monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization (WHO), 2018. (https://apps.who.int/iris/bitstream/handle/10665/272596/9789241565585-eng.pdf, accessed 19 March 2019)

55. World health organization (WHO). Emergency and trauma care. Seventy-second world health assembly, 2019:72;31.

56. Melnyk BM, Fineout-Overholt E. Evidence-based practice in nursing & healthcare: A guide to best practice (3rd ed.). Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins, 2014.

57. World Health Organization (WHO). Health financing policy & implementation in fragile & conflict-affected settings: a synthesis of evidence and policy recommendations. Phoenix Design Aid A/S, Denmark, 2019.

58. Nicholas R, Amit C, Taylor WB, et al. Advancing research on the economic value of emergency care. Risko N, et al. BMJ Global Health. 2019; 4:e001768. https://doi.org/10.1136/bmjgh-2019-001768 PMid:31406603 PMCid:PMC6666808

59. Thind A, Hsia R, Mabweijano J, Hicks ER, Zakariah A, Mock CN. Prehospital and emergency care. Disease Control Priorities• Third Edition, 2015:245. https://doi.org/10.1596/978-1-4648-0346-8_ch14 PMid:26741008

60. Wang M, Moran AE, Liu J, et al. Cost-Effectiveness of optimal use of acute myocardial infarction treatments and impact on coronary heart disease mortality in China. Circ Cardiovasc Qual Outcomes. 2014; 7:78-85. https://doi.org/10.1161/CIRCOUTCOMES.113.000674 PMid:24425706 PMCid:PMC4191653

61. Clark M, Spry E, Daoh K, et al. Reductions in inpatient mortality following interventions to improve emergency hospital care in Freetown, Sierra Leone. PLoS One. 2012; 7:e41458. https://doi.org/10.1371/journal.pone.0041458 PMid:23028427 PMCid:PMC3446969

62. Black CL, Yue X, Ball SW, et al. Centers for Disease Control and Prevention (CDC). Influenza Vaccination Coverage Among Health Care Personnel - United States, 2013-14 Influenza Season. MMWR. 2014; 63:805-811.

63. Institute of Medicine Letter Report. Occupational Health Nurses and Respiratory Protection: Improving Education and Training, 2011.

64. Rimondini M, Busch IM, Mazzi MA, et al. Patient empowerment in risk management: a mixed-method study to explore mental health professionals' perspective. Rimondini et al. BMC Health Services Research. 2019; 19:382. https://doi.org/10.1186/s12913-019-4215-x PMid:31196085 PMCid:PMC6567542

65. Emergency Nurses Association. Care of the psychiatric patient in the emergency department, 2013. ena.org/docs/default-source/resource-library/practice-resources/whitepapers/care-of-psychiatric-patient-in-theed.pdf? sfvrsn=3fc76cda_4. 2013.

66. WHO Regional Office for Europe. The European Mental Health Action Plan 2013-2020. Copenhagen: WHO Regional Office for Europe, 2015. http://www.euro.who.int/__data/assets/pdf_file/0020/280604/WHO-EuropeMental-Health-Acion-Plan-2013-2020.pdf. 2015.

67. McAllister M, Dunn G, Payne K, et al. Patient empowerment: the need to consider it as a measurable patient-reported outcome for chronic conditions. BMC Health Serv Res. 2012; 12:157. https://doi.org/10.1186/1472-6963-12-157 PMid:22694747 PMCid:PMC3457855

68. Náfrádi L, Nakamoto K, Schulz PJ. Is patient empowerment the key to promote adherence? A systematic review of the relationship between selfefficacy, health locus of control and medication adherence. PLoS One. 2017; 12:e0186458. https://doi.org/10.1371/journal.pone.0186458 PMid:29040335 PMCid:PMC5645121