Emergency Department Clinical Risk

15

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Learning Objectives

- The epidemiology of adverse events in emergency department.
- The importance of measuring quality of performance (quality indicators).
- The necessity of providing safety practices and implementation strategy.
- The necessity of finding tools to avoid or reducing adverse events in emergency medicine.
- The importance of implementation infrastructure requirements.

15.1 Background of Emergency Departments

The emergency department (ED) of any institution is an entry point for a significant number of patients to any health care organization. It has to

be conveniently located on the ground floor with direct access to the patients and ambulance. The entrance of the emergency department is always separate from the outpatient department (OPD) entrance. The department caters to various trauma and medical emergencies in both adults and in children round the clock and is adequately staffed with emergency physicians, and nursing staff to handle such emergencies at all times and days.

The common medical emergencies handled in the emergency department includes neurological emergencies like seizures or stroke, respiratory like asthma or any breathing difficulty, cardiac emergencies like myocardial infarction or cardiac arrest or any acute arrhythmia, varied abdominal and gastrointestinal emergencies and trauma emergencies that may include head injury, facial and oromaxillary injuries, chest injury, abdominal injury, musculoskeletal injuries and fractures. Apart from this, the department also caters to patients with poisoning, drowning, hanging, acute allergy, and anaphylaxis and also handles any mass or multiple casualty events and medico legal cases. During non-outpatient hours, the department also handles outpatient-based complaints and nonemergency cases who generally are triage out to OPD during OPD hours.

Unlike wards or ICU, the beds in the emergency department are utilized on a continuous basis for different patients on a given day for initial stabilization and are eventually transferred to appropriate inpatient care areas of the Health

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Care Organization for continuity of care under different specialties (or) discharged from ED after initial treatment with follow-up advice. There are no recommendations or scope for providing continuity of care in the emergency department/beds. The department also oversees operations of the prehospital emergency medical services (ambulance) and coordinates their services.

Maintaining quality and developing error-free systems have been the focus of engineering over the last few decades. The “non-health care” system quality assurance program summarizes their quality assurance in two practical headings, namely paying attention to detail and handling uncertainties.

More recently, quality issues have received much attention in the medical field, and there has been some wisdom from the airline industry, replicated to health care in error prevention by introduction of safety checklists. There are however some fundamental differences between the medical and engineering field (man and machine).

The first aspect is dealing with uncertainties. One of the primary differences between man and machine is the degree of variability. Unlike machines that can be “cloned,” every individual human being is different and each responds and reacts differently to illness and treatment. While there is a general pattern of presentation and response to illness, the uncertainties that one need to be prepared and deal with is more in the medical domain than in the engineering domain.

In emergency medicine, the uncertainties are particularly enormous as mostly the presenting illness is not well defined by the patients and he/she is not fully coherent or conscious to give his symptoms, signs not obviously evident, no support documents or prior medical history available, short therapeutic window, delayed or denied consent and affordability to emergency medical care.

The second aspect is paying attention to detail. Although on the surface this appears to be similar between the medical and engineering field, there is a fundamental difference. Domain experts in the engineering field have made a remarkable difference for machines.

However, the domain experts in medicine need to start understanding the key performance metrics and measure for ensuring better outcomes but still need to have a holistic approach and expertise in order to be successful and have a low margin for error. There is also a lack of adequate expertise in emergency medicine available all over the world.

In light of the above, how do we approach quality issues in the emergency departments?

Prerequisites of a good quality assurance program are:

- (a) It should be reasonably simple
- (b) It should be locally relevant
- (c) Easily implementable
- (d) Should not be resource intense
- (e) Should have tangible outcomes which can be measured

15.2 Epidemiology of Adverse Events in Emergency Department

The emergency department (ED) is considered particularly high risk for adverse events (AE): 60% of ED patients experienced Medication Error [1].

An AE is defined as “an injury caused by medical management rather than by the underlying disease or condition of the patient” [2]. It represent a significant threat to patient safety and public health.

From a systematically review about AE related to emergency department care [3], appears that many studies conducted in multiple countries have reported a prevalence of AE among hospitalized patients ranging from 2.9% to 16.6%, with 36.9% to 51% of events considered preventable [4–8].

Some studies indicate that adverse events related to medical conditions as myocardial infarction, asthma exacerbation, and joint dislocation reach up to 37% [9]. They have shown also that 33% of the near-misses were intercepted.

For what concern chief complain, “alert fatigue” is one of the significant reasons for errors when there is an EMR/HIT [10].

The 29% doctors reported adverse event or near-miss of their ER patients due to poor hand off [11].

The 12% of ED revisits within 7 days is due to adverse events [12].

15.3 Most Frequent Errors Depends on: Patient, Provider, and System

Reasons because the ED is considered particularly high risk for AE include:

- First of all, **patient complexity**, it depends on many issues: age extreme, communication barrier, vague complaints, undifferentiated presentation, mental status changes, cognitive impairment, complex medical condition, delayed presentation, myths and traditional beliefs, and lack of awareness/education or knowledge of a disease.
- Secondly, **care workers**, they could risk making mistakes due to the lack of knowledge and experience on diseases and procedural skills, fatigue (they disrupt sleep cycles for health care), prejudice, and risk-taking behavior (not use personal protective equipment during procedures).
- Thirdly, **the relationship patient–doctor**. Many AE depends on bad communication: at average discharge, the verbal exchange between doctor and patient lasts 76 s. So the incomplete information during an average discharge is 65% [13]. Only 76% of the ED patients get a written diagnosis at discharge and only 34% of the ED patients get instructions on when and how to return to ER/Hospital [14].
- Fourthly, **the work environment** is characterized by time constraints, staff inadequacy, staff’s lack of experience, team/communication problems, overcrowding, equipment lack or failures.

- Lastly, there are **other emerging factors**: multicultural/multilingual patient, relocation/migration of doctors to various countries and health care systems, multi-electronic health recorder (EHR) systems with poor integration for seamless flow.

15.4 Safety Practices and Implementation Strategy

To guarantee the safety practices and avoid AE, we have to do implementation strategy in many settings [15–25]:

1. Infrastructure requirements
2. Basic clinical management process and protocols for quality emergency care
3. Establishing a unit quality department
4. Measuring quality of performance (quality indicators)
5. Sharing best practices
6. Adapting to changing realities

15.4.1 Infrastructure Requirement

The factors which influence the emergency department size and design include a general scope of clinical services provided in the Health Care Organizations (HCO), average volume of ER visits, total number of beds in the HCO, availability of other support services like Radiology & Lab, total floor space, geographical location, demography of the patients who will be handled in the ER (pediatric vs geriatric), or (medical emergencies vs trauma) maximum number of possible users in a given time.

The emergency department design includes:

- **Entrance with:**
 1. Direct access from the road for ambulance and vehicles—clearly marked and with temporary vehicle parking space for cars and other means of patient transport.
 2. Ramp for wheel chair/stretchers.

3. Stretcher and wheelchair placing area.
 4. Well lit entrance with wide doors which can open both ways or one way opening into the ER.
 5. The doors should be wide enough to move a patient in an emergency trolleys comfortably in and out. The ideal width would be minimum 6 ft when both the door are wide open.
- **Waiting area** can be of a total size that includes seating, telephones, display for literature, public toilets, and circulation space.
 - **Triage area** should be able to accommodate patients in wheel chair/emergency stretcher/walking in. The ideal space would depend on the volume of patients received in the department. There is a close operational relationship between triage and reception where registration counter is located.
 - **Resuscitation room (priority 1)**
 1. Should be at least one resuscitation room with a single dedicated bed in the ER.
 2. Ideally there should be an individual closed space with provision for emergency stretcher bed, multi-paramonitor, defibrillator, crash cart, ventilator in each room.
 3. The room should accommodate 4–5 staffs including doctors comfortably and to be able to move around the patient.
 - **Urgent care (priority 2, 3)**
 1. Minimum recommended space between centers of two adjoining beds is 2 m.
 2. Each bed can be separated by a screen on all three sides for providing privacy.
 - **Consultation room (priority 4)** for examination and treatment of priority 4 patients.
 - **Emergency short stay unit (if applicable)**
 1. This facility may be provided either within or adjacent to the emergency unit for the prolonged observation and ongoing treatment of patients who are planned for subsequent discharge (directly from the ED). Mostly applicable to high volume ED.
 2. The types of patients planned to be admitted to this unit will determine the number and type of beds provided, and the design of associated monitoring and equipment however 8 beds is considered to be the minimum functional size.

3. The configuration of the short stay unit should be a minimum of 1 bed per 4000 attendances per year.

- **Nursing station:** a staff room/utility storage room/security room/toilets/pharmacy substores.

The design described below is important to manage patient flow:

The emergency department can have two types of patient input-throughput and output flow based on the volume and space available in the health care institution.

- **For a large volume department**, the entry and exit point of the emergency department are separate. The triage room and registration can be done at the entry, and there is also facility for registering the patient at the entry point. After triage, the patients are moved to the appropriate pre-identified bed space/area for further care. All priority 1 patients are moved to the resuscitation room. Priority 2 and 3 are treated in the urgency care areas which can also be the observation area. Priority 4 patients are triaged out to outpatient department (OPD) or can be handled in emergency room in a pre-designated fast track room or doctor consultation room (especially in non-OPD hours) in the emergency department, and an emergency bed is not necessary for these category of patients. On disposition, the patients are moved into the hospital or discharged through an exit, away from the entry area. Billing counters can be situated at the exit. Bed side billing can also be done.
- **For low volume emergency departments** and HCOs with limited space, the entry and exit is through the same point and the registration and billing counter is essentially located at the entry/exit point. No separate triage room or space is provided and all the patients visiting ER are allotted a bed straight away and a bed side triaging is done. All priority 1 patients are either moved to the bed identified for resuscitation purpose or resuscitation can happen in the same bed. Priority 2, 3, and 4 are treated in emergency beds (Priority 4 can also be treated in ER doctor consultation room (if available). On disposition, the patients are moved into the

hospital or discharged through the same entry/exit point. Billing counters can be situated here and bed side billing can also be done.

15.4.2 Basic Clinical Management Process and Protocols for Quality Emergency Care

Each emergency department is unique as the patient profile varies with locality of the hospital infrastructure within the same city and level of acuity which that particular hospital can handle. Also the disease profiles and health care systems vary across the globe.

Clinical management protocols are based on evidence-based recommendations and best practice recommendation where a clinical evidence is not possible.

Clinical protocols have to be region based applicable to the population demography of the hospital and their health needs.

For example, a trauma center hospital may look into how efficiently they can manage a patient of poly trauma and process to better clinical outcome, like initiating a massive transfusion vs a peripheral pediatric hospital where the nature of emergencies tend to be more medical in nature than surgical.

Irrespective of the locality—the protocols need to be tested and constantly upgraded based on recent updates.

Appropriate mock assessments periodically and audits are a must to ensure the policies and processes and implemented at the ground level.

15.4.3 Establishing a Unit Quality Department

Establishment of quality department is essential in order to examine the association between the scope of quality improvement (QI) implementation in hospitals and hospital performance on selected indicators of quality. Various key performance indicators (KPI) may be set by an identified champion from the emergency department who may be certified through various national or

international training programs for being an internal auditor program or quality implementation in hospital and with help from external accrediting agencies.

Reviews on various aspects of improving KPI must be taken up as a continuous process in order to reduce errors. Coordinate care among settings and practitioners and ensure relevant, accurate information is available when needed as critical elements in providing high level of care.

- **It is extremely important in achieving quality control of the highest standard in medical equipment:** Periodic checks at least once a year is essential in achieving this goal. Can be done for a range of equipment including defibrillators, ventilators, pulse oxymeters, infusion pumps, patient monitors, etc. This may be done as part as set of national and international standards by trained engineers with the help of specialized testing and calibrating equipment as per manufacturer recommendations. It should be concluded by documenting test results and issuing a calibration report. Any measuring equipment or device needs to be tested and checked for its accuracy and calibrated whenever need arises. Testing is done as per domestic standards which implies in accordance with manufacturer specifications, for both safety and performance tests. The results need to be formally documented.
- **Key parameters for testing and calibrating in emergency department may include**
 1. Defibrillators: Electrical safety tests, biphasic energy measurements, ECG, performance and arrhythmia simulation, wave form simulation
 2. Pulse oxymeter: Electrical safety, O₂ saturation, heart rate, pulse amplitude, selectable pigmentation, and ambient light condition
 3. Infusion pumps: Flow rates, occlusion alarm tests, pressure
 4. Ventilators: Modes, lung parameters, etc.
- The entire activity must be subjected to appropriate methods of internal control and inspection.

15.4.4 Measuring Quality of Performance (Quality Indicators)

However, institutions need to adapt appropriate quality indicators, and the following quality indicators can represent the quality of emergency departments:

- Door-to-triage time
- Door-to-doctor time
- Door-to-needle time in stroke thrombolysis
- Pain score assessment
- Investigation return time
- Nurse/patient ratio
- Patient satisfaction level
- Time taken for discharge
- Mortality (Adjusted)
- Length of stay
- Left without been seen by a doctor
- Pain assessment/reassessment
- Safety—patient falls, medication error, failed intubation rate
- Incident reporting and RCA
- Infections—hand-hygiene compliance
- **Door-to-triage time**
 - Description: Time interval of patient arrival to nurse triage
 - Type of parameter: Outcome
 - Formula: Time from patient arrival to time when triage is completed for a particular category of patients
 - Benchmark: Does not exist
 - Action plan: Ensures quality in design, conformance
- **Door-to-doctor time**
 - Description: In case of emergency the time shall begin from the time the patient's arrival at the emergency till the time that the initial assessment is completed
 - Type of parameter: Outcome
 - Formula: Sum of the time taken for assessment/total number of patients in emergency
 - Benchmark: Does not exist
 - Action plan: Ensures quality in design, conformance
- **Door-to-needle time in stroke thrombolysis**
 - Description: In case of acute onset ischemic stroke in window period
 - Type of parameter: Morbidity in stroke
 - Formula: Number of stroke patients thrombolized/number of eligible stroke patients for thrombolysis
 - Benchmark: Does not exist
 - Action plan: Ensures quality in design, conformance
- **Mortality parameter**
 - Description: Standardized mortality rate (SMR)
 - Type of parameter: Outcome
 - Formula: Number of deaths/number of discharges and deaths $\times 100$
 - Benchmark: None
 - Action plan: Ensures quality in design and conformance
- **Patient satisfaction (effective communication)**
 - Description: Efficacy of communication
 - Type of parameter: Process
 - Formula: Quarterly average score/Max score possible $\times 100$
 - Benchmark: Not known
 - Action plan: Through patient satisfaction
- **Patient fall rates**
 - Description: Patient fall rate
 - Type of parameter: Safety; morbidity
 - Formula: Number of falls/number of bed days
 - Benchmark: 8.46/1000 bed days
 - Action plan: Ensures quality in design (beds) and conformance (sedation)
- **Medication errors**
 - Description: Medication error
 - Type of parameter: Safety
 - Formula: (Number of errors/number of bed days) $\times 1000$
 - Benchmark: 1.2 to 947/1000 bed days (reported)
 - Action plan: Clinical pharmacists; process (2-people check)
- **Compliance to hand-hygiene protocols**
 - Description: Compliance to hand hygiene
 - Type of parameter: Infection; outcome; safety

- Formula: $(\text{Number adhered}/\text{total number of procedures}) \times 100$
- Benchmark: 90% adherence
- Action plan: Surveillance; health education
- **Investigation return time**
 - Description: Radiology CT investigation report
 - Type of parameter: Adherence to protocol
 - Formula: Time of order to time of reporting
 - Benchmark: 60 min
 - Action plan: Clinical audit
- **Length of stay in ER**
 - Description: Average length of stay
 - Type of parameter: Adherence to protocol, safety
 - Formula: Total length of stay of all patients in hours/total number of patients
 - Benchmark: 240 min
 - Action plan: Audit
- **Nurse patient ration in ER**
 - Description: Nurse per bed per shift
 - Type of parameter: Safety, mortality, morbidity
 - Formula: Number of nurse/number of beds in each shift
 - Benchmark: Does not exists
 - Action plan: Audit
- **Pain management in ER**
 - Description: Proportion of patients presenting with pain in whom validated pain score is documented
 - Type of parameter: Key performance indicator
 - Formula: Patients with pain assessment using validated score/total number of patients presented with pain $\times 100$
 - Benchmark: Does not exists
 - Action plan: Audit
- **Time taken for discharge**
 - Description: Discharge is the process by which a patient is shifted out from the ED with all concerned medical summaries after ensuring stability
 - Type of parameter: Safety
 - Formula: Sum of time taken for discharge/number of patients discharged
 - Benchmark: Does not exists
 - Action plan: Audit
- **Left against medical advice**
 - Description: Percent of patients who leave the ED before examination
 - Type of parameter: Safety
 - Formula: Total number of patients who leave ER before seen by doctor/total number presented to ER during the time of study $\times 100$
 - Benchmark: Does not exists
 - Action plan: Audit
- **Non-conformance control and management**
 - Any non-conformance observed should be properly reported through incident reporting system which will be reviewed by a multidisciplinary committee and quality department of the hospital.
 - The non-conformances could be
 - (a) Near-miss
 - (b) Medical error
 - (c) Sentinel event
- **Configuration control and management under quality of design**
 - Any process change in hospital flow system or physical layout or functions related to assignment pattern of doctors/staff need to be reported and discussed in the leadership team meet of the institution along with the justification of such a change and approval.

15.4.5 Sharing Best Practices

A “Best Practice” can be defined as a technique or methodology that has proven reliably to lead to a desired result.

At a minimum, a best practice should:

- Demonstrate evidence of success
- Affect something important (e.g., safety, wait time)
- Have the potential to be replicated to other settings
- Evidence-based protocols/guidelines must be incorporated to deliver care

- Guidelines can improve patient safety, streamline methods of care, lower costs and increase efficiency
- Communication and academic discussions among Clinicians and Department staff may ensure a smooth process for implementation of guidelines, e.g., hand washing practices/reducing rates of central venous catheter-related infection
- Ensure guidelines are updated regularly
- Institutional support from leadership and making evidence-based guidelines a habit among all levels of staff

15.4.6 Adapting to Changing Realities

15.4.6.1 Digitization

Opportunities for using data to improve the health system are partially driven by technological advances. New analytical methods, more efficient processing, and automation of routine analyses and analytics, for example, make it easier to draw insights from health data and to present the resulting information in an actionable format.

In the clinical setting, secondary use of health data can improve quality initiatives and the effectiveness of frontline care. For health system management, health data can be used to manage and improve the effectiveness and efficiency of the health system by informing program, policy, and funding decisions. For example, costs can be reduced by identifying ineffective interventions, missed opportunities, and duplication of services.

To facilitate health research, health data can be used to support research that informs clinical programs, health system management, and population and public health. Such research spans multiple fields.

15.4.6.2 Measuring Patient Feedback

Patient feedback systems are used to know their experiences when visiting the hospital, understanding of the services hospitals offer and opinions on changes you may have recently introduced or plan to make.

With a good feedback system, one can increase your understanding of what patients think about a hospital, understand areas of concern and take action to transform the experience for patients. One can make changes and use the system to monitor patient reaction, gradually improving the practice based on accurate feedback.

Patient experience measures:

- should be developed with patient input to ensure that they are representative of their needs, values, and preferences
- reveal critical information about the extent to which care is truly patient centered
- provide a rigorous, validated alternative to the subjective reviews that are posted on a large number of review sites

Service Excellency

Other than the time lines mentioned at the 4 priority levels, other measures that may be undertaken to reduce times:

- Gather prior information about arrival of patient
- Delegate documentation to other trained staff
- Create appropriate policies in order to reduce time
- Use telecommunication systems to deliver relevant information about patient from the time of first paramedic contact

Clinical Audit

- The review of clinical performance against agreed standards, and the refining of clinical practice as a result—a cyclical process of quality improvement in clinical care.
- The systematic critical analysis of the quality of health care, including the procedures used for diagnosis, treatment and care, the use of resources, and the resulting outcome and quality of life for patients.
- Monitor the use of particular interventions, or the care received by patients, against agreed standards. Any deviation from “best practices” can then be examined in order to understand and act upon the causes.

There are different modalities with which we can do a clinical audit:

- **Standards-based audit (criteria-based audit)**

This is the recommended process. Current practice is compared against defined criteria, standards, or best practices, through the “audit cycle”

- **Peer review audit**

With the benefit of hindsight, the quality of services provided is assessed by a team, reviewing case notes and seeking ways to improve clinical care. This is especially applicable in “interesting” or “unusual” cases.

- **Significant event audit**

Adverse occurrences, critical incidents, unexpected outcomes, and problematic cases causing concern are reviewed systematically and solutions implemented. Surveys targets for opinions or suggestions may include patients or special focus groups. Information gathered is then analyzed and change implemented as appropriate.

Stages of an audit

1. Prepare and plan for the project
2. Select an area to audit
3. Defining criteria and setting up standards
4. Collection of data
5. Analyze results
6. Identify solutions for improvement and implement changes
7. Re audit to monitor the impact of changes (close audit loop)

This must be led by senior clinicians in the department and must be reported to the audit review boards and discussed with higher stakeholders for implementation and continuous improvement.

15.4.6.3 Test Optimization

In the emergency department, accurate diagnosis in a minimum of time is critical to ensure the best patient outcomes. Every minute is essential.

High-risk patients with potentially life-threatening conditions must be identified quickly and appropriate treatment initiated. At the same time, cost containment and optimized patient flow management are also essential.

Use of protocols play an important role, for example, the latest guidelines for diagnostic management of acute venous thromboembolism, which recommend using algorithms that combine clinical probability assessment with a quantitative D-Dimer test. This limits the number of required imaging tests, offering cost saving and prevention of patient harm or Troponin I may safely rule-out and accurately rule-in acute Myocardial infarction (non-ST elevation myocardial infarction) in 70% of suspected chest pain patients when sent at an appropriate time.

Patient-centered outcomes research as applied to optimization in tests such as those mentioned above or diagnostic imaging includes the engagement of patients in the decision-making process to order imaging, deliver the results to patients and caregivers, and follow-up incidental findings from the diagnostic test. One aspect of patient-centered care is the process of shared decision-making, which allows patients and their providers to make health care decisions together, taking into account the best scientific evidence available, as well as the patient’s values and preferences.

Clinical decision rules (CDRs) are evidence-based algorithms derived from original research and are used to provide guidance for clinical decision-making. They can either be “directive” (suggesting a course of action) or “assistive” (providing evidence to enhance clinical judgment).

Well-validated CDRs can potentially reduce the use of diagnostic tests and empower clinicians with risk assessments for a given constellation of clinical symptoms and signs. They can also serve to reduce inappropriate variation in practice by offering evidence to assist the clinician at the point of care.

15.4.6.4 Work Culture

Safety

Various factors compromise the security of working doctors in the emergency rooms. Few of these include:

1. 24 h accessibility of the emergency department
2. Lack of adequately trained armed or security guards
3. Patient pain and discomfort
4. Family member stress due to patient's condition and fear of the unknown
5. Family member anger related to hospital policies and the health care system in general or cramped space
6. Long wait times

At a minimum, workplace violence prevention programs should:

1. Create and disseminate a clear policy of zero tolerance for workplace violence, verbal and nonverbal threats and related actions.
2. Ensure that managers, supervisors, coworkers, clients, patients, and visitors know about this policy.
3. Ensure that no employee who reports or experiences workplace violence faces reprisals.
4. Encourage employees to promptly report incidents and suggest ways to reduce or eliminate risks.
5. Require records of incidents to assess risk and measure progress.
6. Outline a comprehensive plan for maintaining security in the workplace. This includes establishing a liaison with law enforcement representatives and others who can help identify ways to prevent and mitigate workplace violence.
7. Assign responsibility and authority for the program to individuals or teams with appropriate training and skills.
8. Ensure that adequate resources are available for this effort and that the team or responsible individuals develop expertise on workplace violence prevention in health care and social services.

9. Affirm management commitment to a worker-supportive environment that places as much importance on employee safety and health as on serving the patient or client.

Reference to Standards

Developing benchmarks to incorporate best practices is absolutely essential to maintain quality in health care. Quality governing bodies such as QCI and accreditation boards like the NABH work in collaboration with hospitals across the country to achieve the same. Benchmarking of a particular standard may be derived from the best evidences in clinical practice or standards set by external agencies such as the WHO. Further, continuous audits and statistical analysis by existing quality departments across hospitals may ensure implementation and impact of implementation as a prerequisite to continuous quality improvement. Potential key performance indicators may also be identified. Also benchmarks can be internal based on the measured performances of the department.

Communication Best Practice

All emergency departments have to ensure that the patients, relatives, the primary physician are well informed about the clinical status of the patient through a structured communication protocol. A communication checklist to ensure adequate communication has taken before disposition needs to be implemented in all emergency departments.

Culture of Safety

Culture of safety with promotion of reporting errors, teamwork, communication openness, transparency with feedback, learning from errors, and administrative collaboration. Identify champions of quality and patient safety in ER.

Standardize

- Communication
- Crucial information
- Verifying comprehension
- Discharge process
- Hand off
- Measures (e.g., kgs vs lbs)
- Documentation

- Time shifts
- Checklists
- Transparency
- Public posting/reporting of quality data
- Patient satisfaction and experience scores
- Feedback reviews
- Communication and Resolution Programs (CRP)

Regulation

- Professional self-regulation
- Maintenance of certification
- External accreditation
- Leadership program for emerging units

Financial Incentive

- Incentive for performance
- “No pay” for preventable complications
- Accountable care organization—Group incentive to deliver coordinated care and outcome

Liability Reform

- Enterprise liability
- Safe harbors
- Administrative compensation systems or health courts

15.5 Clinical Cases About Worse Practices That Didn't Consider the Importance of Non-Technical Skills/ Technical Skills

15.5.1 Non-Technical Skills Case

A 50-year-old white man with a history of hypertension, hyperlipidemia, obesity (body mass index, 34.9 kg/m²), and chronic tobacco use presented with presyncope symptoms.

Severe pressure-like chest pain had started 24 h previously and had completely resolved spontaneously 12 h before the current presentation. An electrocardiogram (ECG) showed persistent ST-segment elevation in the anterior leads. He was hemodynamically well compensated. Initial laboratory reports showed cardiac troponin I elevation to a level above 50 ng/mL. After 15 min he came into the hospital, the patient

experienced sustained ventricular tachycardia and then lost consciousness. He had no spontaneous respirations, and neither the carotid nor femoral pulses could be palpated. So the resuscitation team came into the patient room. The team members are good staff who came from different hospitals and they had not ever worked together, so they were able to perform the functions of their role but they did not understand how they have to interface with the other members of the team.

The team leader did not know the team members and tried to ensure that the resuscitation effort flows smoothly and that each task is completed properly, but he failed.

He did not organize the team because he did not know the abilities of each of the team members. He did not monitor the performance of each role. He did not clearly define each task and verify that assignments are understood.

The team member did not let the team leader know if a task was beyond one's own skill level and did not inform the leader that the task was understood completed.

They did not speak clearly, nobody kept the time of the drugs, the shock time, neither revaluation's time, and the resuscitation was getting worse.

The team was out of control.

Fortunately, a nurse draws attention to changes in the patient's status and she notes that the patient had ROSC.

This is an example that what happens to team members and the leader when each one did not meet the expectations of own role in the team, there was not clear, property, closed-loop communication; there was no knowledge sharing.

Below you could find ACLS' team dynamics guidelines [26]. One of the new features in the 2015 guidelines is an emphasis on team dynamics. In order to provide optimal outcomes, each team member must be able to perform the functions of his role and must understand how his role interfaces with other roles on the team. Usually, a resuscitation team will have one team leader. This leader is responsible for ensuring that the resuscitation effort flows smoothly and that each task is completed properly. This role is often filled by a physician but can be done by anyone who can:

- Organize the team
- Monitor the performance of each role
- Perform any skills if necessary
- Model appropriate behaviors
- Coach other members of the team as necessary
- Focus on provision of exceptional care
- Mentor the group by providing a critique of team and individual performance when the resuscitation is over

Team members should be assigned to roles based on their scope of practice and training for the assigned tasks. A team member must be able to:

- Understand his role in this resuscitation
- Perform the tasks assigned
- Understand the ACLS protocols and algorithms
- Promote and contribute to the success of the team

Expectation	Team leader actions	Team member actions
Roles	Knows the abilities of each of the team members	Team member will let the team leader know if a task is beyond his skill level; asks for help if unable to complete a task
Communication	Clearly defines each task and verifies that assignments are understood; confirms performance of task	Informs the leader that task is understood; informs the leader when each task is completed
Messages	Speaks clearly and in a normal tone of voice when giving assignments and orders	Speaks clearly and in a normal tone of voice when acknowledging assignments and orders, and feels comfortable questioning unclear orders

Expectation	Team leader actions	Team member actions
Knowledge sharing	Asks for suggestions from team members for alternative actions when needed	Shares information with team and helps to identify actions that may be inhibiting the resuscitation effort
Intervention	Intervenes quickly but gently if a team member is about to perform an incorrect action or if a task is taking too long	Asks the leader to repeat an order if the member thinks an error will occur and feels comfortable suggesting alternative courses of action
Evaluation and summary	Asks for suggestions for alternative actions from team members; is constantly aware of patient's responses; keeps team members informed of patient's current status and plans for change in actions; provides positive and corrective feedback as needed	Draws attention to changes in the patient's status or response to treatments

15.5.2 Technical Skills: Central Venous Line

A 77-year-old man presented to the emergency department with abdominal pain. His medical history included treated hypertension and hypercholesterolemia, previous heavy alcohol intake, and mild cognitive impairment. He was drowsy and confused when roused and was peripherally cold with cyanosis. The systemic arterial blood

pressure was 75/50 mm Hg, and the heart rate was 125 beats/min. The abdomen was tense and distended. After the administration of 20 mL/kg of intravenous crystalloid, the blood pressure was not restored, so the EM physician decided to start vasopressor infusion to support blood pressure.

In order to avoid phlebitis or sclerosis, the doctor decided to place a central venous line in the right internal jugular vein. Considering the urgent clinical scenario, he did the procedure without ultrasound using anatomical landmarks.

He was very scared about the patient's vital parameters that were getting worse, so he settled on to not prepare the site in a sterile fashion neither wear sterile dressing nor place the patient in the appropriate position for the site selected (IJV).

He did not infiltrate the skin with 1% lidocaine for local anesthesia around the site of the needle insertion.

Using anatomical landmarks, he inserted the introducer needle with negative pressure, but suddenly the patient turned his head due to pain and he misplaced the needle in the carotid artery. So he went out with the needle and squeezed the punctured site to avoid hematoma. He tried again but he did pneumothorax and he had to put a chest tube to decompress it.

Finally, he placed the CVC line; a computed tomographic scan of the abdomen showed extraluminal gas and suspected extraluminal feces consistent with a perforated sigmoid colon. He was treated with intravenous antibiotics and taken to the operating room for laparotomy and was admitted to ICU.

This is an example of what happens if you do not follow procedures, do not use guidelines and checklist, and do not do it again and again over a fake patient in simulation laboratory. Following procedures, guidelines, checklist, and simulation's experience, it could be possible avoiding CVC's complications that include pain at cannulation site, local hematoma, infection (both at the site and bacteremia), misplacement into another vessel (possibly causing arterial puncture or cannulation), vessel laceration or dissection, air embolism, thrombosis, and pneumothorax requiring a possible chest tube.

What was the doctor supposed to do?

1. Prepare the equipment, syringe and needle for local anesthetic, small vial of 1% lidocaine, syringe and introducer needle, scalpel, guidewire, tissue dilator, sterile dressing, suture and needle, central line catheter. If it is difficult to remind everything, it is possible to use a checklist with all the equipments and you have to put a tick near the material you bring.
2. Place the patient in the appropriate position for the site selected, then prepare the site in a sterile fashion using the sterile solution, sterile gauze, and sterile drapes. For the internal jugular and subclavian approach, place the patient in reverse Trendelenburg with the head turned to the opposite side of the site.
3. Infiltrate the skin with 1% lidocaine for local anesthesia around the site of the needle insertion.
4. Use the bedside ultrasound to identify the target vein, if anatomical landmarks are not clear.
5. Insert the introducer needle with negative pressure until venous blood is aspirated. Whenever possible, the introducer needle should be advanced under ultrasound guidance to ensure the tip does not enter the incorrect vessel or puncture through the distal edge of the vein.
6. Once venous blood is aspirated, stop advancing the needle. Carefully remove the syringe and thread the guidewire through the introducer needle hub.
7. While still holding the guidewire in place, remove the introducer needle hub.
8. If possible, use the ultrasound to confirm the guidewire is in the target vessel in two different views.
9. Next, use the scalpel tip to make a small stab in the skin against the wire just large enough to accommodate the dilator (and eventually, the central venous catheter). Insert the dilator with a twisting motion.
10. Advance the CVL over the guidewire. Make sure the distal lumen of the central line is

uncapped to facilitate passage of the guidewire.

11. Once the CVL is in place, remove the guidewire. Next, flush and aspirate all ports with the sterile saline.
12. Secure the CVL in place with the suture and place a sterile dressing over the site.

15.6 Recommendation

Research on AE in multiple care settings has identified that the emergency department (ED) is considered particularly high risk for adverse events (AE).

To guarantee the safety practices and avoid AE, we have to do implementation strategy in many settings: infrastructure requirements, basic clinical management process and protocols for quality emergency care, establishing a unit quality department, measuring quality of performance (quality indicators), sharing best practices, adapting to changing realities and create and disseminate a clear policy of zero tolerance for workplace violence, verbal and nonverbal threats and related actions.

Developing benchmarks to incorporate best practices is absolutely essential to maintain quality in health care is very important too. Further, continuous audits and statistical analysis by existing quality departments across hospitals may ensure implementation and impact of implementation as a prerequisite to continuous quality improvement. Potential key performance indicators may also be identified.

Structured communication protocol allows the patients, relatives, the primary physician are well informed about the clinical status of the patient. A communication checklist to ensure adequate communication has taken before disposition needs to be implemented in all emergency departments.

Furthering the promotion of reporting errors, teamwork, communication openness, transparency with feedback, learning from errors, and administrative collaboration.

Identify champions of quality and patient safety in ER.

Furthering standardize communication, time shifts, checklists, patient satisfaction and experience scores, feedback reviews.

In the clinical practice, it is important doing alias clinical audit to examine any deviation from “best practices” to understand and act upon the causes.

The simulation also has to become a way to avoid AE in emergency department improving care workers’ technical and no-technical skills.

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