

# Effect of Organization, Hygiene, Monitoring and Stress on Patient Safety

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## Abstract

Significant effort is mobilized in intensive care patients to establish a highly developed culture of patient safety. Despite that, there may still be room for improvement. Intensive care unit (ICU) patients represent a particularly vulnerable group, for they are often incapacitated to express feelings and needs. Patient safety is a multilevel process, the pitfalls and potential detrimental outcomes are described by the later discussed Swiss cheese model. The key principles of patient safety-related actions and behaviors discussed below are clarity and simplicity, organized workflow, protocols and guidelines, monitoring change and adherence, hygiene, patient monitoring and creating an optimal working environment.

**Keywords:** Patient safety; Simplicity; Clarity; Electronic documentation; Organized workflow; Leadership stratification; Continuity of care; Clinical trials; Disinfectants; Depth of anaesthesia monitoring; Stress; Noise

**Abbreviations:** ICU: Intensive Care Unit; SALA: Sound Alike, Look Alike Medications; NEWS: National Early Warning Scores; NCS: Neecham Confusion Scale; DOS: Delirium Observation Screening Scale; UTI: Urinary Tract Infection; AE COPD: Acute Exacerbated Chronic Obstructive Pulmonary Disease; EMA: European Medicines Agency; ARDS: Acute Respiratory Distress Syndrome; LOS: Length of Stay; CLABSI: Central Line Associated Bloodstream Infection; CHC: Chlorhexidine; DOA: Depth Of Anaesthesia; POCD: Postoperative Cognitive Dysfunction; BSR: Burst Suppression Ratio

## Introduction

Implementations towards enhanced patient safety require an integrative approach, based on exchange of knowledge and cross-talk between medical and biological sciences. Societies in the wake of recent heightened economic demands become increasingly cognisant about financial limits in providing quality healthcare. Patient safety can be maintained and improved by implementing qualitative steps in organization, continuity of care and electronic documentation, reevaluating simple hygiene oriented strategies based on recent research results, enhanced patient monitoring, and orienting attention to noise and stress affecting patients and providers [1]. The emphasis of this work is on anesthesia and intensive care scenarios.

## Aspiration for Simplicity and Clarity

Health management is becoming increasingly complex due to the technical and medicinal advancement with diverse subspecialties. Simplicity and clarity should be aimed at wherever feasible without jeopardizing quality and detail [2]. Medical errors, caused by naming, dosing confusions, abbreviations, disorganized, extensive, handwritten documentation, crowded and scurrying working conditions may be vitiated by applying simple commands and logarithms. Complicated and extensive naming and documentation may become counterproductive in an acute and fast turnover environment. For an anaesthesiologist, who is faced and presented with a rapidly deteriorating patient, speedy engulfment of composite information may become challenging. The issue of Sound Alike, Look Alike Medications (SALA) may depreciate nursing performance. Effective shortness, avoidance of unnecessary wording and emphasis on clinically important aspects are strengths of a forceful and adequate approach [3].

The exemplary daily patient documentation contains short electronic assessment of relevant mental, physical, and laboratory parameters by the attending physician, electronic documentation of the action plan, and electronic documentation of the change in status and actions taken as well as short nurse notice of providing services that are out of the scope of documented routine, such as NEWS scoring, daily updated overview of the current hospitalization dynamics in the timeline supports effective problem solving. Constituents, like simple and organized electronic access to consultations, evaluations, imaging and laboratory parameters, patient history, filing printouts to enable the retrieval of electronic information and an updated maintenance of focused and problem-oriented quality documentation enhance the safe creative working process.

Detailed, structured handover, and implementing overviews of circumstances, procedures and outcomes in daily succession in a structured format, with daily updates, integrated into documentation enhance continuity of care.

### Organized Workflow

To achieve organized workflow, inter- and intradepartmental communication is essential. With appreciated feedback from actual users, communication is an enhancer of adherence, particularly during handover, multidisciplinary meetings, and between healthcare entities. Designated outreach personnel, or even ad hoc task forces, to timely and professionally handle interdepartmental requests are of great value.

Lack of strategies, and constantly reinventing approaches and communications leads to a chaotic work environment, resembling action movies more than desirable working conditions, with potential for major mistakes, patient and medication mix-ups, and errors. Allocating roles, knowing one's place and accepting responsibilities with eagerness to fulfill them are basic to an organized workday. The harm of overt chaotic activity is only surpassed by the consequences of ignorance.

An essential component of organized workflow is team training, which should be systematic, but most importantly practically applicable, translational, with hands-on demonstrations. The failure to intertwine theory with practical application jeopardizes efficacy, therefore learning should be integrated into ongoing practice. Implementing modification is optimally gradual, allowing sufficient time for adaptation and embedding into the system.

### Leadership Stratification and Continuity of Care

Despite thorough medical and specialist training, the time spent in the field, the versatility and the number of situations constitute the components of becoming a professional expert. Building from the groundwork warrants familiarizing the practitioner with all aspects of clinical care.

Overgrown, self-important behaviorally aggressive personalities are not less frequent among healthcare providers and they often do not reflect professionalism and experience accordingly and appropriately. Presumptuousness and daring attitude may very well collide with patient safety.

In many institutions departmental hospitalized patient care is planned in weekly or even longer periods for attending ward doctors, other places have frequent changeovers, potentiating the susceptibility to errors in apprehension of often extensive patient history. Continuity in care by dedicated time in predetermined blocks may enhance performance.

### Protocols, Guidelines and the Quality of Evidence

The cornerstone of healthcare is a structured, logical, pathophysiological understanding of coherencies, and the ability of a flexible, fast, systematic response, best suited and customized for the needs of the individual. Yet protocols, guidelines and recommendations are of immense importance, creating a framework of action. The reason for the existence of protocols is manifold.

It is the ever-changing personnel, the multitude of experimental and clinical studies, the assortment of global and local guidelines with variable levels of evidence, the need for enhanced communication, and integrated, speedy responses in stressful situations, in a busy work environment.

Protocols ideally integrate the latest advancements in the field with local work methods therefore they are subject to change and upgrading. In the case of guidelines, the optimal stratification of evidence is implemented in referring to guidelines as imperative, compulsory - based on a high level of evidence; recommendations - based on mid-level evidence, and opinions - based on low-level evidence. Expert opinion may be the major lead or guide, due to the lack of statistical evidence, or solitary low-level evidence trials, alternatively in situations of conflicting statistical evidence [4].

Multicenter, prospective randomized studies are not always available and if so, they arise after stringent criteria, excluding the majority of performed studies and patient populations to achieve homogeneity of the monitored parameters. High-quality studies are selected, representation is shrunk and adjustment for variables to create homogenous, comparable study groups is challenging. Randomization allows control treatment parameters, and blinding ensures objectivity.

It is challenging to provide evidence on large population data because there is an ongoing danger of not being able to control for all dominant variables. The Simpson paradox describes statistical situations when analysis of pulled data offers statistically opposing results. When originally considered as a whole, populations are sub-grouped based on internally more homologous, externally distinguishing features, the statistical significance flips in direction. If confounding factors are unevenly distributed among examined groups, the Simpson paradox is likely to emerge [5,6]. In an ideal world identifying and controlling for confounders and homogenous subgrouping should eliminate the Simpson paradox. Randomization aids in eliminating the paradox, by assigning groups by chance. If sufficiently large groups are created, that is usually in hundreds, the confounding features become proportionately represented among groups, at least that is the hope.

Comorbidities in clinical trials are occasionally assessed by the Charlson comorbidity index. The index can be too inaccurate for

research purposes, carries an inherent potential for flaws, and may skew the statistical analysis. The index is a valuable orientational predictive clinical tool, but in my humble opinion not sufficiently precise to establish comparable patient groups in research [7].

### Quality Control, Internal and External Audits

The ongoing quality control of patient care and safety, the implementation and efficacy of introduced changes, the adherence and level of practicality and integration of procedures aimed at optimizing patient safety are monitored via multiple channels, audits and statistical analysis, patient, relative and worker questionnaires may mirror the adequacy of the work provided.

The internal audits may lead to underestimation of the “Cheese Holes”, yet if done thoroughly, may establish high safety ethics, and external audits may not be suitable for the needs of the local work environment. Nevertheless, major problems will be depicted [8].

Synchronizing requirements for work ethics and quantity in harmony with patient needs is demanding [9]. Resource-conscientious and limited environments often struggle to achieve qualitative and quantitative security, particularly in the context of high prices of medications and technical support. External technical and training support to equipment should be continuously part of the service.

An example of the perception dilemma is the following nurse-led and evaluated study that compared the feasibility of the Neecham Confusion Scale (NCS) and the Delirium Observation Screening Scale (DOS) for delirium. Almost one hundred patients had been followed in a University hospital setting during day, afternoon and night shifts. The authors, similarly to our experience recognize, that nurses are not well trained to discriminate features of hyperactive delirium, even less that of hypoactive delirium. Aggressiveness, negativism, overt positive attitude, or reticent numbed behavior are often misinterpreted as personality traits. A questionnaire-based study of nurse experience has rated DOS superior to NCS screening, in that DOS was faster to perform, and in the case of the NCS need for explanatory help to understand was more often requested by the nurse (19,4 %, vs. 2,7%), the clarity of answers was superior in the former, and overall performance of DOS was more valuable for a nurse to spot delirium symptoms. This opinion is worthwhile and requires consideration, however, burdened by bias, for example, in that easier may have been interpreted as better. A more objective professional feedback would be necessary to conclude, which questionnaire reflects better the delirium incidence and severity [10].

Adherence to enforced changes may frequently be partial, consequently, statistical monitoring of efficacy and outcome may not be reflective. For example, adherence in some ICU settings to regular sedation hold in mechanically ventilated patients was about 50% in a clinical study [11].

There is however a degree of freedom of treatment modification and application based on local circumstances and individual patient needs, a customized approach, that is not always attainable by schemes. The reasons for the lack of adherence should be

investigated, it may help advance the practicality and rationality of instructions.

In the case of daily sedation breaks, a stratified approach is needed, because the sedation hold does not apply blindly to every ICU patient, without jeopardizing brain and cardiorespiratory stability, hence partial adherence may represent appropriate, personalized care.

The cohesion to recent 2016 updates on FDA-induced restrictions on quinolone antibiotic prescriptions for uncomplicated Urinary Tract Infections (UTI), acute sinusitis and acute exacerbations of chronic obstructive pulmonary disease (AE COPD) had demonstrated an immediate and sustained significant decrease in quinolone administration in United States private practices, representing excellent adherence [12].

Likewise, The European Medicines Agency (EMA) published recommendations on the restricted usage of quinolones due to effects that may adversely influence connective tissue function and mental health [13]. These restrictions didn't elicit a statistically significant change in adverse effect reporting frequency, based on the Eudra Vigilance database [14]. The mechanism of quinolone action is the impairment of bacterial DNA synthesis. Unfortunately, increased matrix metalloproteinase (MMP1,2,13) activity had been corroborated in hosts, leading to collagen degradation with the potential of damaging connective tissue such as the cartilage, tendons, and lungs. Such effect is fortified by concomitant steroid usage [15].

Moreover, quinolones chelate cations, increase the efficacy of pro-apoptotic caspase-3 and fortify Reactive Oxygen Species (ROS) activity, contributing to oxidative stress. Based on the above, EMA cautioned against the use of quinolones in the elderly, patients with kidney problems and organ transplant recipients, particularly in situations of concomitant usage with steroids due to increased tendency towards tendon injury.

A yet to be answered question is the quinolone effect on the severely damaged lung, requiring mechanical ventilation in case of severe COVID infection, Acute Respiratory Distress Syndrome (ARDS), and pneumonia, where increased connective tissue demolition and ROS production are potentially major confounders, or in a severely failing heart, that has already reached a detrimental level of fibrotic rearrangement. An arrhythmogenic potential and increased cardiac mortality based on a meta-analysis of existing clinical trials have been reported. EMA warned to weigh the risk-benefit ratio and the need for quinolones in cardiac patients [16].

The clinically applicable literature and warning of quinolone application in severely damaged lungs is sparse, but common sense drives one towards wariness and carefully evaluating the risk-benefit ratio [17,18].

A significant occurrence of pneumothorax and pneumomediastinum has been noted for example in COVID patients requiring mechanical ventilation, and one wonders to what degree do quinolones bestow to such damage [19].

In monitoring and highlighting, insufficiencies to negative constituents are exposed. Avoidance of stigmatizing, that is mistakes are often a result of collective failure and a developing level of current understanding and evidence based on the latest applications of research studies, and picking the end of the chain as the culprit is frequently not a real solution.

Human fallibility can be stigmatizing, aggrandized and abused, in contrast, constructive communication may potentially deflect uneven exposure, and aid to better outcomes.

### The Theory of the Swiss Cheese Model

The model has been developed to describe the active and latent failures as holes in a cheese, that may or may not retain poured water, and conclude in clinically evident mistakes on one-to-many, many-to-one basis [20]. When mistakes do not have an apparent consequence, they may deceitfully encourage the system to sustain them. An example is the Titanic disaster, where a series of latent failures and miscommunications in the environment of press-mediated propaganda of infallible quality, have led to irreparable damage. The reasons for failure had been fully disclosed due to very thorough research decades after the tragedy. The poor choice of building material, the disposal of life-saving boats, the last-minute change in the management crew, the missing binoculars, the poor decision on how to react to the extremes of weather and the maneuvers to avoid collision, the reckless behavior of sailor on duty, ignoring and not forwarding warning messages incoming from the surrounding ships, created a malevolent series of unfortunate events, that individually may have been latent, but in concurrence culminated in deadly collision [21]. In a multilevel, complex system the aim is to find and fill every single cheesehole for the leak to disappear.

### Old Habits Die Hard

When introducing changes, breaking old habits may become the most difficult task. Societies vary in their levels of flexibility, and contrivance on old structures. Organizations may function based on bureaucracy, market-driven, with clan attitude or as adhocracies. Each of the subtypes has beneficial attributes and downsides. Aspiring for a dynamically evolving system is typical for adhocracy, but there is an unacceptable level of risk-taking not suitable for healthcare and a lack of long-term security, therefore a cohesive middle road is advocated by many [22]. Similar dynamics follow the narrower society of healthcare terrain. Certain groups strive for established forms, while others have an attitude of admiring and accepting anything that has been written and advocated by an external source, that is rated based on cultural and professional preference highly. Both extremes are detrimental, yet both extremes participate in the dynamic establishment of the final balance, that is respect for the good old functional, established ways and careful acceptance of new approaches, ideally once proven safe and effective. There should be wisdom in protecting the valuable old habits over change, while promoting reasonably sophisticated new ways, representing true quality revitalization.

An example is the observed titration paradox in anaesthesiology [23]. Conventional methods calculate weight-based doses as initial standards for patients. The titration paradox recognizes the existence of further variables in that individuals in the population exhibit differential degrees of response to fixed-dose regimens based on their sensitivity, and confounding variables, such as receptor upregulation, metabolic rate etc., that are not accounted for during simple weight-based calculations. This paradox becomes scientifically articulated, and becomes obvious when drugs are targeted to a certain effect (entropy level for example).

### Hygiene

Extensive advisory and practical work is related to hygiene that has been illuminated by the recent pandemic. The discovery and widespread utilization of antibiotics revolutionized infection control, but the availability of antibiotics should not desensitize our vigilance towards high principles of hygiene. Systematic and regular monitoring of the microbial environment of incoming patients who are at heightened infective risk should not be the exclusive feature of the ICU context. Using dedicated clothes, cleaned under standard conditions appropriate for infectious environment standards for all healthcare-related personnel, with stringent dis-allowment of carrying on outside hospital facilities is desirable.

ICU personnel should undertake showers before and after entering shifts. Interdepartmental relocation of patients should ideally be preceded and followed by a whole-body wash.

Safe waste disposal of body fluids and biohazard material is planned and executed to liquidate pathological microorganisms, however, manifestly not contaminated urine is often not considered regulated waste and is not required to be discarded as biohazard waste or neutralized, unless visibly tainted by blood.

The road from human and surrounding skin colonization to manifest internal organ infection may be sped up in an immunocompromised susceptible host using indwelling accesses. The overcrowded hospital scene and fast turnover with frequent patient relocations create another potential source for pathogen dissemination. The numerical representation and appreciation of the cleaning workforce may be underestimated.

The pioneering work to stress the need for high standards of hygiene has been done by Ignacz Semmelweis, a Hungarian professor, who forbade medical students to vaginally examine pregnant women without prior hand hygiene in the 19th century [24]. He later obliged staff to wash their hands in chlorine before entering wards. His efforts had been subject to laughter, ignorance, ridicule and bullying. Consequently, his mental health deteriorated to a mental breakdown and he ended up in a mental institution. Nowadays, Semmelweis's legacy is celebrated as one of the greatest visionaries of medical science.

His life is a sad story of how greed, a hostile environment, lack of appreciation, clinging to rigid structures, no inclination for improvement and flexibility, and stigmatizing women and



mothers can destabilize a wonderful human mind, and set brakes to development, including saving lives.

A randomized clinical trial comparing ICU patients daily cleaned in 4% chlorhexidine showed a 58% decrease in the incidence of gram-positive bloodstream infections [25].

When analyzing this likely valid, important and desirable result in this very good clinical study, one cautions against running into premature conclusions, to double-check for potential hooks and to emphasize the importance of proper statistical analysis. While the study offers a method to diminish central-line associated bloodstream infections (CLABSI), we are dazzled with the following unanswered questions:

Length of Stay (LOS) in ICU was statistically characterized by a median stay of four days, a value which depicts the greatest number of participants that are characterized by a certain feature, that is 4 days. It may very well be that a good proportion of patients were in ICU for much longer. The median is the quantity lying amid frequency distribution, while the mean is the average of given numbers. The similarity or dissimilarity of the two values is dependent on the mode of distribution of the elements. The more skewed the distribution, the greater the likelihood of difference between mean and median.

Why is median stay not representative in this case? We do not know if CLABSI has occurred in those already outside the ICU that is frequently the case. We do not know if there was a difference in the time chlorhexidine had been used in infected contra uninfected patients. Had the chlorhexidine wash continued outside the ICU? If not, the likelihood of association is diminished.

Based on the above can we with certainty associate the lack of CHC with CLABSI? We hope so, and that is our bias because we want a resolution that improves our outcome. But in reality, the above questions should be addressed in a new study. The overt use of disinfectants and antibiotics may contribute to the selection of multiresistant pathogens via indirect effect.

A compelling environmental study in the Wuhan region exposed the selective pressure imposed by increased usage of disinfectants due to pandemic, entering urban sewage on antibiotic resistance particularly the quinolone-related efflux pumps and oxa20 encoding beta-lactamases. Antibiotic resistance gene abundance reached 20 times the level of the precovid era due to selective pressure [26]. Among the disinfectants were trihalomethanes, which during prolonged exposure increase the risk of bladder and colon cancer, and quaternary ammonium compounds, with toxicity to ecosystems and during chronic exposure with dermal, respiratory and reproductive effects [27]. In the study, the above chemicals contributed to over 50% of antibiotic resistance gene profiles. According to statistics, 74% of covid infected patients took antibiotics, with 29% represented by quinolones. The proportion of multidrug-resistant bacteria increased 4.5 times. Beyond antibiotic stewardship, prevention of pathogen spread and choice of disinfectants can decrease the alarming increase in antibiotic resistance.

## Patient Monitoring

Patient monitoring using sophisticated high-tech gadgets is a great deal of an economical issue. There are however facets, requiring less financial input, less refined software and invasiveness, yet still improving safety. Monitoring the depth Of Anaesthesia (DOA) is a relatively simple, noninvasive tool to avoid latent or manifest adverse effects [28]. DOA arguably modifies the dose of intraoperative anaesthetics and analgesics, the level of sedation, and the emergence from surgical anaesthesia [29]. It is possible to follow and control the emergence from anaesthesia using DOA. Entropy-guided anaesthesia led to faster emergence and less postoperative agitation and delirium [30]. Moreover, monitoring has led to improved postoperative cognitive functions in multi-trauma patients. Postoperative Cognitive Dysfunction (POCD) is decline in intellectual functions - basic and higher intellectual skills - postoperatively. POCD may be transient or long-lasting, may affect performance, morbidity, and even mortality, and occurs with higher frequency in the older population and after major surgical procedures [31]. POCD triggers are multidimensional, pain is one of the leading factors in their development. Entropy is a noninvasive tool, designed to depict state entropy, response entropy and Burst Suppression Ratio (BSR), that is frontal EEG signals and electromyography data, measuring quantitative consciousness to complete suppression of cortical neuronal activity.

Burst suppression emerges during the delivery of high-dose anaesthesia, during deep brain inactivation when episodes of isoelectricity are interrupted by episodes of hyperexcitability. Several theories attempt to explain the phenomena. The hyperexcitability theory pointing at calcium efflux during too deep anaesthesia, or the metabolic hypothesis blaming disbalance between slow ATP production to disproportional ATP consumption [32]. The presence of burst suppression during general anaesthesia likely predisposes to postoperative delirium [33]. Burst suppression during cardiac arrest, cardiopulmonary resuscitation and after, has been associated with poor outcomes. Pharmaceutically induced burst suppression has been proposed to decrease oxygen consumption and to have a protective value in status epilepticus and during intracranial hypertension. Burst suppression appears during too deep anaesthesia and as such, overly deep anaesthesia is associated with worse postoperative morbidity. Monitoring depth of sedation may be of value in ICU patients, where administration of analgesics and sedatives is a matter of days and due to multiorgan impairment metabolism, elimination and accumulation of maternal substances and their, frequently partially active or detrimental metabolites may represent a real danger for overall brain function [34,35].

Monitoring the depth of anaesthesia became an emerging aspiration when the issue of awareness during anaesthesia gained recognition. Lack of monitoring or lighter anaesthesia may lead to awareness, and out of fear from alertness, without monitoring, overly deep anaesthesia may be implemented.

Depth of Anaesthesia Monitoring (DOA) methods cannot substitute for the thoroughness of comprehensive EEG [36],

yet they provide great orientational, additional perioperative monitoring tools. Perhaps DOA could be included in clinical research works comparing the influence of anaesthesia on outcome measures and could be widely available in the ICU, where patients with multiorgan failure have variable levels of drug metabolism and elimination [37].

### The Effect of Physical and Psychological Stress on Healthcare Personnel Performance and Patient Outcome

There is extensive research to understand the stress-related changes in brain function. Stress affects patients and providers. While some level of stress has a conditioning significance, overt, repeated or aberrant stress leads to the establishment of maladaptive responses, such as depression or Post Traumatic Stress Disorder (PTSD).

Stress response - the fight or flight reaction - is mediated largely by catecholamines and steroid hormones. Steroids enter the brain and receptors are in the hippocampus. Corticosteroids function via genomic, and non-genomic actions and have a decisive role in enhanced memory consolidation related to stress, to the unfortunate impaired memory retrieval at the time of the stress, and surrounding happenings [38]. Higher shock intensity during fear conditioning is associated with an enhanced freezing response to a novel trigger [39].

Acute stress differentially impairs some memory processes, while enhancing others, depresses the use and modification of memories, but enhances the long-term specificity of memory unless the situation is extremely stressful. Stress hormones via the amygdala-hippocampus axis lead to enhanced memory for the stressful event itself, related to the information directly associated with the stressor, but the surrounding information retention is impaired. Genomic corticosteroid actions lead to reduced hippocampal and amygdala neuroplasticity, related to encoding new information [40]. In experiments, social stress induced a greater increase in corticosteroid levels than pain-induced stress.

Positive reinforcement has a significant effect on memory consolidation, fading and retrieval. Positive memories are better stored and retrieved, than negative ones, with more details, including less fading, called the fading effect bias.

When residents are trained, the teaching ideally follows the principles of logic and reasoning, built on factual knowledge. The person must be encouraged to think and act rationally and logically. Despite that, particularly in a busy environment, under stressful situations, among constantly changing personnel, protocols and algorithms may potentiate performance. Another aspect that underscores the need for constant memory reinforcement and using guidelines is the scientific argument, that while expandable, memory has a limited storage capacity and the addition of new items has the potential to impair the quality and the quantity of already stored memories [41].

Noise in the work environment is defined as activity that is irrelevant to the individual's creative process and should be

a concern, and attribute to address for employers to create an optimal working environment [42]. The effect of noise has been shown when following the school performance of pupils, on several levels, for example, reading ability particularly is jeopardized, and overall memory impairment is more pronounced in older children [43]. The greater the background noise, the worse the performance of workers in a fast-food restaurant [44]. Even though it is not possible to avoid noise and chaotic movement in a work environment, organization and minimisation of attendees, avoidance of unnecessary verbal and nonverbal self-manifestations may lead to improved work performance.

While modern healthcare realizes the need for a psychological and empathic attitude towards patients and relatives, the role of positive visual nonverbal and verbal experiences, despite the available quality research, translation to enhancing an optimal work environment is underappreciated. In this aspect, old habits that die hard are potentiated by downplaying significance. Moreover, the crosstalk between the psychological and neurological research aimed at optimizing working conditions is exiguous, while expectations are increasing.

### Conclusion

Medicine is a progressive science, subject to advancement. Likewise, patient safety is an evolving concept, a collective affair. Establishing and nurturing the culture of patient safety is a priority, carrying the potential of decreased mortality. Patients and healthcare providers are entitled to sensible approach and treatment, to optimizing peaceful and mutually tolerant working conditions. There's an appeal to the sense when applying statistics and guidelines for careful and considerate planning. Patient safety steps can be further improved by using simple, economically affordable methods. Prevention is the best tool to avoid health-related and patient safety problems by establishing and maintaining reasonable working conventions.

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