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Table 1. Limitations for each manuscript type.

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Case Report	1500	200	10	No tables	10 or total of 20 images
Letter to the Editor	500	N/A	5	No tables	No media
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Clinical Imaging/ Visual Diagnosis	400	N/A	5	No tables	3 or total of 6 images
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Books with Single Author: Cohn PF. Silent myocardial ischemia and infarction. 3rd ed. New York: Marcel Dekker; 1993.

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Editorial

Dear Colleagues:

The 1st Middle East Congress on Disaster and Prehospital Management Congress was held on October 8–11, 2017, in Istanbul. We thank the specialists and keynote speakers from various countries, the Turkish Ministry of Health, the World Association for Disaster and Emergency Medicine, the Turkish Red Crescent, and the Turkish Disaster and Emergency Management Presidency for participating.

We participated in the European Society of Emergency Medicine Congress held on September 23–27 in Athens, Greece. The first day was for courses, and I attended the course on ultrasound as a lecturer. We shared our experiences and knowledge with our European colleagues.

Sonoschool, which is the ultrasound education branch of the Emergency Physicians Association of Turkey, has been regularly organizing new courses. In November and December, there will be four courses in our country. In November, courses on "Basic ultrasound" and "Thoracic ultrasound for the critically ill" will be held in Erzurum and Ankara. In December, a roundtable meeting on "Clinical decision-making with bedside ultrasound" in Erzurum and a course on "Thoracic ultrasound for the critically ill" in Ankara will be organized. Theoretical and hands-on education will be provided in these courses.

The 6th International Emergency Medicine Symposium will be held on November 24–26 in Tashkent, Uzbekistan. We will share our knowledge and experience with our Uzbek colleagues.

The Eurasian Journal of Emergency Medicine publishes new articles, reviews, and case reports in every issue. In the present issue, there are interesting articles on accidental poisoning in children, anxiety and depression in intern doctors, code blue implementation, and subspecialization in emergency medicine. Subspecialisation is one of the leading problems in emergency medicine in our country. Our efforts will keep on about this issue in every platform.

Happy reading

Best wishes

Prof. Erden Erol Ünlüer
Editor-in-Chief

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Accidental Poisoning in Young Children: an Emergency Medicine Perspective for Pakistan and Other Low-and Middle-Income Countries and a Call for Action

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Abstract

Accidental pediatric poisoning (APP) is an important public health issue in both the developed and developing parts of the world. It continues to affect a number of children, but in Pakistan and other low- and middle-income countries (LMICs), few measures have been taken to counter it. As many of these children present to the Emergency Department (ED), the aim of our review was to analyze the biomedical literature regarding childhood-related accidental poisoning in general and in Pakistan and similar countries, in particular, with an emphasis on their emergency departments. We focused on children aged 0–5 years. This attempt was intended to be a first step toward gaining a better grasp of the epidemiology, following which we wish to suggest a simple management strategy. Additionally, we aim to identify the most common accidentally ingested agents in young children in Pakistan and assess the risk factors for poisoning and the efficacy of possible interventions. Given that accidental ingestions are entirely avoidable, we have focused on preventative steps and treatment. We thus present suggestions in this perspective piece for tackling the problem in resource-limited countries in general, where there is an urgent need for it.

Keywords: Accidental poisoning, childhood poisoning, low-middle income countries, emergency department, Pakistan

Introduction

By definition, poisoning is the injury or destruction of cells via inhalation, ingestion, injection, or absorption of a toxic substance. The prognostic key factors include the nature, dose, formulation and route of exposure of the poison, coexposure to other poisons, state of nutrition of the child, age, and pre-existing health conditions (1). In developing countries, poisoning has been recognized as a major health problem among children and adolescents (2).

Accidental poisoning is implicated in about 2% of all injury deaths in children in the developing nations (3). Current epidemiological studies regarding accidental poisoning in children have demonstrated a consistent pattern regarding the age and gender, being predominant in male children aged less than 6 years, as they are considered to be more actively involved in exploring their environment (4). Evidently, as per a World Health Organization (WHO) report on child injury prevention, the rate of fatal poisoning is highest for children aged <1 year. Since fatal poisoning rates in low to middle-income countries (LMICs) are four times that of high-income countries (1), it becomes evident that acute poisoning is an important cause of morbidity and mortality in children, which can be significantly and effectively controlled by preventive and educational measures (5). Unfortunately, due to the lack of national database resources on pediatric poisoning and relevant legal or government-run institutions to facilitate the process, the exact scale of the problem in Pakistan is very difficult to ascertain.

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In this brief review, we aim to identify the epidemiology, risk factors, and interventions in the face of accidental pediatric poisoning (APP). Additionally, we wished to focus on the gaps in knowledge as far as the situation in the LMICs was concerned. We also aimed to derive independent solutions to the problem and explore ways in which we could develop them further.

A thorough knowledge of the risk factors and their interactions may be useful in planning preventive measures against childhood poisoning. Studies have noted that APP typically occurs in the morning, when children are at home and at play (6). The risk particularly increased when cleaning products were stored in kitchenware, spray bottles, or food containers (7), with the age group of 1–3 years being most at risk (8).

The child's accidental exposure to toxic substances represents a complex interplay of host, agent, and environmental factors. Host factors associated with unintentional poisoning include young preschool age, male sex, and a curious, impulsive personality (9-11), with intentional poisoning being more common to adolescence and females (10). In addition, ingestion was found to be the major route of poisoning, according to the American Poison Control Centre (PCC) (12). Interestingly, of the various toxic ingestions included, kerosene oil was found to be the most commonly involved agent in the developing countries of South Asia and some parts of Africa (4, 13), followed by Organophosphorous compounds such as pesticides. This was particularly prevalent in countries, such as Pakistan, where there is a noticeable lack of safety measures involving manufacturers and caregivers alike. Other hazardous compounds used by young children out of inquisitiveness are pharmaceuticals, such as cough/cold preparations and sedatives/hypnotics (12).

The ease of access also increased the risk; when questioned, only 30% of caregivers claimed to appropriately store hazardous materials at home (6). Additionally, more than 50% of the parents incorrectly perceived antibiotics and oral contraceptives as harmful in small quantities and cough medications to be harmful only in large quantities. One in five parents was also unaware of the potential toxicity of iron tablets (15).

Since over-the-counter medications, such as analgesics are widely available at home, their accessibility makes them more likely to be associated with APP compared to prescription medications, which are falsely perceived as being more involved (15). Interestingly, although the child-resistant (CR) packaging claims to prevent poisoning, paracetamol - which usually enjoys a CR status internationally - is primarily involved in accidents. Crust formation around the cap, improper closure, and lack of customer counseling [15] may explain the observation.

Although few studies have been conducted in Pakistan in this regard, a low socioeconomic status (48%), storage of kerosene and petroleum in soft drink bottles (40%), absence of mother's formal education (38%), child hyperactivity (19%), and unsafe storage (12%) emerged as key role players in APPs within the country (16) an observation that can also possibly be applied to other LMICs.

Most cases of APP in Pakistan and its surroundings involved the misuse of household products (47.0%), drugs (21.8%), industrial chemicals (7.9%), and agricultural pesticides (9.1%) (16). In the United Kingdom, on the contrary, medications accounted for more than 50% of the bulk, and household products for around one-third (17).

In India, Sri Lanka, and Pakistan, specifically, the household products entailed pyrethroids, thermometer mercury, rodenticides, phenyl, detergents, and corrosives - with kerosene being the most common agent that poisoned overall. Likewise, the most common drugs involved included anticonvulsants, thyroid hormones, benzodiazepines, analgesics, oral contraceptives, phenothiazines, and iron-supplements (19).

Certain strategies can be undertaken to prevent accidental poisoning. For instance, placing substances in their usual storage place immediately after use, safely disposing unwanted medicines, using substances that contain bitterness-causing agents, and educating children about the dangers of poisoning have all proven to be helpful preventative measures (18). Relating incidents in a "story-telling" style - via parent networkers, the media, maternal and child nurses - has been identified as a way to spread awareness and consequently prevent unintentional pediatric poisoning (20). Other awareness campaigns should also be initiated to make parents aware of the hazards of accidental poisoning (1, 21).

It is believed that strategies dealing with only one substance may be more effective than a general poison-prevention approach (22). In addition, the provision of free locks, PCC number stickers, and syrup of ipecac (a natural emetic) have proven to be effective in keeping the incident under control (1). Legislation regarding CR packaging of medicines and household chemicals should also be formulated (1, 19). Another prevention strategy came in the form of poison-warning stickers, such as "Mr. Yuk," which were designed to discourage children from handling the containers or ingesting the poison (21). Finally, the general warning "keep all medicines out of reach of children", when modified to "out of reach *and sight* of children", proved to be effective in keeping their curiosity suppressed (19).

Although prevention is important, the post-incident arm cannot be ignored. PCCs need to be established to triage poisonings, dispense accurate and timely advice to caregivers and health facilities, direct first aid where appropriate, and refer the more severe cases to health facilities (1). Not surprisingly, thus, the regional poison center was found to significantly reduce pediatric visits to emergency rooms (18, 23, 24); it also reduced parental anxiety and possible financial pressure.

Cultural barriers and low socioeconomic states result in these populations being unaware of the usefulness of PCCs or the inability to access them. Nevertheless, more than 50% of parents preferred to use the local poison center in case of an emergency (25). It is also interesting to note that PCC callers reported a higher prevalence of knowledge regarding prevention than did non-callers. This underscores the need for educational interventions to be directed at those who refuse to use these centers.

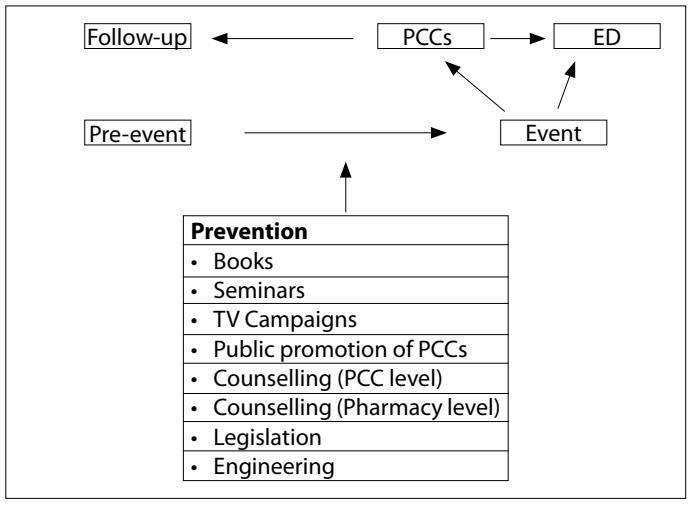

Figure 1. Management Strategies for APP in LMICs: In this model, the management of the problem is indicated through a stratified approach (pre-event vs. event/post-event)

APP: accidental pediatric poisoning; ED: emergency department; PCC: poison control centers; LMIC: low-and middle-income countries

To sustainably reduce the numbers of unintentional poison injuries, we thus make the case for developing preventative programs through awareness, advocacy, and opportunistic counseling. We further chose to suggest a model (Figure 1) for incorporating the PCCs at the pre-event (primary prevention), event (secondary prevention), and post-event (tertiary prevention) phases to help reduce the burden of EDs (24).

As Figure 1 suggests, with real advocacy, public and private healthcare-related partnerships (the collaboration of PCCs and ED units included), as well as national policy making, the APP incidence can be kept under control (25). However, making interventions in the pursuit of prevention and treatment is not enough - it is just as important to follow up on their progress and complete the feedback loop. Illustrated storybooks, aimed at reaching out to parents from all socioeconomic backgrounds, can effectively be put to use to increase awareness. Once the material is published in Urdu and locally distributed, it can be translated into other languages, such as Hindi for India and Swahili for Africa, and thus the model can be replicated in other LMICs. Television campaigns in the form of paid advertisements can also be generated to further the cause.

A limitation of this paper is in the inability to determine whether the model suggested will be reproducible in all LMICs, as it has not been tried and tested before. Nevertheless, this is one of the first reviews of its kind that focuses on APP in children aged ≤5 years, presenting to the EDs of LMICs. Finally, since research on APP in Pakistan is majorly confined to only two or three hospitals, it will be important to further the existing data by surveying other hospitals, both in Karachi and Pakistan.

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A Reality in Emergency Medicine: Subspecialization

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Abstract

Emergency medicine is a rapidly evolving discipline, encompassing almost all other branches of medicine. This broad spectrum encourages physicians to improve themselves in a specific area because emergency departments are no longer the place where just first treatment is administered, but also where treatment is maintained. This paper aims to identify the needs and barriers of the advanced training or subspecialization in emergency medicine in Turkey using other countries as examples.

Keywords: Emergency medicine, fellowships, residency

Introduction

Emergency medicine (EM) was recognized in 1993 in Turkey and has since evolved as a specialty at an increasing rate (1). The duration of training is four years similarly to other countries, and a certificate of completion of training is issued after compulsory service by the Ministry of Health. Accreditation for all specialties and advanced trainings (subspecialties) is approved by the Board of Medical Specialties in Turkey.

Subspecialization, which first emerged in internal medicine and general surgery, originated in the 1960s in Turkey (2). These subspecialties, with time, have become today's specialties (such as plastic and cardiovascular surgery). Also, these branches now have their sub-branches (child subspecialties). Although EM is similar to these main branches in terms of broad scope, there is no future plan regarding advanced training or subspecialization in EM in Turkey (3).

Why do we need subspecialization?

Firstly, there are various areas closely related to EM such as prehospital EM, disaster medicine, and medical toxicology, but these areas specifically are not affiliated with any discipline. Prehospital EM is provided by general practitioners in Turkey. Disaster situations are coordinated by the Health Disaster Coordination Center, which is an organization of the Ministry of Health and is not an academic institution. Although toxicology is maintained by pharmacologists, it is not enough for clinical practice. There is an ongoing debate regarding critical care and pediatric EM. There are only a few countries (including Turkey) with intensive care units (ICUs) in the emergency departments (EDs) (4). Many academic and non-academic EDs have level one to level three ICUs. Although critical care is provided by emergency physicians (EPs) in these special areas, there is no opportunity for advanced training in this discipline for EPs (5). Also, pediatric EM is a subspecialization only for pediatricians, but EPs treat nearly half of children with medical problems and more than half of the children with trauma presentations in many EDs (6). As a result, sufficient medical education, public health, and patient care quality are not achieved because of all of these shortcomings.

Secondly, emergency residents and attending physicians need to improve in their areas of interest. However, they cannot enhance their

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Table 1. The subspecialties and dual certifications of EM in countries that have advanced trainings

	United States (13, 16)	Canada (18, 19)	United Kingdom (21)	Saudi Arabia (22)
Addiction Medicine	+			
Administrative/ Quality improvement	+			
Aerospace medicine	+			
Cardiovascular EM	+			
Critical care	+	+	a	+
Disaster medicine	+			
Education	+	+		
Family medicine/Anesthesiology/ Internal medicine/Pediatrics	a	b		
Forensic EM	+			
Geriatric EM	+			
Health Policy	+			
Hyperbaric & Undersea medicine	+			
Informatics	+			
Injury control	+			
International EM	+	+		
Neurovascular & Stroke medicine	+			
Observation medicine	+			
Occupational & Environmental Health	+			
Palliative care	+			
Pediatric EM	+	+	+	+
Population health & Social EM	+			
Prehospital EM	+	+	+	
Research	+	+		
Resuscitation	+	+		
Simulation	+	+		
Sports medicine	+			
Surgical critical care/Trauma	+	+		
Tactical medicine	+			
Telemedicine	+			
Toxicology	+	+		
Ultrasound	+	+		
Wilderness medicine	+			
Women's health	+			

[a]Dual trainings available in EM

[b]Family Physicians with additional competency in EM are trained by the College of Family Physicians of Canada program

EM: emergency medicine

trainings due to the aforementioned limitations and work intensity. This has led to job dissatisfaction. In addition, medical students are reluctant to become an EP, and nearly half of the quota of EM remains unfilled because EM is not preferred by medical students due to academic and job-related concerns (7, 8).

Finally, there are two associations in Turkey, namely Emergency Physicians Association of Turkey and Emergency Medicine Association of Turkey, and both associations have more than 10 different working groups. Each group has various EPs who are interested in the area, and they organize several trainings. These groups and ed-

ucated EPs are increasing in Turkey, although they are not officially accredited.

What are the barriers and limitations?

Presently (in 2017), the number of EPs in Turkey includes 953 residents, 1445 attendings, and 250 academic staff, and there are 95 academic EDs (9). In addition, general practitioners work in other EDs. The number of EPs is still not sufficient for standard patient care, and more educated EPs are needed in the public sector. However, the desired number of EPs cannot be trained because one-third of the EM residents resign during the training process due to stress factors and concerns about their futures (10).

There is still a lack of standardization in the medical education of emergency resident training. Some academic EDs have enough trainers or materials, while others do not (11). New academic EDs have been established, but they do not have enough trainers or policies for education and quality health service. Residents' education remains incomplete during the training process; therefore, they apply for postgraduate education and courses individually. If there is advanced training such as subspecialization in EM in future, it should be started at certain academic faculties with enough trainers, opportunities, and international connections.

Global examples

Many countries have recognized subspecialties in EM at different times and in different areas. Some are very old and others are new. The US is the first example of this evolution. EM, established in 1970s, introduced the first accredited subspecialty as a pediatric EM in 1991. Thereafter, sports medicine and medical toxicology were recognized in 1992 (12). Presently, there are 34 fellowship programs, nine of which are accredited by the American Board of Emergency Medicine (ABEM) in the US (Table 1) (13, 14). Most recently, there are available options for the recognition of clinical ultrasonography, either as a subspecialty or a designation of focused practice (15). Dual accreditation is also another option for EPs. One can complete the training in both specialties as EM/anesthesiology, internal medicine, pediatrics, or family medicine (Table 1) (16). All of these advanced trainings take one or two additional years, nevertheless only 4.3% of ABEM physicians have a subspecialty certificate (17).

Canadian EPs have opportunities to choose various advanced trainings. Pediatric EM and intensive care are accredited fellowship programs by the Royal College of Physicians and Surgeons of Canada. Also, there are unaccredited fellowships and degree programs (Table 1) (18). One or two years of training are usually spent to attain advanced education during or after residency trainings, and these programs exist in many academic EDs (19).

In the UK, there are two subspecialties-pediatric EM was recognized in 2001 by the General Medical Council and prehospital EM was recognized in 2011 (12, 20). Only 65% of the pediatric EM positions are chosen by EPs in the UK. One additional year of dedicated full-time training is required for both certifications. Also, EPs can acquire a dual certificate of completion of training in both EM and intensive care medicine (Table 1) (21).

In Saudi Arabia, after 4 EPs graduated in 2004, EM has evolved rapidly. There are two accredited fellowship programs by the Saudi Commission for Health Specialties-pediatric EM and critical care (Table 1). Both trainings take two additional years to attain a subspecialty (22). Also, there are future plans regarding five other fellowships-medical toxicology, prehospital EM/disaster medicine, undersea and hyperbaric medicine, emergency ultrasound, and sports medicine (23).

Conclusion

Subspecialization should be of high priority and absolutely considered for the development of EM. Turkey has witnessed wars and earthquakes for many years due to geopolitical positions, and therefore disaster medicine and prehospital EM should be included in advance training in EM. Medical toxicology, pediatric EM, and critical care should also be considered as a subspecialty in EM due to clinical need. Because EM has lower rates in terms of both career choice and the number of working physicians in Turkey, we suggest that the Government should make subspecialization in EM more attractive to the medical students and motivate the residents in order to improve education and health care quality.

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Reducing Pain Experienced During Potassium Chloride Infusion in the Emergency Department

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Abstract

Aim: Patients with hypokalemia often complained of pain during intravenous potassium chloride infusion. By administering lignocaine prior to the infusion, the pain experienced may be reduced but safety concerns have limited its clinical application. The primary objective was to determine the efficacy of lignocaine in reducing pain experienced during potassium chloride infusion in the Emergency Department. The secondary objective was to determine the adverse events associated with intravenous lignocaine use for this purpose.

Materials and Methods: Continuous quality improvement data were prospectively collected. The lignocaine protocol involved giving 30 mg of 1% lignocaine intravenously 1 minute before starting the potassium chloride infusion. The decision to use this protocol was left to the discretion of the attending doctor when managing a patient with hypokalemia requiring intravenous replacement. The nurse taking care of the patient would record any experience of pain during the infusion. Occurrence of any adverse event was recorded.

Results: A total of 100 patients were recruited. After stabilized weights adjustment, the resultant sample size was 98, with 49 patients in each group. The proportion of patients experiencing pain was significantly higher when no lignocaine was given (38.8% vs 16.3%, p=0.013). The absolute risk reduction was 22.5%, and the relative risk of pain was 0.42 (0.20–0.87, p=0.013). The numbers needed to treat was five (range, 3–19). There was no adverse event associated with the lignocaine protocol in this study.

Conclusion: Intravenous lignocaine was efficacious and safe in reducing pain during potassium chloride infusion.

Keywords: Lignocaine, pain, potassium chloride, safe

Introduction

Hypokalemia is a common electrolyte abnormality encountered in the clinical setting. It can lead to cardiac arrhythmias, muscle weakness, and rhabdomyolysis (1-5). The causes of hypokalemia can be broadly classified into decreased intake, increased entry into cells due to causes such as increase in extracellular pH, increased β-adrenergic activity or insulin administration, and increased losses from sweating, and the gastrointestinal or renal systems (6). In addition to the diagnosis and treatment of the underlying cause(s) of hypokalemia, replacement of the potassium deficit is necessary when managing these patients. This urgency of replacement therapy will depend on the severity of hypokalemia, the rate of decline in serum potassium concentration, and associated comorbidities of the patient. Potassium can be administered as potassium chloride, potassium phosphate, potassium bicarbonate potassium gluconate or its precursors (potassium citrate, potassium acetate) (7, 8). Potassium chloride has been the mainstay of replacement therapy for two main reasons:

- The serum potassium concentration increases at a faster rate than other formulation as chloride is primarily an extracellular

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anion, thereby promoting maintenance of the administered potassium in the extracellular fluid (9).

- Patients with hypokalemia are often chloride-depleted. This chloride-depleted state will contribute to metabolic alkalosis by enhancing renal bicarbonate reabsorption that leads to potassium wasting, as sodium is reabsorbed in exchange for secreted potassium rather than with chloride (10, 11).

Intravenous replacement should be used in patients with severe symptomatic hypokalemia (less than 2.5 mmol/L) and in patients with less severe hypokalemia who are unable to take oral medications. The most common problem associated with potassium chloride infusion is pain. The occurrence of pain has been reported in up to 60% of patients receiving intravenous replacement (12), resulting in patient's refusal of the prescribed therapy (13). While the exact mechanism of action is not known, possible causes include direct chemical and/or osmotic irritation of the intima and mechanical distension from volume of drug injected (14). Prevention or reduction of pain can be achieved by running potassium chloride at an infusion rate below 20 mmol/hour (15), injecting into large vein using a large bore cannula, adding a diluent (e.g., 0.9% normal saline) during the infusion process, and applying an ice pack.

Previous studies have demonstrated the efficacy of lignocaine in alleviating pain during potassium chloride infusion both immediately and over an infusion time of up to 2 hours (14-16). However, the varying doses of lignocaine, small sample size, and subsequent reports of safety issues have limited the prevalent use of lignocaine in clinical practice. Safety issues have been attributed to the different formulations of lignocaine available and the extra step of preparation which led to an increased likelihood of medical error (17). Concerns have also been raised about the potential of lignocaine to mask phlebitis. More than a decade later, we embarked on this study to relook at the efficacy and safety related to the use of lignocaine in reducing pain during potassium chloride infusion. We hope that our findings will offer clinicians the option of a fairly simple intervention that will address the issue of pain experienced by patients during potassium chloride infusion.

Materials and Methods

Setting

This study was conducted in an Emergency Department (ED) in Singapore that sees about 135,000 patients a year.

Design

A prospective observational study of the effect of lignocaine on pain during potassium chloride infusion was recorded in a continuous quality improvement database from March 2015 to May 2016. Patients were recruited by consecutive sampling. They were included if the attending ED physician ordered intravenous potassium replacement with potassium chloride. Patients with a history of epilepsy, cardiac arrhythmia, and sensitivity to lignocaine were excluded from the study. Baseline characteristics of age, gender, concentration of serum potassium, duration of potassium chloride infusion, and concurrent run of normal saline were recorded prior to the initiation of lignocaine.

Potassium chloride was given as a premixed solution containing 10 mmol of potassium chloride in 100 mL of water for injection. This commercially available preparation was routinely used for potassium chloride infusion as per departmental protocol. Patients who received lignocaine were given a 3 mL bolus of 1% solution a minute before the start of the potassium chloride infusion. This intervention was unblinded to the patient and attending staff. Patients were put on cardiac monitoring during the period of intravenous replacement if they had received lignocaine.

All doctors and nurses working in the ED were briefed on the lignocaine protocol. As this practice was recommended but not a standard-of-care in the department, the decision to administer lignocaine to the patient was left to the discretion of the attending physician.

Outcome

The primary outcome was to determine the efficacy of lignocaine in reducing pain experienced during potassium chloride infusion. The qualitative occurrence of self-reported pain was tracked instead of a quantitative pain score during the potassium chloride infusion. This was chosen as a practical outcome measure, as any occurrence of pain would necessitate intervention from the attending staff to help the patient tolerate the infusion. These interventions were dependent on the attending physician and included applying ice pack, slowing down the initial infusion rate, and stopping the infusion due to patient's refusal. The secondary outcome was to determine the adverse events associated with intravenous lignocaine use for this purpose. Adverse events were defined as lignocaine toxicity, cardiac arrhythmia, masking of phlebitis, and medication error. Occurrence of any pain or adverse event was recorded by the attending staff and subsequently traced from review of the patients' case records.

Sample size

On the basis of the previous study by Lim et al. (14), the incidence of pain in patients who did not receive lignocaine was 85.7% compared with 28.6% when lignocaine was given. For a reduction of at least 50% in the occurrence of pain in patients who received lignocaine prior to the potassium chloride infusion, a sample size of 22 with equal numbers in each arm was required to power our study (α=0.05, β=0.2, power=0.8). To increase the robustness of the study, patients were enrolled in the study until the end of the quality improvement initiative that would recruit 50 patients in each arm of the study as determined a priori.

Statistical analysis

To control for selection bias in the assignment of subjects to treatment due to the baseline characteristics, stabilized inverse probability of treatment weights (IPTWs) were used in the analysis to estimate the efficacy of lignocaine on pain outcome. IPTWs were derived using weights on the basis of propensity scores to create a pseudo-sample in which the distribution of the measured baseline covariates was independent of the treatment assignment (18). Propensity scores of the subjects were estimated using the multivariable logistic regression where the status of treatment was regressed on the measured baseline covariates. Stabilized IPTWs will reduce variability due to instability in estimation that could be induced either by those treated subjects with low propensity scores or untreated subjects with high propensity scores (18, 19). Absolute standardized difference was calculated for each of the baseline covariates to assess the balance be-

tween both groups and was compared before and after applying stabilized weights. An absolute standardized difference of less than 0.1 was used to indicate negligible difference in the mean or prevalence of a covariate between the treatment and control group.

Risk estimates and numbers needed to treat (NNT) were estimated using stabilized weights. Chi-square test was used to test for differences between categorical variables and two-sample t-test was used for continuous variables. All statistical analyses were performed using Statistical Package for the Social Sciences (IBM SPSS Statistics; Armonk, NY, USA) version 24.

Results

One hundred eligible patients were enrolled consecutively in the study to meet the sample size of 50 patients in the treatment group where lignocaine was given prior to the initiation of potassium chloride and another 50 patients in the control group with no lignocaine given.

The baseline demographics and clinical characteristics of the 100 patients are presented in Table 1. The average age of patients included in the study was 64.5 (±19.3) years. Majority of the patients were females (70%). Eighty-one percent of all patients required more than 1 hour of potassium chloride infusion, and 79% of the patients required concurrent run of normal saline due to their presenting medical conditions. The average serum potassium concentration of patients was 2.7 (±0.4) mmol/L.

Table 1. Patients' baseline demographics and clinical characteristics

Variable	**n=100**
Age, mean (±SD), years	64.5 (±19.3)
Gender (%)	
Male	30.0
Female	70.0
Serum Potassium, mean (±SD), mmol/L	2.7 (±0.4)
Infusion duration required (%)	
= 1 hour	19.0
> 1 hour	81.0
Concurrent Normal Saline (%)	
Given	79.0
Not given	21.0

Prior to stabilized weights adjustment, all covariates, except gender, had an absolute standardized difference of more than 0.1, with a maximum of 0.55 for the mean serum potassium concentration (p=0.007) (Table 2). On average, patients in the lignocaine group tend to be younger (mean age, 63.0 vs. 66.0 years) and had a higher level of serum potassium concentration (2.8 vs. 2.6 mmol/L). The proportion of patients who required potassium chloride infusion of more than 1 hour was lower in the lignocaine group than in the control group (74.0% vs. 86.0%). More patients in the lignocaine group had concurrent run of normal saline solution during the potassium chloride infusion (84.0% vs. 74.0%). There was no absolute difference in the proportion of gender between the two groups.

After stabilized weights adjustment, the resultant sample size was 98, with 49 patients in each group. There were no significant differences in the baseline covariates between the two groups. The absolute standardized differences for all covariates in the weighted sample ranged from a maximum of 0.1 to a minimum of 0.03. Balance of baseline covariates between the lignocaine and the control group was achieved in the stabilized weights adjusted sample.

The efficacy of lignocaine on pain was estimated on the basis of the weighted sample where the assignment of patients to lignocaine was independent on the patients' baseline characteristics. The proportion of patients experiencing pain was significantly higher in the control group where no lignocaine was given prior to the potassium chloride infusion (38.8% vs. 16.3%, p=0.013) (Figure 1).

The absolute risk reduction was 22.5% and the relative risk of pain associated with lignocaine was 0.42 (95% C.I., 0.20–0.87, p=0.013). In other words, the risk of experiencing pain for patients who were not assigned to the lignocaine group was 2.4 times the risk of those who were given lignocaine. The numbers needed to treat was 5 (95% C.I., 3–19), suggesting that on average, for every five patients who were treated with lignocaine prior to the initiation of potassium chloride infusion, one will benefit from the treatment.

There were no adverse events associated with the lignocaine protocol used in this study, particularly the occurrence of cardiac arrhythmias, lignocaine toxicity, and medication errors.

Table 2. Characteristics of patients for the unweighted and weighted samples

	Unweighted			**Weighted by Stabilized IPTWs**		
	Lignocaine (n=50)	**No Lignocaine (n=50)**	**p (Std Diff)**	**Lignocaine (n=49)**	**No Lignocaine (n=49)**	**p (Std Diff)**
Gender, n (%)	15 (30.0)	15 (30.0)	--	15 (30.6)		0.825
Male			(0.00)		14 (28.6)	(0.04)
Age, mean (±SD), years	63.0 (±19.7)	66.0 (±19.1)	0.441 (0.15)	64.6 (±19.5)	65.1 (±18.8)	0.883 (0.03)
Serum Potassium, mean (±SD), mmol/L	2.8 (±0.3)	2.6 (±0.4)	0.007 (0.55)	2.7 (±0.3)	2.6 (±0.4)	0.613 (0.10)
Infusion duration more than 1 hour, n (%)	38 (76.0)	43 (86.0)	0.202 (0.26)	38 (77.6)	40 (81.6)	0.616 (0.10)
Concurrent Normal Saline given, n (%)	42 (84.0)	37 (74.0)	0.220 (0.25)	39 (79.6)	38 (77.6)	0.806 (0.05)

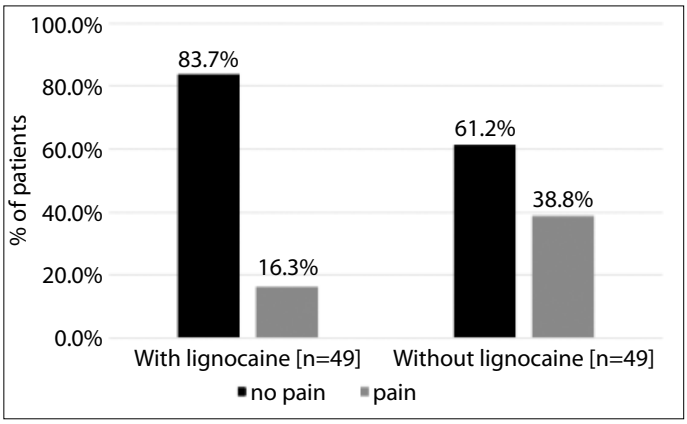

Figure 1. Proportion of patients experiencing pain during potassium chloride infusion

Discussion

Pain control and lignocaine

Several lignocaine regimens have been used in previous studies to reduce the pain during potassium chloride infusion. Lim et al. (14) used 3 mL of 1% (30 mg) lignocaine as a bolus 1 minute before starting a 20 mmol potassium chloride diluted in 100 ml dextrose 5% infusion which was administered over 2 hours. Morrill et al. (15) used 10 mg of lignocaine added to 10 mmol of potassium chloride in 50 ml of dextrose 5% which was ran over 1 hour. Pucino et al. (16) used 50 mg of lignocaine added to 20 mmol of potassium chloride in 50 ml of dextrose 5% which was administered over 2 hours. The preparation of potassium chloride used in our institution was 10 mmol in 100 mL of water for injection, which was less concentrated than the solutions used in previous studies. Therefore, the incidence of pain in our patients without lignocaine was 38.8%, lower than the 60% reported in literature. To ensure that the lignocaine dose we used was effective in controlling pain and had minimal risk for adverse event, we decided to use 3 mL of 1% lignocaine for in our study. Furthermore, Lim et al. (14) has shown that this dose of lignocaine was effective for pain control both immediately and throughout a 2-hour infusion period, attributable to the duration of action of lignocaine [$t_{1/2}$, 80–108 minutes (20, 21)]. With the increased in sample size, our study had shown that lignocaine was able to reduce to pain associated with potassium chloride infusion. At S$0.74 per vial and a number needed to treat of 5, this intervention was inexpensive, in addition to being safe at the study regimen.

We would want to highlight that the technique of slow intravenous push when administering the bolus lignocaine dose was important for anesthetizing the nerves fibers that supply the veins. A rapid bolus would deliver the drug systematically rather than allowing lignocaine to act locally and may render the lignocaine bolus ineffective.

Intervention needed

Application of ice pack was done more commonly in 71.4% patients as compared to slowing down of infusion rate in 25% patients who experienced pain. It was unlikely that the attending ED physician would agree to slow down the infusion rate as the first measure after making the decision to initiate intravenous replacement therapy for severe, symptomatic hypokalemia. Our study did not standardize the use of a large vein (e.g., cubital fossa) or a particular cannula size as in previous studies. By leaving this to the attending ED physicians, a pragmatic trial would demonstrate the efficacy of lignocaine in reducing pain during potassium chloride infusion.

Adverse outcomes

While there was genuine concern for potential adverse events from lignocaine use, this likelihood was low at the prescribed dose of 30 mg. For an average 70 kg adult, this was 0.4 mg/kg, way less than the toxic dose of 3 mg/kg for lignocaine where cardiac arrhythmias and other features of lignocaine toxicity ranging from circumoral numbness to seizures may occur. To address the concern of cardiac arrhythmias, our patients were put on cardiac monitoring throughout the period of infusion during the study. No arrhythmia was noted with this dosage of lignocaine. Therefore, the routine use of cardiac monitoring with lignocaine in our study's prescribed dose and use was not recommended. There were also no reports of features attributable to lignocaine toxicity. Phlebitis could be avoided by assessing the injection site before running the potassium chloride infusion with lignocaine.

Another reason contributing to the infrequent use of lignocaine to reduce pain from potassium chloride infusion was medical error arising from an extra step in preparation. Errors had resulted when staff used the wrong formulation due to the different concentrations and preparations of lignocaine currently available. This should not be a reason to deny patients a simple intervention which could be carried out by trained staff adhering to stringent preparation protocols, as with many other medications being used in any hospitals.

Study limitations

The main limitation of this observational study was the lack of randomization of patients into receiving lignocaine prior to potassium chloride infusion. However, we attempted to control for this by the use of stabilized weights in the statistical analysis. Nonetheless, unidentified confounders may still exist, affecting the results.

Another limitation was that absolute occurrence of pain was tracked instead of pain score. Therefore, for patients who experienced pain during the infusion, we were unable to compare the difference in pain scores between the two groups. This decision was based on an ideal outcome, as the pretreatment with lignocaine should alleviate all pain associated with the infusion, removing the need for intervention from the attending staff. The extent of pain score reduction with lignocaine during potassium chloride infusion and its effectiveness would need to be evaluated in a separate study.

Conclusion

The addition of lignocaine to intravenous potassium chloride replacement was useful in reducing pain during the infusion process. This would improve patient acceptance of the therapy and also reduce the need for additional intervention from the attending staff. In addition, we have proven that this extra step in preparation could be done safely and the addition of lignocaine was not associated with any adverse events as previously thought. Therefore, we recommend the routine use of 3 ml of 1% lignocaine prior intravenous potassium chloride replacement as a new practice standard.

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Investigating the Effect of Emergency Medicine Internship on Vocational Anxiety and Depression in Sixth Grade Students of the Medical Faculty

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Abstract

Aim: The sixth grade of medical school is a true preparatory stage for the physicians. This places the physician candidates at stress before the emergency medicine (EM) internship and can lead to anxiety and depression. The present study is the first study to investigate depression, anxiety, and stress levels of sixth-grade medical students before and after the EM internship.

Materials and Methods: This is a prospective study,which is conducted on sixth-grade medical students. Anxiety, depression, and stress scores were assessed on the first and last day of the EM internship. The Beck depression and Beck anxiety scales and Depression Anxiety Stress Scale-42 (DASS-42) were used. Overall, 131 sixth-grade medical students who met the inclusion criteria were enrolled in the study.

Results: The mean Beck depression score was 10.15±6.11 on the first day of internship and 6.37±4.79 on the last day of internship. The difference was statistically significant ($p<0.05$). The mean Beck anxiety score was 9.02±7.25 on the first day of internship and 4.69±4.85 on the last day of internship. The difference in Beck Anxiety score was statistically significant ($p<0.05$). The mean DASS-42 scores were 23.91±14.35 on the first day and 15.31±12.13 on the last day. The difference was statistically significant ($p<0.05$).

Conclusion: Sixth-grade medical students showed high scores on stress, anxiety, and depression scales before the EM internship, which is due to various reasons. However, as many causative factors disappear at the end of the internship and also as they experience the benefits of the EM internship, these scores drop on the last day of the internship.

Keywords: Anxiety, depression, intern doctors

Introduction

The medical faculty sixth grade studentship or the commonly used term internship and residency are the real preparation period for the medical profession. Students who have knowledge that it is more theoretical in the previous years of education to gain skills for both witnessing clinical applications in situ and examining patients in the presence of the responsibilities , making analysis and interpretation, and taking an active role in a number of interventional processes during the final year. Particularly, in the emergency medicine (EM) internship, students personally taking care of a patient for the first time, share the responsibility with EM assistants at the diagnosis and treatment stage of the disease. In addition, intern physicians, for the first time during EM internship, usually encounter the patient group that needs urgent and immediate intervention, such as those with cardiopulmonary arrest or multiple traumas, and are involved for the first time in this stressful environment.

Stress is defined as the negative psychological or physical consequences of any external stimulus created by an individual. Stress is the modest form of mood disorders. People with increased stress and

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failure in coping with it may develop anxiety and depression. Numerous factors from personal life to professional life may cause stress, depression, and anxiety (1). In addition, environmental factors and their changes are known to affect the level of stress in an individual (2).

Intern physicians are stressed even before starting the internship because of numerous responsibilities and changing environmental factors, thereby being victims of anxiety and depression. In this study, we aimed to measure reference levels of anxiety and depression of sixth grade students who experience intensive workload and stressful environment for the first time and to investigate the effect of 2-month period spent in the emergency department on these emotions.

Materials and Methods

This study was prospectively conducted on the medical faculty sixth grade students receiving EM internship between October 15, 2015, and June 01, 2016, in the emergency department of Atatürk University Medical Faculty. The students were subjected to Beck depression, Beck anxiety, and DASS-42 tests on the first and last days of EM internship, and anxiety, depression, and stress scores were determined.

The study was performed on a total of 138 students; 3 and 4 of the students(totally 7) were excluded from the study, respectively, due to "using antipsychotic drugs" and "not volunteering to participate in the survey," which were among the exclusion criteria. In total, 131 individuals took the first and last evaluation tests and completed the study.

Inclusion and exclusion criteria of the study are given in Table 1.

The participants who accepted to be enrolled in the study were taken to a private room in the emergency department and the survey forms were completed with a face-to-face interview.

Beck anxiety, Beck depression, and DASS-42 scales, which have been validated and translated to Turkish and were proven as reliable, were used to determine the depression and anxiety of the participants.

Beck anxiety scale is a self-assessment scale, used to determine the frequency of the anxiety symptoms that individuals experience. This scale provides a Likert-type (sum of ratings) measurement. There are 4 options in each of the 21 symptom categories. Each item is rated between 0 and 3 points. The severity of the anxiety experienced by the individual is derived from the total score of the scale.

Beck depression scale is a self-assessment scale, applied on both healthy and psychiatric patient groups. The objective of this scale is to determine the risk for depression and to measure the level and change in the severity of depressive symptoms. This form includes 21 self-assessment items and provides a 4-point Likert-type measurement. Each item is scored increasingly between 0 and 3 points, and the total score is obtained by the sum of these points. A high total score indicates high severity of depression.

DASS-42 was developed by Lovibond in 1995. The scale consists of 42 items with 14 belonging to depression (e.g., I couldn't seem to experience any positive feeling at all), 14 to anxiety (e.g., I was aware of dryness of my mouth), and 14 to stress (e.g., I found myself in situations that made me so anxious) dimensions. This scale is designated for the measurement of depression, anxiety, and stress symptoms that present from the time it is applied, including the last week (3). Written informed consent was obtained from participants who participated in this study.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Being volunteer to participate in the study	1. Not volunteering to participate in the study
2. Having no hearing impairment	2. Having impaired hearing
3. Being able to speak and read in Turkish	3. Not being able to speak and read in Turkish
4. Having stable vital signs	4. Having no stable vital signs
	5. Individuals with hormonal dysfunction
	6. Individuals using steroid, anxiolytic, and sedative drugs
	7. Individuals diagnosed with severe anxiety disorder, active psychosis, or dementia
	8. Individuals with substance abuse
	9. Individuals with any chronic disease

Table 2. Age distribution of the participants

Age, years	Number of persons
22	2
23	35
24	39
25	29
26	14
27	6
28	3
30	1
34	1
44	1

Statistical analysis

Data obtained were evaluated using the Statistical Package for Social Sciences version 20 (IBM SPSS Statistics; Armonk, NY, USA) package software. A paired-sample t test was used for comparing the variables showing normal distribution. All data were expressed as mean ± standard deviation, and $p<0.05$ values were considered statistically significant.

Results

A total of 131 sixth grade interns in the Atatürk University Medical Faculty voluntarily participated in the study. Of the participants, 77 (58.8%) were males and 54 (41.2%) were females. The mean age was 24.64±2.34 years (min-max, 22–44), and the median age was 24 years. The age distribution of the participants is shown in Table 2.

Table 3. Overall scores obtained from the stress, anxiety, and depression tests applied on the first and last days

	Beck depression, mean ± standard deviation	Beck anxiety, mean ± standard deviation	DASS-42, mean ± standard deviation
Mean scores of the first day	10.15±6.11	9.06±7.25	23.91±14.35
Mean scores of the last day	6.37±4.79	4.69±4.85	15.31±12.13

The mean value of Beck depression scale on the first day was 10.15±6.11 (min-max, 1–37) and median value was 9. The mean value of Beck depression scale on the last day was 6.37±4.79 (min, 0; max, 23) and the median value was 5. This decrease in Beck depression scale mean values between the first and last day was statistically significant ($p<0.05$).

The mean value of Beck anxiety scale of the participants on the first day was 9.02±7.25 (min-max, 0–33) and the median value was 7. The mean value of Beck anxiety scale on the last day was 4.69±4.85 (min-max, 0–22) and the median value was 3. This decrease in Beck anxiety scale mean values between the first and last day was statistically significant ($p<0.05$).

The mean value of DASS-42 of the participants on the first day was 23.91±14.35 (min-max, 0–66) and the median value was 22. The mean value of DASS-42 scale on the last day was 15.31±12.13 (min-max, 0–61) and the median value was 12. The difference was statistically significant ($p<0.05$).

We designed the tests to evaluate the diseases that are frequently encountered in emergency department; the mean score on the first day was 24.37±11.15 (min-max, 3–54) and the median score was 23, while the mean value on the last day was 13.31±8.34 (min-max, 0–43) with a median score of 12, and the difference was statistically significant ($p<0.05$). When the scores obtained from the tests were compared according to gender, no statistically significant differences were found between the two sexes ($p>0.05$).

The first and last day points obtained from the tests applied on the participants are summarized in Table 3.

Discussion

To our knowledge, this study is the first to investigate depression, anxiety, and stress levels of the medical faculty sixth grade students before and after EM internship. When the levels of these three factors were compared between the first and last days of the emergency department internship, the first day values were found to be higher than those of the last day, and the difference was statistically significant. We think that this may be because interns become stressed anticipating that a difficult environment they never knew and were unfamiliar is waiting them, and after 2 months spent in EM, they comprehend that it was not something to be feared owing to the experience they have gained. We have discussed the reasons for stress, anxiety, and depression before starting EM internship.

Changing environment

Today, stress, anxiety, and depression are recognized as general emotional problems by many researchers. People often experience these three moods in daily life. Stress is the mildest and most common of these moods. It is described as the negative psychological or physical consequences of any external stimulus created by the individual. Evidently, although there are many factors that can cause stress in every person's daily life, being under the influence of stress varies from person to person. Numerous factors in daily life, such as natural disasters, familial problems, economic concerns, professional troubles, problems experienced in traffic, and environmental factors may be a source of depression, anxiety, or stress (1). In our study, changing environment and being involved in a new environment and a more challenging professional tempo than other internships might have caused stress, anxiety, and depression in our participants.

Working in the field of health

Various studies have shown that health care workers are under severe stress compared to other occupational groups (4). In health care organizations, depression symptoms may develop when appropriate coping mechanisms are not applied for stress resulting from daily events and the profession (5, 6). Medical faculty sixth grade is the preparation period for the medicine profession. Moreover, the interns take the responsibility of a patient for the first time during EM internship. The interns who consider themselves more responsible for a patient for the first time might be more stressful, anxious, and depressive.

Violence in health

Studies have shown that violence occurs most commonly in the health care field compared to the other occupational areas. It has been reported that violence toward health care workers worldwide and in Turkey is a serious professional problem that needs to be emphasized (7). Violence incidents lead to long-lasting adverse effects on health care professionals, such as enervation, loss of labor, reduction in job satisfaction, anxiety, stress disorder, feeling of insecurity, depression, alcohol abuse, smoking, suicide, and deterioration in interpersonal relations (8-13). It is known that exposure to violence is most often experienced in emergency services (14).

Increasing violent events towards the health care professionals that are most commonly experienced in emergency department might be a factor of anxiety and stress before the internship.

The challenges of working in emergency services

Emergency departments are an extremely stressful area of work by nature. Emergency physicians must make and apply quick and correct decisions. Therefore, EM is associated with specific problems and functioning compared to the other departments. EM clinics are and will continue to be one of the most exhausting units of hospitals in the conditions of our country. Emergency department is an area where many and different diseases are simultaneously encountered, and patients present with different complaints then previous patients (15). Even minor mistakes in emergency departments may cause severe mortality and morbidity of the patients. However, the crowded environment of emergency departments always increases the probability of mistakes. Working conditions, overtime, and workload of physicians in emergency departments is another factor increasing

stress and tension in the environment. Furthermore, emergency departments provide 24-hour service therefore the emergency department staff continue to work on weekends and long public holidays. These reasons might be important factors affecting the levels of stress, anxiety, and depression in these participants who are part of emergency health care team during the 2-month internship period.
In our study, no statistically significant difference was found between the two sexes in the scores obtained from stress, anxiety, and depression on the first and last days of the internship. In general, women are more likely to be depressed (16). The reason for no significant difference found between the genders might be related to the source of stress arising from professional life rather than private life. The two sexes receiving educations in similar conditions during 6 years and having common concerns about the emergency department might have caused this result. Similar publications in the literature that have been conducted on populations similar to ours, supporting our hypothesis (1, 17).

Study limitations

Our work is single-centered study. Our study was relatively small number of participants and scope of a certain period.

Conclusion

Individuals may develop anxiety and depression due to many different factors, including changing social environment, physical environment, emotional state and change of mental–biological functions. Medical faculty sixth grade students get high scores on the stress, anxiety, and depression scales before starting to EM internship due to many reasons, but the last day scores are decreased as a result of elimination of many factors that we think as a reason of this situation and by experiencing the good aspects of working in emergency departments.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Atatürk University School of Medicine.

Informed Consent: Written informed consent was obtained from participants who participated in this study.

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EURASIAN JOURNAL OF EMERGENCY MEDICINE

"Code Blue" in Theory Versus Daily Practice: Data from a Secondary Care Hospital Short title: "Code Blue" in a State Hospital

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Abstract

Aim: Education regarding the code blue team has been provided in all hospitals, but the true code blue activation is rare. This study aimed to evaluate the true code blue rates and to investigate if there is a need for education regarding code blue or an additional team for reducing team efforts in hospitals.

Materials and Methods: In this cross-sectional study, the code blue reports of a secondary care hospital were retrospectively searched from the forms recorded, and a self-administered structured survey with health staff was developed to determine the knowledge level regarding code blue.

Results: In total, code blue was activated at 123 instances. Code blue had been mostly activated from the services (n=43). Twenty-two patients had been hospitalized; 34 of patients had been admitted to ICU; 19 patients had died; and the remaining 20 patients had been externed. The overall response times were <3 minutes in all code blue cases. In total, 120 staff members participated in the self-administered structured survey. Overall, 38 participants were identified in the moderate group and 82 in the adequate awareness group. There was no significant association between demographic characteristics and the status of awareness regarding the code blue system (p>0.05).

Conclusion: The most significant problem is the number of inappropriate calls. To achieve a lower number of inappropriate calls, we must continue the periodic in-service basic life support training.

Keywords: Code blue, emergency code systems, health staff

Introduction

Hospital emergency codes are used worldwide to alert the staff for various emergency situations to reduce in-hospital deaths. Code blue systems are communication systems that ensure the most rapid and effective resuscitation of a patient in respiratory or cardiac arrest; however, personnel training and code procedures are important for those in charge of the code blue systems in the hospital. Each hospital, as part of the disaster plan, establishes a policy to determine which units will provide personnel for code coverage.

In Turkey, hospitals have code blue teams to reduce preventable in-hospital deaths. Although education regarding the code blue team program has been provided in all hospitals, true code blue activations are rare. This study aimed to evaluate the true code blue rates and reasons for wrong code blue activations and to additionally investigate if there is a need for education regarding code blue or constitute another team to reduce code blue team efforts in hospital.

Materials and Methods

Study design

This study analyzed the code blue forms used between January 1 and December 31 in 2016, and a self-administered structured

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survey including 10 questions about the code blue system was conducted in our hospital. Our hospital deals with approximately 60000 patients per month and has a code blue team composed of 2 experienced nurses and an intensive care unit (ICU) doctor for responding to all calls in all hospital areas except ICU and emergency rooms. A code blue is defined as any patient with an unexpected cardiac or respiratory arrest requiring resuscitation and activation of a hospital-wide alert. A wrong code is defined as a code activated for training or incorrectly dialing the number 2222.

In our hospital, any health staff (doctor, nurse, or paramedics) can raise an order for code blue by dialing 2222. Subsequently, the code blue team that is responsible for that region arrives at the scene. After arriving to the scene, the order for code blue is terminated by the team leader by dialing the same number. All the information is recorded in code blue forms, for example, which parts of hospital activated the code blue; how many were incorrect or true codes; the results of patient's last status (classified as exitus, transferred to another hospital, hospitalization, admission to ICU, and discharge); and the maximum number of arrivals evaluated from the code blue forms. In addition, a survey including 10 questions were obtained from the health staff to evaluate their level of knowledge regarding code blue system. The survey obtained from the health staff is shown in Figure 1. Questions were prepared by the investigators based on the American Heart Association (AHA) 2015 guidelines (prevailing at the time of study), with a maximum score of 10. Each answer was allotted one point, giving a total of 10 points for the survey. Participants with 0–5 points were classified into the weak awareness group; those with 6–8 points into moderate; and those with 9–10 points into the adequate awareness group. The results of the survey and evaluation of code blue forms were compared and the association between the level of theoretical knowledge and daily practice of health staff were evaluated.

Study duration

Between January 1 and December 31, 2016, the hospital's code blue reports (Figure 2) were searched retrospectively, and data were collected from the recorded forms. Incomplete forms or the code blue alarms, which had been cancelled, were excluded from the study.

Statistical analysis

The data were recorded in a Microsoft excel file, and the data analysis was performed using the Statistical Package for the Social Sciences for Windows, version 22.0 (IBM SPSS Statistics, Armonk, NY, USA). The differences between groups were compared by using Mann–Whitney U test and Kruskall–Wallis H test where appropriate. Data were shown as mean ± standard deviation or median (min-max), where applicable. A p value <0.05 was considered statistically significant.

Ethics

This study has been approved by the ethics committee of Bitlis Eren University. The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all the participants.

Results

Code blue was activated at 123 instances throughout the study period. Of these, 28 were excluded because of a wrong call. The evaluation of the characteristics of the remaining 95 code blue calls according to location showed that code blue was activated mostly from the services (n=43) and followed by polyclinics (n=23), phlebotomy units (n=13), and radiology department (n=11; Table 1).

The evaluation of the distribution of the final status of patients showed that 22 patients had been hospitalized (23%); 34 had been admitted to the ICU by a successful intervention (35%); 19 were exitus (20%); and the remaining 20 (22%) were externed from the emergency department with an appropriate treatment or a confirmation regarding the rejection of treatment (Table 2).

The overall response times after the code blue activation were <3 minutes in all code blue cases. In total, 120 health staff participated in the self-administered structured survey; 32 of these (27%) were males and 88 (63%) were females.

According to the code blue activation status, 40% of participants (n=48) have activated and 60% (n=72) have never activated the code blue previously. Additionally, 38 participants (32%) have resuscitated a patient with cardiac or respiratory arrest; however, 82 of these (68%) have never resuscitated previously. The evaluation of the education status of participants showed that 26% (n=32) were high school graduates; 15 (n=18) had an associate's degree; 52% (n=62) were undergraduates; and 7% (n=8) were postgraduates.

According to the running period as a health staff; the percentage of health staff for 1 year was 13% (n=16); for 2–5 years was 55% (n=66); for 6–10 years was 20% (n=24); and for >10 years was 12 % (n=14; Table 3).

Overall, 38 participants (32%) were located in the moderate group and 82 (68%) in the adequate awareness group. There was no statistically significant association between sex, code blue activation status, resuscitation status to a patient with cardiac or respiratory arrest status, running period as a health staff of participants, and the status of awareness regarding the code blue system (p>0.05).

Discussion

Code blue is generally used to indicate a patient requiring resuscitation or otherwise in need of immediate medical attention, most often due to respiratory or cardiac arrest that is common in hospital areas; delayed treatment is associated with a lower survival rate (1). There are various studies regarding this issue in literature (2-4). In total, 231 of 311 patients' code blue calls were inappropriate in a study performed by Kaernested et al. (5). Conversely, in a study performed by Herrera et al. (6) this rate was 11%. Canural et al. (7) reported that 61% of code blue calls had not been in a life-threatening situation. However, in our study, the rate of wrong calls was 22%; the rate of patients not in a life-threatening situation was 45%. Our data are compatible with some of the data because of various rates reported previously in literature. Despite organizing

PROPOSALS	TRUE	FALSE	DON'T KNOW
Code blue only activates in cardiac or respiratory arrest.			
Respiration and circulation control must control to activate code blue in patients in syncope,			
Code blue team is waited for CPR in patients with cardiopulmonary arrest.			
Code blue mist be activated in patiens with epileptic seizures.			
Code blue team must arrived to scene in max 3-5 minutes.			
Code blue must activates in patients with hypotension in hospital.			
Punishment are applied to individual activated code blue unnecessaryly.			
Security personnel must take precautions to interfered by code blue team.			
Any health staff can give an order for code blue by phone by dialling 2222 and after arriving to the scene, order for code blue is terminated by team leader by phone dialling same number.			
Code blue activation must be terminated as soon as possible if it is unnecessary code.			

Sex?

What's the code blue number?

Have you ever dialled code blue number?

Have you ever ressuciated a patient with cardiac or respiratory arrest?

What is your education status?

How long have you served as a health staff?

Figure 1. Questionnaire form obtained from the health staff

periodic training and education for the code blue system, the rate of wrong code blue calls rate was high. The reason of this may be that the staff may have initiated the code blue process under any dangerous and at-risk situations. Moreover, the reason for this was observed as pressure on the hospital staff by the patients' relatives who are highly sensitive of seeking emergency medical care for the patient.

The overall response times after the completion of announcement were reported as 105 seconds in a study by Eroglu et al. (8); 6 minutes in a study by Canural et al. (7); 2.17 minutes in a study by Bal et al. (9); 4,31 minutes in a study of Bayramoglu et al. (10); and <1 minute in study of Ezquerra Garcia et al. (11). Here, the time was <3 minutes. Because of the retrospective nature of the study, the mean response time was not determined. However, according to the data from the forms, this time was <3 minutes in all code blue calls. Ideally, the code blue team should arrive at the scene in approximately 3–5 minutes. In some studies, this time surpasses 5 minutes. This situation may originate due to the wide space of the hospital or inadequate number of members of code blue team. For this reason, constitute further code blue team and assign to different location of hospital may be a solution.

Most of the calls (43%) were made from the services according to the locations of the calls and followed by polyclinics, phlebotomy units, and radiology department. Similarly, Bayramoglu et al. (10) reported that most of calls had been made from services. Phlebotomy units were in the first line according to Eroglu et al. (8). The code blue system does not work in ICU s and emergency department with critically ill patients. The most critically ill patients in the remaining population are found in services. This may be a reason for most calls being made from services.

According to the final status of the patients, Aune et al. (12) reported a discharge rate of 29% in hospital cases and this rate was reported as 29,5% by Bayramoglu et al. (10). Bal et al. (9) reported that 137 cases were coded, 90 of these survived, but the number of ICU deaths were unknown. In our study, we found that 23% of patients had been hospitalized; 35% of patients had been admitted to ICU; 20% of patients had been exitus, and the remaining 22% of patients had been externed from the emergency department with an appropriate treatment or a confirmation regarding the rejection of treatment. However, the total death rate was 20% and the survival was 80%. Unfortunately, because of the retrospective nature of the study, the number of ICU deaths is unknown.

We aimed to determine the level of awareness regarding the code blue system of the health staff with a self-administered structured survey and investigated whether the factors influencing the level of knowledge have been present in this study. The results indicated that all participants scored ≥6 points. Here, we concluded that the level of awareness of health staff is adequate. Despite the improved results, the rate of patients experiencing a life-threatening condition among those evaluated with a code blue call is only 45% in the same hospital for the last year, and this rate is quite low when compared with the theoretical level of knowledge. The reason for inadequate application

CODE BLUE INTERVENTION FORM				
Name-surname T.C. identification number Sex Date of birth		Location: Date:		
Calling time **İntervention time** **Total response time**				
İnitial evaluation	Consciously Breathing Circulation	Yes Yes Yes	No No No	
CODE BLUE TEAM INTERVENTIONS				
Respiratory support with balloon mask monitorization Opening intravenous access Administration of intravenous drug Entubation Defibrillation		Others		
The time of termination of CPR	Spontaneous circulation	Yes No		
The time of awakening				
Other results	Exitus	Transferred to ICU	Hospitalization	Externed	Denied of treatment
Taem Leader		**Other staff**		
1..... signature		1..... signature 2..... signature 3..... signature		

Figure 2. Code blue forms of the hospital

Table 1. Call distribution according to location

	n	%
Polyclinics	23	24
Service	43	45
Phlebotomy rooms	13	14
Radiology department	11	12
Others	5	5
Total	95	100

Table 2. Distribution of the final status of patients

	n	%
Hospitalization	22	23
Admission to ICU	34	35
Exitus	19	20
Denial to treatment	10	11
Externed	10	11
Total	95	100

ICU: intensive care unit

in daily practice of health staff may originate from the pressure of the patients' relatives as stated above or the lack of awareness regarding stress management of the health staff not accustomed working in the emergency department.

According to the results of our study, it is clearly seen that simulated practice should enhance along with theoretical education to achieve a lower number of inappropriate calls.

Study limitations

The low number of participants and code blue activation instances are the limitations of the study. In addition, because of the retrospective nature of the study, the forms included incomplete information and long-term mortality could not be determined. Another limitation is that the number of health staff with a post graduate

Table 3. The characteristics of health staff participated in the questionnaire

		Adequate awareness group (68%) n=82		Moderate awareness group (32%) n=38	
		n	%	n	%
Sex	Male	20	24	12	32
	Female	62	76	26	68
Code blue activation status	Yes	32	40	16	42
	No	50	60	22	58
Status of intervention to arrest	Yes	28	34	10	26
	No	54	66	28	74
Education status	High school	20	24	12	32
	Associate degree	12	15	6	16
	Under graduate	42	51	20	52
	Post graduate	8	10	-	-
Running time for a health staff (years)	0-1	8	10	8	21
	2-5	46	56	20	53
	6-8	16	19	8	21
	>10	12	15	2	5

degree was limited. Thus, the association between the education status and code blue theoretical knowledge could not evaluated correctly. Prospective and multicenter studies with larger groups are needed.

Conclusion

The most significant problem of the current system is the number of inappropriate calls. To achieve a lower number of inappropriate calls, we must ensure periodic, in-service, basic life support training.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Bitlis Eren University.

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

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The Relationship between Age and Affected Cerebral Vessels in Ischemic Stroke Patients

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Abstract

Aim: This study aimed to analyze the relationship between the age and the radiological findings in patients who admitted to University of Health Science Okmeydani Training and Research Hospital Emergency Department with cerebrovascular disease between January 2015 and January 2016. Ischemic stroke has a major importance due to its high mortality and morbidity. Ischemic stroke is the third leading reason of deaths in the world. It is also an important reason for long-term disability besides mortality.

Materials and Methods: This study is a retrospective study and covers 352 patients who admitted to our Emergency Department with cerebrovascular disease between January 2015 and January 2016.

Results: Patient information system was searched as covering the study period. Information of age and radiologically affected cerebral artery at first admission were recorded. Obtained data were recorded in study form. With our analysis, we detected meaningful relationship between the age and the posterior circulation ischemic stroke. The study was performed with 352 patients in University of Health Science Okmeydani Training and Research Hospital between January 2015 and January 2016. Quantitative data were reported as average ± standard deviation; and categorical data were reported as number or percentage. In all statistical analysis, $p<0.05$ was accepted as statistically meaningful difference. SPSS 22 for Windows was used for statistical analysis.

Conclusion: In our study, we detected a meaningful relationship between the age and the posterior circulation ischemic stroke similar to the literature. Additionally, in the result of our study, we detected posterior circulation strokes are younger than middle cerebral artery and anterior cerebral artery strokes.

Keywords: Age, cerebrovascular circulation, ischemia, stroke

Introduction

Stroke stands for a focal neurologic syndrome that occurs suddenly due to cerebrovascular disease (1). World Health Organization defines stroke as "Suddenly occurred symptoms due to focal or global malfunctions of cerebrum that might result in death" (2, 3). Almost 80%–85% of stroke cases are with ischemic origin, and 10%–15% of them are hemorrhagic (2).

Despite all successful improvements of its treatment, acute stroke is still the third most common reason of mortality and morbidity after heart diseases and malignancy (3, 4). Besides its mortality, it causes economic and psychosocial outcomes that affect individuals, families, and communities. For these reasons, prevention and treatment of stroke is an important public health problem.

Risk factors of ischemic cerebral vascular diseases such as diabetes mellitus, hypertension, atrial fibrillation, smoking, and coronary artery diseases are well-defined by too many international multicentric researches (5).

Recent studies suggest new approaches to acute ischemic stroke in early stages that decrease rates of mortality and morbidity due to

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stroke, and we assume that knowing the effects of risk factors on prognosis and treatment of acute strokes will contribute to decreasing mortality and morbidity levels of patients who are managed in the emergency department.

There are several studies on all the risk factors, but there is limited source of studies that shows the relationship between age and affected vessels in ischemic stroke.

In this study, we aimed to analyze the relationship between age and the affected cerebral vessels by using both clinical records and radiological findings in patients who admitted to our emergency department with ischemic stroke between January 2015 and January 2016.

Materials and Methods

Patients admitted to our training and research hospital emergency department between January 2015 and January 2016 who has one of the I63, I64, I65, I66, I67, I68, I69, and G46 diagnoses codes inside ICD-10 medical coding system were included in this retrospective study. Approval was obtained from the Institutional Ethics Board before beginning the study.

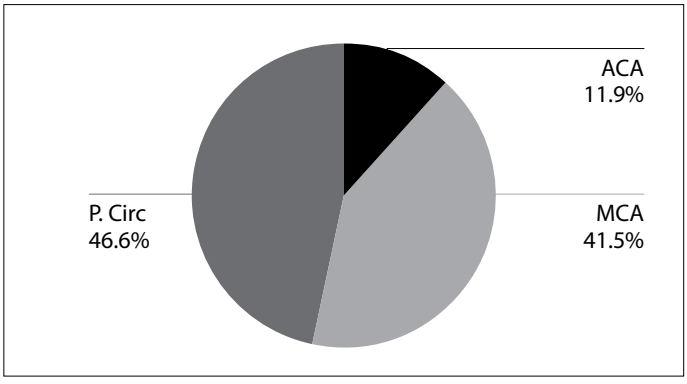

Figure 1. Image showing affected vessels' distribution in ischemic stroke
P. Circ.: Posterior Circulation; ACA: Anterior Cerebral Artery; MCA: Middle Cerebral Artery

Hospital electronic medical record system and hospital archive files were used to get information about patients' clinic and radiologic findings. All patients older than 18 years and diagnosed and coded to ICD-10 system with ischemic stroke were included in this study.

Patients diagnosed with hemorrhagic infarct were excluded. Patients who had no radiological finding on their diffusion magnetic resonance imaging (MRI) imaging and whose ischemic lesion could not exactly define which cerebral vessel it belongs to were also excluded. Some of the patients had more than one cerebral vessel affected and hence were excluded from this study.

Under these certain criteria, included patients were grouped as: anterior cerebral artery (ACA) affected, middle cerebral artery (MCA) affected, and posterior circulation (P. Cir.) affected.

Statistical analysis

Statistical analysis was performed by using IBM Statistical Package for the Social Sciences (IBM SPSS Statistics, Armonk, NY, USA) 22 for Windows. The normality of distribution was assessed with Shapiro–Wilks test. To compare groups, the Mann-Whitney U test was used for the analysis of non-parametric continuous variables. The Pearson correlation test was used for the detection of correlation between quantitative variables. Chi-square test was used for the detection of correlation between qualitative variables. The cut-off values of parameters were identified using the analysis of receiver operating characteristic (ROC) curves for the differentiation of groups. For all statistical tests performed, $p<0.05$ was considered to be statistically significant.

Results

For the time period of our study's retrospectively analyzed data, between the age of 20 and 95 years, 352 patients were admitted to our emergency department with diagnosis of acute ischemic stroke and were included in our study according to the inclusion criteria.

A total of 164 (46.6%) of the analyzed stroke patients had affected vessel in P. Cir, 146 (41.5%) had MCA affected, and 42 (11.9%) had ACA affected. Median age of patients was 70 years (Figure 1).

Table 1. Relationship between age and affected vessels in ischemic stroke

				ACA			MCA			P.CIRC.		p
Age		Mean±SD		71.3±13.2			68.4±13.9			65.2±14.4		
		Med (Min-Max)	75	36.0-88.0		70	24.0-95.0		66	20.0-94.0		0.010
Age	20-29	n-%		0	0.0%		3	2.1%		1	0.6%	
	30-39	n-%		1	2.4%		1	0.7%		4	2.4%	
	40-49	n-%		3	7.1%		10	6.8%		22	13.4%	
	40-59	n-%		3	7.1%		21	14.4%		28	17.1%	
	60-69	n-%		7	16.7%		34	23.3%		38	23.2%	
	70-79	n-%		15	35.7%		40	27.4%		39	23.8%	
	80-89	n-%		13	31.0%		32	21.9%		29	17.7%	
	90 ≤	n-%		0	0.0%		5	3.4%		3	1.8%	

Kruskal-wallis (Mann-Whitney U test). P. Circ.: Posterior Circulation; ACA: Anterior Cerebral Artery; MCA: Middle Cerebral Artery

The ACA-affected group had the highest median value of age with 75, followed by the MCA-affected group with a median value of 70. The P. Cir group had the lowest median value with 66. Results of statistical analyses of the data showed that ages of P. Cir patients were significantly lower than ages of both the MCA and ACA patients ($p<0.05$) and that the ages of the MCA-affected patients were significantly lower than ACA-affected patients ($p<0.05$) (Table 1).

Discussion

It is a fact that more than 70% of stroke patients are older than the age of 65 years (6). In several studies, the mean value of stroke patients' ages was analyzed. It was found to be 70±11 years by Yoneda et al. (7), 65.3±8.2 years by Reganon et al. (8), 64±3 years by Williams et al. (9), 63.5±13.6 years by Hakbilir et al. (10), and 68.6±14.6 years by Gürger at al. (11) Our study supported these numbers with mean age value of 67.3±14.2 years.

Although according to a study made by Kumral et al. (12) in 2002, the MCA-affected group were two-thirds of all analyzed patients, and it is responsible for 90% of anterior circulation infarcts; in our study, MCA-affected patients were only 41.5% of all ischemic stroke patients. Unlike this particular study, the ACA-affected group had the highest mean value of age with 71.3±13.2 years. In the same study, isolated ACA-affected patients were 3%, but in our study, ACA-affected patients had higher rate among all ischemic stroke patients with 11.9%.

Musolino et al. (13) found that P. Cir infarcts ratio among young adult patients were significantly higher than older patients. Our findings supported that study. We found that mean age value of P. Cir–affected ischemic stroke patients was 65.2±14.4 years and just like the study referenced above, P. Cir–affected patients were significantly ($p<0.05$) younger than ACA- and MCA-affected patients.

Study limitations

The limitations of this study were in common with other radiological imaging–based studies. Difficulty to have exact definitions of some radiological images and poor quality of imaging due to multiple factors have limited our study.

Conclusion

Our study showed that younger ischemic stroke patients are much likely to have their P. Cir cerebral vessels affected. After all neurological examinations made, emergency physicians should keep in their minds that it is much possible for younger patients to have P. Cir infarcts, and due to its higher mortality and morbidity, clinical decisions have to be made quickly.

Although there are several numbers of studies that are based on clinical findings of ischemic stroke patients, there are very limited isolated studies that analyzed affected vessels according to radiological findings. And some significant differences were observed between our study and referenced studies above. So, it is required to make more studies that are based on radiological finding instead of clinical findings to have a common idea about ischemic stroke patients.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of University of Health Science Okmeydanı Training and Research Hospital.

Informed Consent: Informed consent is not necessarry due to the restrospective nature of this study.

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EURASIAN JOURNAL OF EMERGENCY MEDICINE

Prognostic Value of the Neutrophil–Lymphocyte and Platelet–Lymphocyte Ratios in Predicting One-Year Mortality in Patients with Hip Fractures and Aged Over 60 Years

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Abstract

Aim: In this study, we aimed to determine the effect of neutrophil–lymphocyte ratio (NLR) and platelet–lymphocyte ratio (PLR) on one-year mortality in patients with hip fractures and aged over 60 years.

Materials and Methods: The S72.00, S72.10, and S72.20 codes were screened according to International Classification of Disease-10, and 560 patients were included as cases of hip fractures. Blood counts on admission and clinical data were obtained from medical data. Predictors of one-year mortality were evaluated.

Results: In total, 116 out of 560 patients (20.7%) included in the study died during the one-year follow-up. When the patients' characteristics were compared according to one-year mortality (survivor and non-survivor groups), significant differences were detected for age, lymphocyte count, NLR, and PLR ($p<0.05$). When a Cox regression model was created to assess the factors predicting one-year mortality, the hazard ratios of NLR and PLR were 1.059 (1.022–1.097, $p=0.002$) and 0.997 (0.994–0999, $p=0.01$), respectively.

Conclusion: In the study, in predict mortality among patients aged over 60 years and who had hip fractures, the NLR and PLR were observed to be higher in the survivor group than in the non-survivor group. However, when the specificity of these values is considered, it is obvious that they are not sufficiently reliable for clinical use.

Keywords: Hip fracture, neutrophil–lymphocyte ratio, platelet–lymphocyte ratio, one-year mortality

Introduction

Since the human lifespan has increased in recent years, there has been an increase in the geriatric population. Hip fractures, which are commonly seen among the elderly, are injuries with high mortality and morbidity rates, resulting due to the limited physiological reserves of the elderly, their preoperative medical conditions, trauma, and major surgical combinations (1, 2). The average lifespan among the elderly who received treatment for hip fractures is shorter than the lifespan of those who did not receive treatment in the same age group (3). Except for the direct effect of trauma, reactions, such as systemic inflammatory response syndrome, might develop in patients with hip fractures in a manner similar to that for multi-trauma patients; this is considered a significant mortality factor for the patient group involved. Therefore, considering the factors that might be related to the degree of the inflammatory response in patients with hip fractures could give an idea regarding mortality (4).

The white blood cell (WBC) count is regarded a well-defined inflammatory indicator and/or stress indicator, whereas the neutrophil–lymphocyte ratio (NLR), which is calculated through the division of absolute neutrophil count by absolute lymphocyte count, is asserted to be a new indicator of the inflammatory response. A high correlation has been detected between the NLR and acute coronary syndrome, non-ST myocardial infarcts, ischemic and hemorrhag-

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ic strokes, pulmonary embolisms, and several types of cancer (5-7), while the platelet–lymphocyte ratio (PLR) is calculated through the division of absolute platelet count by lymphocyte count. The PLR has been claimed to have potential as a marker to help identify thrombotic activity and inflammation in certain oncological and cardiac diseases (8, 9). In previous studies, a number of factors in hip fractures that could lead to mortality have been analyzed. However, there are a limited studies show that the subtypes of leukocyte and thrombocyte counts, especially NL and PL, are associated with severe clinical conditions and mortality in major surgical procedures in the literature (10-12). In this study, we aimed to determine the prognostic value of the NLR and PLR on one-year mortality in patients who have hip fractures and aged over 60 years.

Materials and Methods

Study population

This retrospective, case-control study was designed after obtaining approval by the local ethics committee. The diagnostic codingof patients who were admitted to the emergency department (ED) of a training and research hospital between January 2009 and March 2015 was screened from the electronic database of the hospital. The diagnostic coding was performed by scanning the International Classification of Disease-10 (ICD-10) codes on patients with the S72.00 (femur neck fracture, closed), S72.10 (pertrochanteric fracture, closed), and S72.20 (subtrochanteric fracture, closed) codes. We obtained death data of patients from the national death notification system. Those with high-energy trauma, a hematological disease, an infectious and inflammatory disease, a recent myocardial infarction, severe renal disease (glomerular filtration rate<30 mL/min), severe liver disease, immunosuppression, and a history of malignancy and those aged under 60 years were excluded from the study. Overall, 694 patients were found to have the three ICD codes (S72.00, S72.10, S72.20); 134 patients were excluded (56 patients aged <60 years, 27 patients had missing data, 18 had high-energy trauma, 2 had active malignancy, 28 had chronic renal failure, and 3 had severe liver disease). Finally, 560 patients were included in the study for statistical analyses (Figure 1).

Data collection

The demographic data of the patients, whole blood count parameters obtained on admission [such as WBC count, NLR, red blood cell distribution width (RDW), hemoglobin level, platelet count, PLR, and mean platelet volume (MPV)], fracture types of the patients, duration of hospital stay, and comorbidities and their outcomes at the hospital (discharge, death) were recorded in study forms. It was obtained from Public Health Association death notification system whether patients are survived at present. The patients were divided into two groups as survivor and non survivor according to one year mortality.

Laboratory parameters

The laboratory results were evaluated according to the first venous blood samples taken on admission to the ED. Total blood cell counts and its subtypes were analyzed using an automated blood cell counter (Cell-dyn, 3700, Abbott, USA). The NLR was calculated as the ratio of the neutrophil count to the lymphocyte count, and the PLR was calculated as the ratio of platelet count to lymphocyte count.

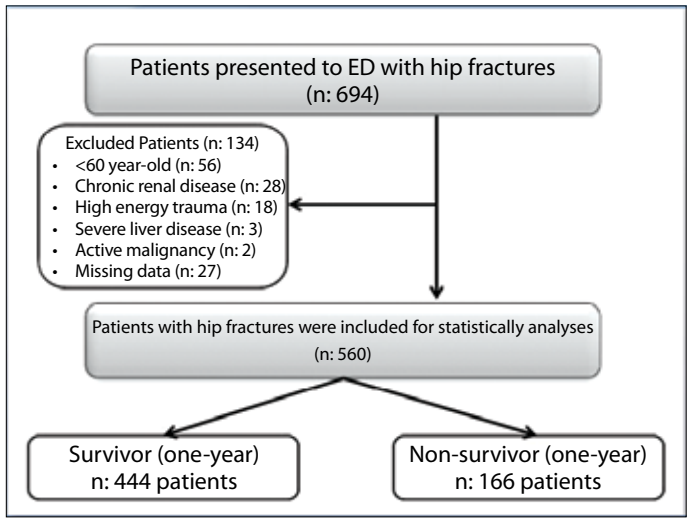

Figure 1. Flow chart of patients

Table 1. Demographics and some laboratory findings of the patients [median (IQR 25%–75%)]

Age (years)	80 (74–85)
Sex (female), n (%)	348 (62.1)
Comorbidities, n (%)	
Hypertension	264 (47.1)
Congestive heart failure	24 (4.3)
Chronic renal disease	27 (4.8)
Diabetes mellitus	121 (21.6)
Coronary artery disease	98 (17.5)
Hemoglobin level (g/dL)	11.8 (10.5–13.1)
WBC count (10^3/μL)	9.9 (7.8–12.1)
Neutrophil count (10^3/μL)	7.8 (5.8–10.3)
Lymphocyte count (10^3/μL)	1.2 (0.8–1.6)
Red blood cell distribution width (%)	14.9 (13.9–16.4)
Platelet count (10^3/μL)	212 (169–257)
Mean platelet volume (fL)	8.3 (7.7–9)
NLR	6.7 (4–11)
PLR	181 (126–256)
Type of fracture, n (%)	
Head	9 (1.6)
Neck	424 (75.7)
Perthrochanteric	127 (22,7)
30-day mortality, n (%)	27 (4.8)
One-year mortality, n (%)	116 (20.7)

IQR: interquartile range; NLR: neutrophil–lymphocyte ratio; PLR: platelet–lymphocyte ratio; WBC: white blood cell

Statistical analysis

Statistical analyses were performed using Statistical Package for the Social Sciences 15.0 (SPSS Inc.; Chicago, IL, USA). Demograph-

Table 2. Patients' characteristics according to long-term (one-year) mortality [median (IQR 25%-75%)]

	Survivor	Non-survivor	p
Age (years)	80 (74–84)	83 (77–87)	<0.001*
Sex (female), n (%)	282 (63.5)	66 (56.9)	0.1
Comorbidities, n (%)			
Hypertension	205 (46.2)	59 (50.9)	0.3
Congestive heart failure	15 (3.4)	9 (7.8)	0.03*
Chronic renal failure	22 (5.0)	5 (4.3)	0.7
Diabetes mellitus	103 (23.2)	18 (15.5)	0.07
Coronary artery disease	72 (16.2)	26 (22.4)	0.1
Hemoglobin level (g/dL)	11.8 (10.5–13.1)	11.9 (10.3–13.1)	0.5
WBC count (10^3/μL)	10 (7.9–12.1)	9.8 (7.7–12.1)	0.8
Neutrophil count (10^3/μL)	7.8 (5.7–10.3)	7.8 (5.9–10.1)	0.6
Lymphocyte count (10^3/μL)	1.2 (0.9–1.6)	1 (0.7–1.4)	0.004*
Red blood cell distribution (%)	14.8 (13.8–16.3)	15 (14.1–16.5)	0.1
Platelet count (10^3/μL)	214 (172–257)	206 (159–263)	0.3
Mean platelet volume (fL)	8.3 (7.7–9)	8.2 (7.6–9)	0.5
NLR	6.6 (3.9–10.9)	7.2 (4.7–12.2)	0.04*
PLR	178 (119–248)	197 (140–289)	0.02*
Type of fracture, n (%)			
Head	6 (1.4)3 (2.6)		
Neck	336 (75.7)	88 (75.8)	0.5
Perthrochanteric	102 (23)	25 (21.6)	

*p<0.005. IQR: interquartile range; NLR: neutrophil–lymphocyte ratio; PLR: platelet–lymphocyte ratio; WBC: white blood count

ic data related to the patients were expressed as number, percentage, median values, and interquartile range (IQR, 25%–75%). The Kolmogorov–Smirnov test was used to assess the normal distribution of the variables. Non-parametric parameters were analyzed using the Mann-Whitney U test. To determine the cut off values of the NLR and PLR between the survivor and non-survivor groups, a receiver operating characteristic (ROC) curve was generated, and the area under curve (AUC) was calculated. Multivariate Cox regression models were used to evaluate the relationship of one-year mortality with the NLR and PLR. Age, sex, comorbidities, hemoglobin level, WBC count, lymphocyte count, neutrophil count, MPV, RDW, and the type of fracture were included multivariate Cox regression model. Finally, for two groups, which were created according to the cut off values of NLR and PLR, survival rates were calculated using the Kaplan–Meier curve for one-year mortality. The 95% confidence intervals (95% CIs) were calculated whenever appropriate, and a p value of <0.05 was considered statistically significant.

Results

A total of 560 patients diagnosed with femur fractures were included in the study for statistical analyses; 348 patients (62.1%) were women and median age of all patients was 80 years (IQR, 25%-75%, 74-85). The median NLR and PLR were 6.7 (4-11) and 181 (126-256), respectively. In total, 27 patients (4.8%) died within 30 days and 116 (20.7%) died within 1 year. The demographics and some laboratory results of all patients are shown in Table 1.

When patients' characteristics were compared according to the one-year mortality of patients (survivor–non-survivor), significant differences were detected for age, lymphocyte count, the NLR, and the PLR (p<0.05). While the median NLR was 6.6 (3.9-10.9) in the survivor group, it was 7.2 (4.7-12.2) in the non-survivor group (p=0.04). While the median PLR was 178 (119-248) in the survivor group, it was 197 (140–289) in the non-survivor group (p=0.02) (Table 2).

Laboratory parameters

The cutoff NLR was obtained regarding the differences between the survivor and non-survivor groups using ROC analysis. For the NLR, the AUC was estimated as 0.56 (95% CI, 0.50–0.61), and the best cutoff NLR was 3.9 (sensitivity, 80%; specificity, 25%) (Table 3, Figure 2).

When survival rates were calculated using the Kaplan–Meier curve for one-year mortality according to cutoff NLR (3.9), the estimated mean of survival day was 314 (95% CI, 295-332) in patients with an NLR of <3.9 and the estimated mean of survival day was 306 (95% CI, 295-316) in patients with an NLR of >3.9. However, the difference

Table 3. Prediction performance of the NLR and PLR for long-term (one-year) mortality

	NLR (Cut-off: 3.9)	PLR (Cut-off: 131)
Sensitivity	80 (71–87)	80 (71–87)
Specificity	25 (20–28) 29 (25–33)	
Positive likelihood ratio	1.06 (0.96–1.18)	1.13 (1.02–1.26)
Negative likelihood ratio	0.81 (0.5–1.21)	0.68 (0.4–1)
Accuracy	56 (50–61)	56 (50–62)

NLR: neutrophil–lymphocyte ratio; PLR: platelet–lymphocyte ratio

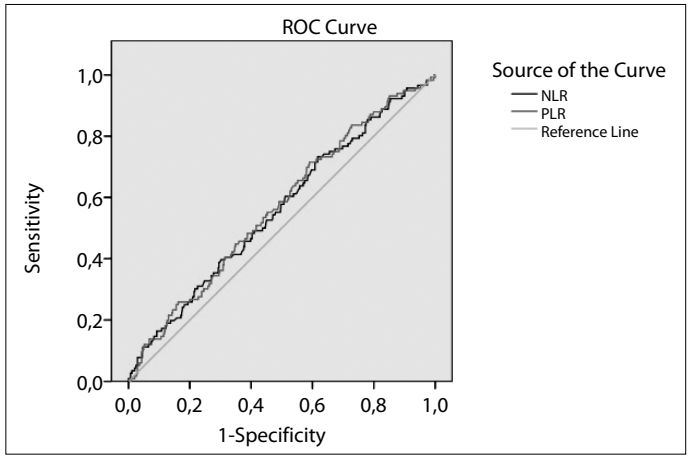

Figure 2. ROC curve of the NLR and PLR to predict mortality
NLR: neutrophil–lymphocyte ratio; PLR: platelet–lymphocyte ratio; ROC: receiver operating characteristic

Table 4. Cox regression model to predict long-term (one-year) mortality

	Wald	p value	HR (95% CI)
Age (years)	8.89	0.03	1.03 (1.01–1.06)
Sex	1.15	0.2	0.7 (0.5–1.1)
Comorbidities, n (%)			
Hypertension	1.06	0.3	1.2 (0.8–1.6)
Congestive heart failure	2.24	0.1	1.7 (0.8–3.5)
Chronic renal failure	0.03	0.8	0.9 (0.3–2.2)
Diabetes mellitus	4.04	0.04	0.5 (0.3–0.9)
Coronary artery disease	2.95	0.08	1.4 (0.9–2.3)
Hemoglobin level (g/dL)	0.001	0.9	0.9 (0.8–1.1)
WBC count (10^3/μL)	0.58	0.4	1 (1-1)
Neutrophil count (10^3/μL)	0.08	0.7	1 (1-1)
Lymphocyte count (10^3/μL)	0.40	0.52	1 (1-1)
Red blood cell distribution (%)	0.83	0.36	1.04 (0.9–1.1)
Platelet count (10^3/μL)	3.55	0.06	1 (1-1)
Mean platelet volume (fL)	0.17	0.67	0.9 (0.7–1.1)
NLR	9.97	0.002	1.05 (1.02–1.09)
PLR	6.01	0.01	0.997 (0.994–0999)
Type of fracture	1.04	0.7	2.2 (0.4–11.5)

CI: confidence interval; HR: hazard ratio; NLR: neutrophil–lymphocyte ratio; PLR: platelet–lymphocyte ratio; WBC: white blood cell

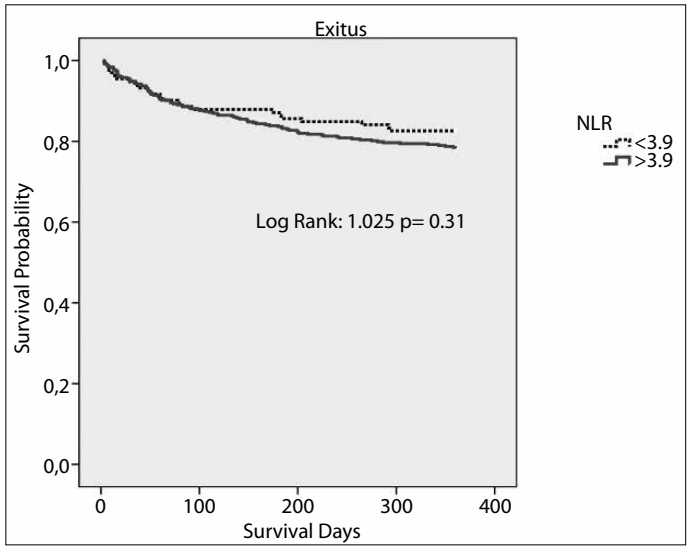

Figure 3. Comparison of Kaplan–Meier survival curves of the NLR
NLR: neutrophil–lymphocyte ratio

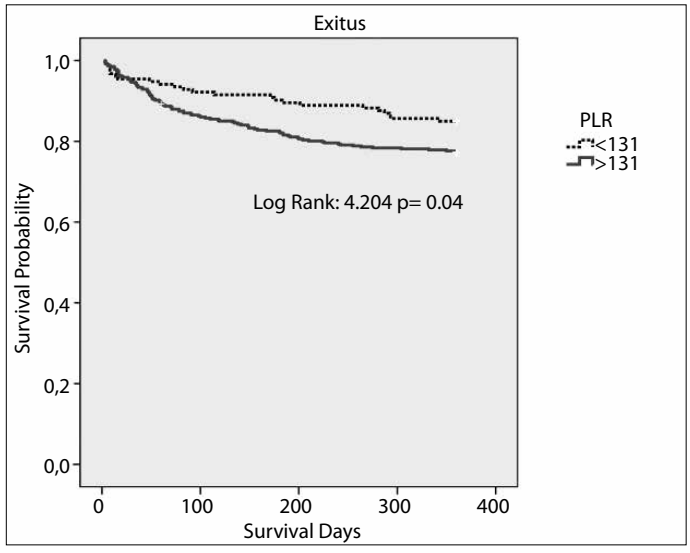

Figure 4. Comparison of Kaplan–Meier survival curves of the PLR
PLR: platelet–lymphocyte ratio

between the groups was not statistically significant (log-rank test, 1.025; p=0.3) (Figure 3).

When the Cox regression model was created to assess the factors predicting one-year mortality, the hazard ratio (HR) of the NLR was 1.059 (1.022-1.097; p=0.002; Table 4).

Platelet–lymphocyte ratio

The cutoff PLR was obtained regarding the differences between the survivor and non-survivor groups by ROC analysis. For the PLR, the AUC was measured as 0.56 (95% CI, 0.50-0.62), and the best cutoff PLR was 131 (sensitivity, 80%; specificity 30%) (Table 3, Figure 2).

When survival rates were calculated using the Kaplan–Meier curve for one-year mortality according to the cutoff PLR (131), the estimated mean of the survival day was 325 (95% CI, 310-340) in patients with a PLR of <131 and the estimated mean of survival day was 301 (95% CI, 290-312) in patients with a PLR of >131. The difference between the groups was statistically significant (log-rank test, 4.204; p=0.04) (Figure 4).

When the Cox regression model was created to assess the factors predicting one-year mortality, the HR of the PLR was 0.997 (0.994-0999, p=0.01) (Table 4).

Discussion

In the study, wherein we researched the NLR and PLR for predicting mortality among patients aged over 60 years and who had hip fractures, both NLR and PLR were observed to be higher in the survivor group than in the non-survivor group. However, when the specificity of these values is considered, it is obvious that these values are not sufficiently reliable for clinical use. Likewise, according to the cut off values, which were determined using ROC analysis, when the survey of the patient groups were evaluated using Kaplan–Meier life analysis in terms of one-year mortality, there were no differences in the survey based on the NLR, whereas there was a statistical difference based on the PLR. However, we believe that this difference does not contribute significantly to clinical use in practice.

The markers for inflammation were considered in a very large disease group (13, 14). In an effort to study the state of the inflammatory response in the body and to what extent it is stimulated, biomarkers such as WBCs, acute-phase reactants, and adhesion molecules and cytokines were used. In routine practice, the WBC count is used for the diagnosis and follow-up of diseases and is noted in many scoring systems (13). WBCs play an important role in the systemic inflammatory response. Jilma et al. (14) studied changes in the types of WBC after inflammation and found that the neutrophils in circulation increased in number and that the number of monocytes and lymphocytes decreased. In recent years, the NLR has been regarded as a parameter that shows a high level of neutrophils, which is indicative of an acute inflammatory response, and the poor health condition as well as the negative effects of the low level of lymphocytes, which reflect physiological stress (15). In the previously conducted studies, the NLR has been reported as a new cardiovascular risk factor (16, 17). However, there are few studies in which risk analyses of patients were considered in the preoperative period of the surgical population. In the study by Vaughan-Shaw et al. (10), it was claimed that the NLR could be used as an independent predictor in the survey prediction among geriatric patients who require emergency abdominal surgery. Hip fractures mostly affect the geriatric population that often has more than one health problem. On average, an old person usually has more than one disease (18, 19). Among these diseases, cardiac, respiratory, and cerebral diseases and malignancies are largely responsible for mortality and morbidity in the geriatric population (20, 21). Further, these diseases are associated with chronic inflammation. This highlights the relationship between the NLR and the progression of the diseasein patients with chronic illnesses. Forget et al. (11) evaluated the NLR after surgery for hip fractures. They researched the relationships between patients' NLRs on admission and postoperatively on the second and fifth days with adverse clinical events in the hospital and mortality after discharge and suggested that NLR alone is a risk factor but that it cannot be used as a predictor for mortality. In contrast, a study by Sedlar et al. (12) focused on the effect of early postoperative period and subacute inflammatory response [WBC count, NLR, C-reactive protein level, interleukin-6 level, and soluble adhesion molecule level] on the long-term mortality but did not to confirm the effect of acute inflammatory response. Our study is based on the baseline NLR that we obtained when patients were admitted to the ED in the preoperative period, and we do not consider that the NLR can be used as an indicator in predicting mortality.

Increased platelet activity is closely associated with atherosclerosis and thromboembolic states. It has been suggested that the PLR is a new indicator showing chronic inflammation. In particular, the PLR has been introduced as a potential marker to determine excess thrombotic activity and inflammation in oncologic and cardiac disorders (22, 23). In several recent studies, it has been suggested that the PLR is associated with major adverse cardiovascular outcomes and that it is an independent marker of mortality in some oncological diseases (24, 25). In a study by Turkmen et al. (26), the PLR was shown to be superior to the NLR in predicting the severity of inflammation. Similarly, Neofytou et al. (27) suggested that the PLR was superior in diagnosing colorectal cancer. To our knowledge, our study is the first to determine the predictive value of the PLR and hip fractures. Although we found a statistically significant difference with the PLR in living analyses in terms of one-year mortality, we believe that this difference (estimated mean of survival day; survivor for 325 days, non-survivor for 301 days) will not make a significant clinical contribution with regard to hip fractures.

Study limitations

Our study has several limitations. It is a single-center retrospective study, and data were obtained from patient files. The postoperative hematological parameters of the patients were not considered. Repetitive measurements of the NLR and PLR were not performed. The inflammatory process is complex, and other inflammatory parameters were not evaluated in this study. We used a single blood sample to calculate the NLR and included all-cause mortality as our endpoint. Considering the retrospective nature of our analysis, the results should be regarded only for generating a hypothesis and need to be confirmed in prospective trials.

Conclusion

It is important to identify new risk factors for mortality predictions after hip fractures in the geriatric age group. The NLR and PLR are simple measures, do not require additional expenses, and are inexpensive, universally available, rapidly accessible, and routine parameters. We found that in patients with a hip fracture, the NLR and PLR measured at admission were higher in the survivor group than in the non-survivor group. However, we believe that this difference does not make a significant contribution for use in clinical practice.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Keçiören Training and Research Hospital.

Informed Consent: Written informed consent was not obtained because of retrospective study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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EURASIAN JOURNAL OF EMERGENCY MEDICINE

Evolution of Emergency Medicine in Pakistan –A Fellow's Perspective

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Dear Editor,

Emergency medicine is a dynamic specialty focused on the rapid identification, evaluation, and treatment of patients who are acutely ill or injured. Due to immense demand, this field has systematically developed and is now offered as structured training in Pakistan. As the first fellow to have attained the reputed fellowship in this field from the College of Physicians and Surgeons of Pakistan, I would like to compare our nation's training program to those of countries where emergency medicine has already been established for almost half of a century. I will also generally discuss this field for newcomers interested in pursuing it as a career.

The American College of Surgeons was among the pioneering groups of physicians that recognized the importance of emergency services. In 1970, the first emergency medicine residency began, and in 1979, the American Board of Medical Specialties recognized it as a forthcoming specialty. Currently, there are now 167 emergency medicine residency training programs that are accredited by the American College of Graduate Medical Education, which offers 1,821 categorical and advanced residency positions. Most programs last for a total duration of three years, but some programs are four years long. There are several combined residency tracks offered as well, with programs like family medicine, internal medicine, and pediatrics. The American Board of Emergency Medicine, which is under the authority of the American Board of Medical Specialties, provides board certification with either the Doctor of Medicine or Doctor of Osteopathic Medicine degrees for licensed practice in the field of emergency medicine. Fellowship training following the completion of emergency medicine residency training programs are available in the fields of sports medicine, pediatric emergency medicine, pre-hospital emergency medical services, disaster medicine, medical toxicology, emergency ultrasound/diagnostic imaging, palliative care, and critical care. The United States is regarded as the best nation in the world to offer training in emergency medicine, and its programs can be very difficult, but not impossible, for international medical graduates to enter, due to a highly competitive selection process.

In the United Kingdom, the equivalent specialty, termed accident and emergency (A&E) medicine, is in a phase of constant and rapid development. By the mid-1970s, it was evident that there was an urgent need to regularize training of consultants for which the Specialist Advisory Committee in A&E medicine was formed and a training program was designed. The first senior registrar induction was in 1977. Following the formation of the Faculty of A&E Medicine in 1993, specialist registrar training in A&E began. As of this writing, A&E is composed of doctors belonging to a variety of ethnic backgrounds in order to fulfill the growing demand and much needed workforce in this field. Training is based on a six-year pathway that begins at the end of the foundation year program. Entry into specialty training for emergency medicine is from the Acute Care Common Stem program, which is a generic program shared by acute medicine and anesthesiology services. The first two years consist of six months of training in emergency medicine, six months in acute medicine, and one year in anesthetics and intensive care. The third year specifically includes six months of training in pediatric emergency medicine. Progression to higher training in the fourth year occurs after a national application procedure. Specialty training between the fourth and sixth years involves 12-month placements in departments of different sizes and patient demographics. The College of Emergency Medicine

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was founded in 2008 and is now authorized to certify and provide qualification of the fellowship with the Royal College of Emergency Medicine to interested candidates desiring specialization. It is also possible to subspecialize in an area such as pediatric emergency medicine, intensive care medicine, acute medicine, sports medicine, or pre-hospital care.

Our country has adopted a similar Anglo-American model derived from developed nations mentioned before. Emergency medicine in Pakistan is still a very new specialty compared with existing giants such as internal medicine or general surgery. From the time of its creation in 2012, the training program was designed to last five years, thus allowing trainees to experience various rotations and gain the necessary knowledge required in the field. The initial two years involve trainees rotating in specialties like medicine and allied, surgery and allied, pediatrics, anesthesiology, cardiology, and critical care. In the final three years, trainee residents spend their time in the emergency department as seniors who are required to overlook and manage acute presentations. Upon completion of five years, candidates become eligible to sit for the final exam of the fellowship of the College of Physicians and Surgeons of Pakistan. After fulfilling the final requirement, they are awarded the Fellowship in Emergency Medicine.

Emergency medicine is a vast specialty that addresses a variety of medical problems in a way much different from that of any other specialty. It consists of various subjects, each contributing to the pool of knowledge and skill that identifies the specialty. These include the provision of emergency care, teaching and research, pre-hospital medicine, disaster medicine, resuscitation and trauma, toxicology, environmental science, and hospital administration. Emergency medicine provides a "safety net" for the existing health-care system by ensuring that patients have access to unscheduled medical care.

For people interested in pursuing emergency medicine as a career, there is a certain skill set required. Trainees should be able to maintain a fast pace and unending enthusiasm, be involved in working with and leading a team, possess a breadth of knowledge, have effective communication skills, be flexible in terms of working hours, and function well under extreme pressure.

This field offers an exciting, varied, and challenging job that exposes practitioners to all forms of specialties. There is a great deal of practical hands-on work requiring fast judgment and action. Although some may complain that shift work can cause difficulty in maintaining a healthy social life, the number of consultants is expected to increase; therefore, career prospects are great. There are excellent opportunities for covering events, working abroad, and other roles outside of the hospital environment.

What changes will there be to our specialty in the coming 10–15 years? There will be continued increases in demands. There will also be a greater number of patients with more grave illnesses and miraculous expectations. This will also lead to continued pressure on hospital beds. We should make efforts to work with primary care physicians, social workers, and other community services in order to ascertain that the best response to emergency health needs are adequately met. In certain areas, the concept of local urgent care centers will likely become more popular by being able to fulfill most of the health requirements for smaller communities.

Initial patient assessment and immediate treatment during resuscitation of the injured and ill will remain the basic role of the emergency medicine practitioner. If there is a need to look after the health needs of patients for longer periods, then we must begin to develop the skills and experience in order to deal with these issues. We should begin identifying gaps in training and perhaps consider restructuring training programs to ensure that compulsory skills are achieved. It is of equal importance that we realize whether consultants in post need to attain new skill. The system of continuing professional development should identify these gaps, and the necessary financial support must be gained to allow for attaining and retention of new skills.

There is a lot of work that we can do much better than the current system for improving the care for the critically ill. However, we must not forget that focusing on and increasing services to one section of our workload should not decrease services to patients in other departments. Expansion of care requires greater manpower, and neglecting this statement risks overworking current care providers. Emergency departments are struggling to handle increased work demands and are experiencing greater waiting times for patients.

Whatever the future holds, we should strive to remember the reason for our specialty's success: the ability to provide a constant presence at the hospital front door for the many unattended and unannounced emergency health-care needs of patients. Over the last decade, we have been introducing new systems, ensuring that training programs encompass a greater breadth of knowledge and skill, and are more flexible to ensure that new demands are met. Hopefully, with such continued enthusiasm, this specialty will prosper and attain undeniable standing in the health-care system of Pakistan.

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Cardiac Arrest with Extreme Hyperkalemia

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Case Description

A 34-year-old man with type 1 diabetes, which is being treated with a subcutaneous insulin self-injection, presented to the emergency department in a state of coma. The patient had skipped taking the insulin injection for four days and then complained of fatigue and epigastralgia. On the day of hospital arrival, his mother found him unconscious in his room at home and an ambulance brought him to our hospital. At the time of arriving at the emergency department, he had cardiac arrest and his electrocardiogram (Figure 1a) revealed pulseless electrical activity. Cardiopulmonary resuscitation was immediately performed. His serum glucose concentration was 1.178 mg/dL, arterial blood pH was 6.69, and serum potassium concentration was 10.6 mEq/L.

A diagnosis of diabetic ketoacidosis with severe hyperkalemia was made (1, 2). As his electrocardiogram (Figure 1b) revealed ventricular fibrillation during resuscitation, electrical defibrillation was conducted, but his electrocardiogram showed pulseless electrical activity. Calcium gluconate, normal saline, insulin, and bicarbonate were administered. After approximately 1 h of chest compression and artificial ventilation, his potassium concentration reduced to 5.4 mEq/L and his electrocardiogram revealed sinus rhythm restoration (Figure 2) with palpable peripheral pulses. He was discharged home uneventfully after receiving education about the importance of receiving a regular insulin injection during 14 days of admission.

Discussion

Patients with diabetic ketoacidosis have a risk of cardiac arrest because of electrolyte imbalance, particularly potassium imbalance. The rapid evaluation of electrocardiograms is key to the immediate diagnosis of life-threatening potassium disorders. As in this case, bradycardia along with an absent P wave, wide QRS complex, and peaked (tentorial) T wave characterize hyperkalemia on the electrocardiogram. Our present case proved that cardiac arrest with extreme hyperkalemia (more than 10 mmol/L) can be reversible by correcting the serum potassium concentration while continuing efforts, such as by providing cardiopulmonary resuscitation. Effective medications include calcium gluconate, insulin, bicarbonate, and saline infusions. Cardiopulmonary resuscitation should be continued in patients with hyperkalemia until serum potassium concentrations are corrected.

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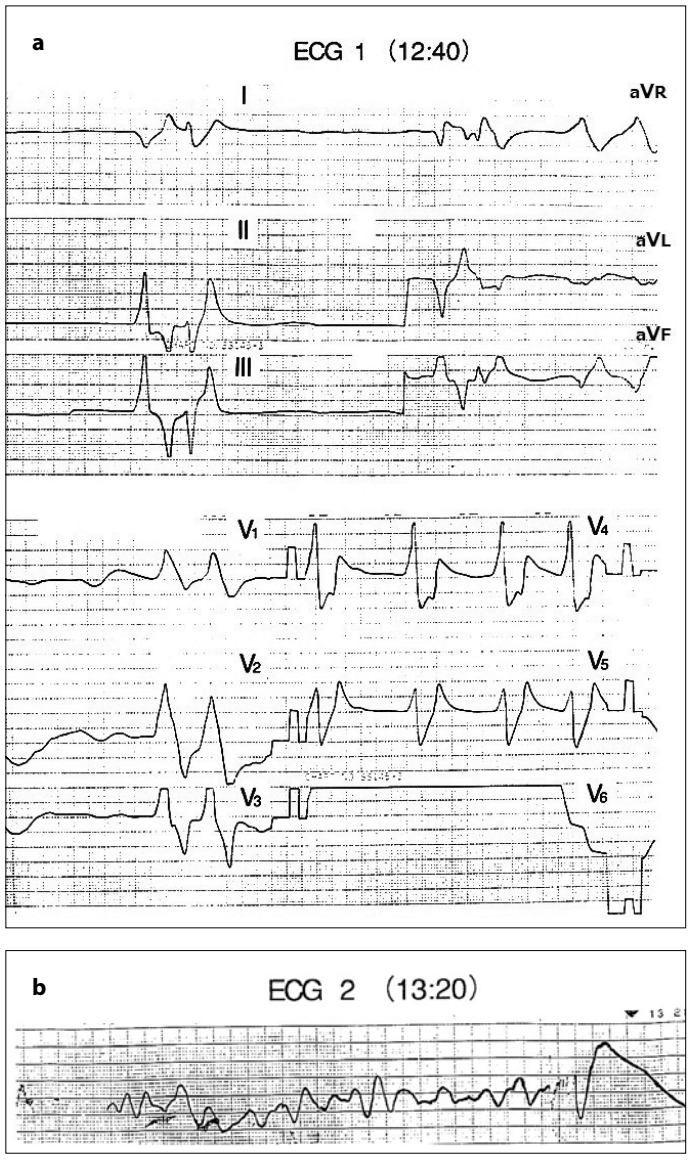

Figure 1. a, b. Initial electrocardiogram showing wave forms of pulseless electrical activity (lead V6 is not placed). (a) Monitored trace indicating ventricular fibrillation (b)

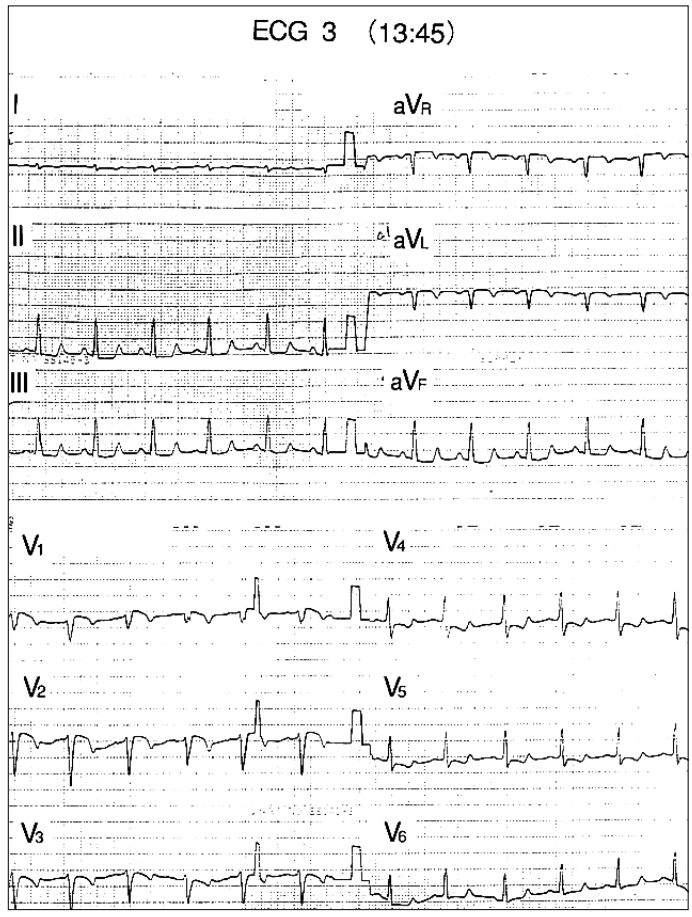

Figure 2. Follow-up electrocardiogram showing sinus rhythm with palpable peripheral pulses

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