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Uvodnik Editorial

Ovaj broj časopisa imao je dug put do objavljivanja. Nasa je namera a utičemo na povećanje učešća inostranih autora, unapredjenje kvaliteta i dalji razvoj časopisa.

Sve navedeno jeste neodvojivo vezano za uopšte razvoj Resuscitacione medicine i stručne i naučne misli u navedenoj oblasti u Srbiji, uključujući tu i Urgentnu medicinu. Naravno da je to uslovljeno postojanjem i razvijenošću stručnih i naučnih istraživanja i postojanjem nastojanja pojedinaca, grupacija ali pre svega institucija da se navedenom oblasti bave.

Period korone, opteretio je osobe koje rade u ovoj oblasti svakodnevnim bitkama za svoju egzistenciju i napornim radom u COVID uslovima. Sve je to svakako uticalo da se naša pažnja usmeri ka navedenim pitanjima a negde je u drugi plan došlo se ono što se zove istraživanje, objavljivanje ili organizovanje stručnih aktivnosti a da one nemaju kontakta sa COVID 19. Mi smo proteklih godinu dana vodili svoje bitke i bitke za svoje zdravlje i zdravlje pacijenata, stoga nas i nije bilo, časopis nije izlazio jer, kako rekoh postojali su neki drugi prioriteti, ipak sve ovo mi radimo pre svega iz svoga zadovoljstva a ne zato sto to jeste nas osnovni posao, tako da u tim uslovima smo se bavili i još uvek se bavimo, nadamo se ne još dugo mnogo čime ali ne previše publikacijama, časopisom i slično.

Nadamo se da će mo u drugoj polovini 2021 naći načina i vremena da budemo prisutniji i u ovim aktivnostima, želimo to, jer će to biti znak da se život vraća u redovne tokove.

Dr Zlatko Fišer
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Originalni rad

Pedijatrijska traka
Pediatric tape

Kornelija Jakšić Horvat[1], Snežana Holcer Vukelić[2]

Sažetak

Uvod

Zbrinjavanje životno ugroženog deteta je uvek stresogeni događaj, a poseban problem predstavlja doziranje lekova, određivanje količine tečnosti za nadoknadu volumena i upotrebu medicinske opreme adekvatne veličine, koji se u pedijatriji određuju na osnovu telesne mase deteta, koja je u urgentnim situacijama često nedostupan podatak.

Cilj

Naš cilj je bio napraviti pedijatrijsku traku, po ugledu na Broselow traku, prilagođenu našim uslovima i dostupnim lekovima, jer je sama Broselow traka nedostupna na našim prostorima.

Metod i materijal

Za izradu naše pedijatrijske trake korišćena je originalna Broselow traka, gde je iskorišćena veza između dužine/visine deteta i njegove telesne mase, te potom su izračunate doze lekova i veličina opreme za uzrast, odnosno telesnu masu deteta.

Rezultati rada

Naša pedijatrijska traka se sastoji iz dva dela: merna traka sa zonama boja i kartončići koji prate odgovarajuće boje. Traka je podeljena u devet zona boja sa preračunatim dozama lekova, količinama tečnosti za nadoknadu volumena i veličinama opreme za svaku zonu

Zaključak

U nadi da će pedijatrijska traka naći široku upotrebu na našim prostorima, otvaramo diskusiju stručne javnosti za eventualne korekcije iste..

ABSTRACT

Introduction

Care and management of a life threatened child is a stressful event per se, further aggravated by the need for precise calculation of medication doses, the amount of fluids for volume replacement and choosing the rightsized equipment based on child's weight and age, which is often an information unavailable at the scene of the emergency event.

Objective

Our objective was to make a pediatric tape modeled by Broselow tape, but modified for medications and overall conditions present in our region. The original Broselow tape is not available in our country.

Method and materials

For tailoring this pediatric tape we used the original Broselow tape.The connection between length/height of a child and its body weight was used in the same way, and then doses of medications and sizes of medical equipment were calculated for the appropriate age/body weight.

Discussion

Our pediatric tape has two measuring parts: measuring tape with colored zones and cards that follow the appropriate color. Tape is divided into nine zones with calculated doses of medications, the amounts of fluids for volume replacement and sizes of equipment for each zone.

Conclusion

Hoping that this pediatric tape will find its place and use in our region, we hereby open a discussion of our professional community regarding this accessory and its future potential.

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Uvod:

Zbrinjavanje životno ugrožene dece je uvek stresogeni događaj. Poseban problem predstavlja doziranje lekova, kao i određivanje količine tečnosti za nadoknadu volumena, koje se u pedijatriji određuje na osnovu telesne mase deteta. Tokom zbrinjavanja kritično obolelog deteta stvarna telesna masa je često nedostupan podatak, a merenje nije moguće.

Orijentaciona telesna masa novorođenčeta je oko 3 kg, sa 5 meseci odojče udvostruči svoju telesnu masu tj, uzima se orijentaciono da odojče oko 5 - 6 meseci ima oko 6 kg, a jednogodišnjak oko 10 kg. Nakon prve godine telesna masa deteta se izračunava po dobro poznatoj formuli:

TM = (godine starosti + 4) x2

Međutim, u situacijama kada je dete životno ugroženo, izvođenje matematičkih radnji je haotično i često sa greškama, sa jedne strane i sa druge strane veliki je broj lekova, čija se doza mora znati i ordinirati po kilogramu telesne mase deteta.

Za brzu orijentaciju služi Broselow traka, koja se kao merna traka zasniva na bojama koje povezuju detetovu visinu izmerenu trakom sa telesnom masom - uključujući doziranje lekova, veličinu opreme koja se treba koristiti i visinu šoka za defibrilaciju.

Originalnu Broselow traku je napravio dr Jim Broselow, lekar urgentne medicine u Hickory, North Carolina, još 1980. godine. Radeći na urgentnom odelenju, suočavao se sa donošenjem kritičnih odluka u urgentnim situacijama o proceni telesne mase, te želeo je da olakša pravilno doziranja lekova u pedijatrijskih pacijenata. Na taj način se skraćuje vreme i eliminišu se greške u doziranju lekova u stresogenim situacijama pri zbrinjavanju životno ugrožene dece (1).Kasnije u saradnji sa Robertom Lutenom pored adekvatne doze leka dodali su i podatke o veličini medicinske opreme koja je odgovarajuća za dete određene težine.

Broselow traka je namenjena deci do 12 godina starosti koja imaju maksimalnu telesnu masu od oko 36 kg. Izuzetno veliki značaj ima u prehospitalnim uslovima (2) i pojednostavljuje donošenje odluka u hitnim slučajevima eliminišući potrebu za procenom detetove telesne mase, koja se obično koristi za izračunavanje pravilne doze leka.

Danas se u mnogim zemljama primenjuje i priznata je u većini medicinskih udžbenika i publikacija kao standard za urgentno lečenje dece.

Cilj:

Broselow traka nije dostupna na našim prostorima. Stoga, smo napravili po ugledu na Broselow traku, pedijatrijsku traku prilagođenu za naše uslove i dostupne lekove.

Materijal i metodi:

Za izradu naše pedijatrijske trake, korišćena je Broselow traka, gde je po ugledu na nju iskorišćena veza između dužine/visine deteta i njegove telesne mase, te potom su izračunate doze lekova i veličina opreme za uzrast, odnosno telesnu masu deteta.

Diskusija i rezultati:

Po ugledu na Broselow traku napravili smo pedijatrijsku traku za naše uslove, koja sadrži i vitalne parametre za zdravo dete određene dobi sa unapred izračunatim dozama lekova. Traka je podeljena u devet zona boja sa preračunatim dozama lekova, količinama tečnosti za nadoknadu volumena i veličinama opreme za svaku zonu (slika 1.). Koristeći zone boja nema potrebe oslanjati se na memoriju i pamtiti doze lekova, kao i računati kako telesnu masu, tako i ukupnu dozu leka za dete u stresogenim situacijama. Cilj naše inicijative je razviti jednostavan, siguran, brz i efikasan način za akutnu primenu lekova.

Broselow zone

zona		Telesna težina u kg	starost
siva		3 kg, 4 kg, and 5 kg	< 3 meseca
roza		6–7 kg	3-5 meseci
crvena		8–9 kg	6 – 11 mes.
lilava		10–11 kg	12 – 24 m .
žuta		12–14 kg	2 god.
bela		15–18 kg	3 – 4 god.
plava		19–23 kg	5 – 6 god
narand žasta		24–29 kg	7 – 9 god.
zelena		30–36 kg	10 – 11 god.

Slika 1.

Slika 2.

Naša pedijatrijska traka se sastoji iz dva dela: merna traka sa bojama (slika 2.) i kartončići koji prate odgovarajuće boje (slika 3.).

Slika 3.

Na prednjoj strani kartončića prvo su navedeni starost, dužina, telesna masa deteta i adekvatni vitalni parametri za zdravo dete te starosne dobi: respiratorna frekvenca, srčana frekvenca i sistolni krvni pritisak. Takođe, na prednjoj strani sa desne strane se nalaze preračunate doze lekova neophodnih u resuscitaciji: Adrenalin, Amiodaron, Lidocain i Atropin; potom jačina šoka za defibrilaciju i kardioverziju - preračunato u J (džulima). Nakon toga slede podaci o veličini opreme za dete odgovarajuće starosti: ETT (endotrahealni tubus) - veličina i dubina insercije, LMA (laringealna maska) i I-gel. Sledeći podatak je količina tečnosti za nadoknadu volumena (slika 4.).

10-11 kg - lilava

- **Starost: 11-18 meseci**
- **Dužina: 74 -84.5 cm**
- **Težina: 10-11 kg (srednja vrednost 10.5 kg)**

Vitalni znaci (normalne vrednosti)
Respiratorna frekvenca: 20-30/min.
Srčana frekvenca: 110-170/min.
Sistolni krvni pritisak: 70-105 mmHg

Resuscitacija
Adrenalin (1:10,000): 0.1 mg (1 ml) iv.
Amiodaron (50 mg/ml): 50 mg (1 ml) iv.
Lidocain 2% (20mg/ml):10 mg (0.5 ml) iv.
Atropin (0,1mg/ml): 0.21 mg (2.1 ml)
Defibrilacija (4J/kg):40J
Kardioverzija (1J/kg):10 J (prvi put) 20 J (drugi put)
ETT:4 (bez kafa) 3,5 (sa kafom)
Dužina insercije ETT:11 -12 cm
LMA:2 Igel:1,5 - 2

IV tečnosti
- **Kristaloidi bolus (20 ml/kg): 200-220 ml**
- **Za održavanje: 41-43 ml/h**

Chest tube:16-20 French

Slika 4.

Sa druge strane kartončića se nalaze preračunate doze lekova za anafilaksu, konvulzije, hipoglikemiju i analgo-sedaciju (slika 5.).

10-11 kg -ljubičasta

Anafilaksa
Adrenalin (1:1000) – 0,15 ml im.
Metylprednisolon – 20 mg iv.
Konvulzije
Lorazepam (2mg/ml) – 1 mg (0,5 ml)
Midazolam (5mg/ml-0,2 mg/kg): 2,1 mg (0,42 ml)
Diazepam rectal (5mg/ml -0,5 m/kg max.10mg): 5mg (1 ml)
Hipoglikemija
Dextrosa 10% (0,1 g/ml):5,25 g (52,5ml)
Glukagon(1 mg/ml): 0,5 mg (0,5 ml)
Terapija bola
Morfijum (2mg/ml) - 1 mg (0,5ml)
Fentanyl (50 mcg/ml) – 10 mcg (0,2 ml)
IV kateter (G):20-24
Baby sistem (G): 23-25
IO:15G

RSI premedikacija
- **Atropin (0,1mg/ml) : 0,21 mg (2,1 ml)**

Lekovi za indukciju
- **Etomidate (2mg/ml): 3,2 mg (1,6 ml)**
- **Ketamine (10 mg/ml): 20 mg (2 ml)**
- **Propofol (10mg/ml): 32 mg (3,2 ml)**

Lekovi za paralizu
- **Succinylcholine (20 mgt/ml): 20 mg (1 ml)**
- **Recuronium (10 mg/ml): 13 mg (1,3 ml)**

Održavanje paralize
- **Vecuronium (1 mg/ml):1 mg (1 ml)**

Sedacija –održavanje
- **Lorazepam (2 mg/ml):0,5 mg (0,25 ml)**

Slika 5.

Za pravilnu upotrebu Broselow Tape trake dete mora ležati na ravnoj površini (3) i voditi računa da kolena ne budu savijena. Jednom rukom držite kraj trake sa crvenom strelicom tako da je ravna sa detetovom glavom. (zapamtite: „crvena strelica kod glave“). (slika 6.)

Slika 6.

Dok držite jednu ruku na vrhu detetove glave, slobodnom rukom pokrenite traku po dužini tela deteta dok ne bude ravna petama (ne prstima).
Zona boje koja je u visini detetovih peta daje podatke o približnoj telesnoj masi u kilogramima, dužini u cm i starosti deteta.
Nikada nemojte meriti dete u sedećem položaju. Ako je dete duže / veće nego što se može izmeriti trakom (TM > 36 kg), zaustavite se i nastavite kao i kod odraslog pacijenta.
Ako je dete previše gojazno na osnovu vizuelne procene uzima se u obzir sledeća zona boje za doziranje lekova, a za veličinu opreme se koristi izmerena boja pošto dete koje ima prekomernu težinu obično ne povećava veličinu svojih disajnih puteva (3,4).
Potrebna je odgovarajuća obuka sa trakom kako bi se smanjile greške. (5,6) Predlaže se i dokumentacija zone boje koja se koristi za primenu lekova, nadoknadu tečnosti i za određivanje veličine opreme .

Zaključak:

Nadamo se da će naša pedijatrijska traka naći široku upotrebu među našim kolegama, kako prehospitalno, tako i hospitalno, te da će omogućiti tačnije doziranje

lekova i upotrebu medicinske opreme adekvatne veličine kod vitalno ugrožene dece. Ovim radom otvaramo diskusiju stručne javnosti za eventualne korekcije, da pedijatrijska traka stvarno odgovara našim potrebama kako prehospitalno tako i hospitalno pri zbrinjavanju životno ugrožene dece.

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Originalni rad

Evaluation of Healthcare Professionals' Knowledge on Code Blue: A Multi-Centre Survey Study

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Abstract

Introduction: The Blue Code practice provides increase in survival rates and decrease in the rate of permanent sequelae after cardiac arrest. There are issues that healthcare workers should pay attention to in the Code Blue practice.

Aim

The primary purpose of this survey study is to determine the knowledge levels of physicians and nurses about the Code Blue and cardiopulmonary resuscitation in 6 centres. The secondary aim is to determine the solutions that can be made to eliminate these deficiencies.

Methods

After the approval of the Faculty Ethics Committee, Mersin University Faculty of Medicine, Adana Baskent Turgut Noyan Training and Research Hospital, Dokuz Eylül Univ. Faculty of Medicine, Hacettepe University Faculty of Medicine, Gulhane Training and Research Hospital, Manisa Celal Bayar Univ. Faculty of Medicine, except for the doctors and technicians of the Department of Anaesthesiology and Reanimation and the healthcare professionals working in the intensive care units, the doctors and nurses working in other departments were asked to answer the questions in the questionnaire via the internet with the questionnaire form stated in Appendix 1.

Results

A total of 415 participants responded the survey. Of them, 45.8% were nurses, 24.8% residents, 23.3% faculty members, 5.4% specialist doctors and 0.7% general practitioners. Totally 86.6% of the participants knew the Code Blue number. To the question „What is the Code Blue?", 92.7% of the participants gave the correct answer to his question. „Do you hesitate to intervene when you encounter a patient requiring emergency intervention?" 25.9% of the participants answered „Yes" to the question. „Is there a form about Code Blue in your clinic?" 41% answered „No" to the question.

Conclusion

According to the results of the survey we conducted, we are of the opinion that healthcare workers have insufficient knowledge about the Code Blue. In order to solve these problems, it would be appropriate to direct healthcare professionals to both in-hospital and external training programs.

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Introduction

Code Blue (CB) is a unique worldwide code used to call code team for deteriorating or cardiac arrest patients in hospital [1]. The victims can be in-service patients, relatives of the patients, hospital staff or others. Although the call numbers may differ between countries, the number in our country is 2222.

The resuscitation team members should be trained for basic and/or advanced life support and, ideally there should be a doctor, an anaesthesia technician or a nurse, in our country due to the legal legislations also a paramedic staff and a security guard should be in the team [2].

The survival of the patient is strictly dependent on the time elapsed between the cardiac arrest to resuscitation and it's estimated to be 3-5 minutes [3]. In addition, until the team arrives, if possible, the person calling the CB should begin basic life support skill.

The resuscitation equipments and specific drugs are in the emergency box with the team but they also have to be in all wards and specific places in the hospital.

The knowledge of the healthcare professionals and hospital staff about CB and emergency situations should be basically adequate, if not, it has to be improved by trainings. For the purpose to evaluate the knowledge of the healthcare professionals about CB and cardiopulmonary resuscitation (CPR), we conducted this survey in six central hospitals. According to the results of this survey, actual courses or education programmes can be organised and the level of knowledge and awareness about CB can be increased.

Method and Materials

After the approval of local ethics committee in Mersin University Faculty of Medicine, Clinical Trials Ethics Committee (Number: 78017789/050.01.04/1075579), the survey was sent to responsible researchers of Departments of Anesthesiology and Reanimation of five hospitals (Adana Baskent University Hospital Dokuz Eylul University Faculty of Medicine, Hacettepe University Faculty of Medicine, Gulhane Training and Research Hospital, Manisa Celal Bayar University Faculty of Medicine). A questionnaire consisting of 21 questions was prepared (Appendices 1). . First 4 questions are about personal information, other 17 questions are about CB. All the questions are multi-choice and the time required for answering the questions is about 5 minutes. The data was collected between August and October 2019. The survey was conducted to healthcare professionals (doctors and nurses) except anaesthetists, anaesthesia technicians, the doctors and nurses of intensive care unit (ICU) and Emergency Service on the internet (https://docs.google.com/forms/u/1/d/1nZGDE7l91D-ngIB7HIxF5Ou3rvpe8X5WIbgiLWR8e5w8/edit?usp=forms_home&ths=true).

Results

The survey was conducted with 1600 healthcare professionals in 6 hospitals. But totally 415 (25.9 %) participants responded the survey. The participants did not respond every question, some of the questions were not ticked.

Personal informations about the participants (first four questions) are shown in Table 1.

Table 2 shows the responds of questions 5, 6, 7, 8 and 9.

Question number 10 was asking true sentences about CB and there was 6 options, only 2 of them were wrong. Totally 402 (96.8) participants responded this question. Only 6.4% (n=26) of them marked as wrong, the rest of the participants responded truly.

The eleventh question is "In which of the following situations should Code Blue be called?". Totally 406 participants replied this question and it's a multiple–choice one. The vast majority of the participants (n=391, 96.3%) marked "Respiratory arrest patient", secondly they marked "Pulseless patient" (n=386, 95.1%), "Unconscious patient" (n=212, 52.2%), "Patient with decreased oxygen saturation" (n=57, 14%), "Fainted patient" (n=36, 8.9%), "Patient with low blood pressure or pulse" (n=20, 4.9%), "The relative of intensive care patient relapses after crying in the waiting area whose and whose breathing and pulse are present" (n=5, 1.2%) respectively. Nobody marked "Vomiting patient" option at this question.

The other question was "Who gives the Code Blue call?" and there were 5 choices. Most of the answers were "Doctors" (n=383, 94.3%) and "Nurses" (n=382, 94.1%). In consecutive, "Personnel" (n=186, 45.8%), "Security staff" (n=146, 36%), "Secretary" (n=143, 35.2%) were the answers.

Table 3 shows the distribution of questions about BLS and ALS.

The following question was "If you had BLS education, when?" and totally 359 participants replied. The majority of the participants (n=238, 66.3%) marked "In the last 5 years", respectively "In between 5 and 10 years ago" (n=74, 20.6%), "More than 10 years ago" (n=47, 13.1%).

The next question was "If you had ALS education, when?" and there were 248 answers. The majority of the participants (n=168, 67.7%) marked "In the last 5 years", respectively "In between 5 and 10 years ago"

Table 1. Distribution of Personal Informations of the Participants

Personal Information		n	%
Profession			
Faculty member		94	23.3
Specialist		22	5.4
Medical practitioner		3	0.7
Resident		100	24.8
Nurse		185	45.8
Total		404	
Institution			
University hospital		329	81.6
Foundation university		2	0.5
Training and Research	Hospital	68	16.9
Other			
Total		4	1
Department		403	
Surgical			50.7
Internal		204	29.9
Other		120	19.4
Total		78	
Professional Experience		402	
0-1 year			
1-5 years		29	7.2
5-10 years		111	27.4
>10 years		66	16.3
Total		199	49.1
		405	

(n=55, 22.2%), "More than 10 years ago" (n=25, 10.1%).

Table 4 shows the answers of last five questions.

Discussion

Although all of the participants were healthcare professionals, it was concluded that they did not have enough information about CB and CPR in line with the answers given. Even though the CB call number is a nationally used one, it was observed that not all participants gave the correct answer to this question.

The vast majority of the participants knew what the CB is. Only six participants answered this question incorrectly. Another question about who must be in the CB team was answered by half of the participants correctly but a knowledge gap or confusion about this issue was noticed. Almost every participants marked doctor and nurse, ideally there must be a personnel and an anaesthesia technician in the team.

Table 3. The distributions of answers of questions about BLS and ALS

Questions	Yes n	No n	Total n
Have you ever take an education about Basic Life Support (BLS)?	354 (87.8%)	49 (12.2%)	403
Have you ever take an education about Advanced Life Support (ALS)?	241 (61%)	154 (39%)	395

Table 2. Responds of Question 5,6,7,8 and 9

Questions	True n	False n	Total n
What's the Code Blue number?	342	53	395
What's the Code Blue?*	401	6	404
Who should be in the Code Blue team?*	124	281	405
What is the maximum time of the Code Blue team to arrive the victim?*	198	201	399
Where must be the Code Blue emergency equipment?	300	105	405

* Multiple options can be marked in these questions.

In several studies it's showed that the initial time of CPR, means early intervention and defibrillation, is very important for survival [4, 5]. Every minute in cardiac arrest is valuable. It is found more successful to start CPR in 1.5-2 minutes than in more than 5 minutes [6]. When the maximum time for the CB team to arrive at the scene was asked, most of the participants answered this question correctly but not all of them. So, this result showed that there should be trainings not only about the cardiopulmonary resuscitation but also general framework of CB implementation.

In-hospital cardiac arrests, the equipments or drugs are used by the practitioners and CB team. And ideally, all the supplies of emergency situation have to be in both code blue CB team and wards [7]. There was a question about the place where the equipments should be, very few patients marked as in both CB team and in the wards. The majority of the respondents thought that they should be in all the services.

The healthcare worker detecting CB is responsible for providing BLS to increase the rate of survival until the team arrive [8]. For this purpose, there is a legislation by Ministry of Health in our country, every health worker has to receive training on BLS once a year. The CB team take information about the patient if available and then take over the resuscitation [9]. Most of the participants but not all of them, knew that staff who detected Code Blue is responsible for providing basic life support until the blue code team arrives. In this survey, very few of the participants marked "The only task of the Code Blue team is to provide the patient's airway (intubation)". Some of the healthcare workers think that only endotracheal intubation is the procedure that cannot be performed by other staff except anaesthetists. Most of the participants marked "Before making

Table 4. Distribution of answers of five questions

Questions	Yes n, (%)	No n, (%)	Total n
Do you follow the resuscitation guidelines?	302, (77.6)	87 (22.4)	389
Do you hesitate to intervene when you encounter a patient who needs emergent intervention?	104 (25.9)	297 (74.1)	401
Do you feel sufficient about knowledge and practice?	216 (53,7)	86 (46.3)	402
Do you have a form in your clinic regarding the Code Blue?	230 (59)	160 (41)	390
Is there an algorithm for the Code Blue in your institution?	307 (78.1)	86 (21.9)	393

a Code Blue call, the patient's airway, breathing, circulation (ABC) and consciousness status should be checked and if any of them have a problem, a Code Blue call should be made." But almost a quarter of the participants did not think so. The minority of the participants thought that nothing should be done until the team arrives. It's not acceptable that a health worker doing nothing in a cardiac arrest patient.

The record of the resuscitation procedure is necessary for several reasons such as collecting data, controlling the procedure and legal aspects. There is a Code Blue Notification Form in every hospital in Turkey. In addition to this form, hospitals may use their own form for archive. This form should be filled completely by the team leader. In this survey, lack of knowledge about this form was found.

Ethically, if the CB is called for an in-patient, the responsible doctor of the patient should be informed [10]. However, three quarters of the participants agreed with this, rest of them thought that it's unnecessary to inform the responsible doctor.

It's suggested to call CB in adults immediately for any patient who's unresponsive, apneic, and/or pulseless. But, in some cases, it should be called for deteriorating patient. The answers of the question related to this issue was marked as CB team should be called for pulseless and apneic patients. In fact, a confusion about in which patients CB team should be called was detected. There can be local protocols for summoning CB team depending on hospital policies; all staff should call the team in their institute. According to the survey findings, the participants thought the call should be given by doctors or nurses.

Basic Life Support training is very essential for hospital staff. Their knowledge and performance can improve patients outcomes [9]. Also continuation of education is very important actually. It's suggested to repeat BLS trainings at every two years. Education programs of institutes varies. In our hospital it is compulsory to give this training to every new nurse who comes to the hospital, schedules are prepared by head nurse responsible for education. Most of the participants had BLS educations, but the ratio of staff taking this education within five years is not sufficient. The number of participants taking Advanced Life Support training is lower than BLS. The guidelines for resuscitation eliminate chaos in cardiopulmonary arrest scene, prevent unnecessary applications. Unfortunately a quarter of the participants did not implement the guidelines. At about half of the participants feel themselves insufficient in CPR. It is an important problem for health system of the country.

Conclusion

There are serious problems about CB and CPR practices.

- Training programmes about legal aspects of CB should be arranged.
- Who should call the team? For which patients, the CB team should be called? When the team should be at the scene? These questions should be taught to healthcare workers and the staff.
- Basic Life Support training should be done effectively, preferably with small groups (The staff can be classified into two or three groups according to number in each department). And also it's very important to provide the continuation of the trainings.
- Advanced Life Support trainings should be increased and the staff working in risky places should be provided with this training.
- In institutes, it's better to have algorithms and notification forms to prevent chaos and collect healthy data.

In conclusion, according to the results of the survey conducted, it's considered that healthcare workers have insufficient knowledge of the Code Blue. In order to solve this problem, it would be appropriate to direct healthcare professionals to both in-hospital and/or external training programs.

Conflict of Interest:

None

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Проблемы с трахеостомическими канюлями у пациентов с COVID-19: причины и способы решения.

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Abstract

Patients with severe lung injury due to COVID-19 are often in need of mechanical ventilation. Due to the predicted length of invasive respiratory support, tracheostomy is commonly indicated to improve patient comfort, to reduce the need for sedation and to allow safer airway care [7] [8] [15]. In this article we report two clinical cases of patients with COVID-19, who suffered cardiac arrest due to problems with tracheostomy canula placement.

The first case report is regarding a 74-year-old patient, who was transported to CT from the ICU. Problems first occurred in the elevator, where specialist were forced to switch to bag ventilation, when the oxygen supply ran out. As a result, an episode of desaturation to 80% was registered. Upon arriving in the ICU, the patient was connected to a mechanical ventilator, however ventilation was ineffective: peak pressure was more than 40 cmH2O and the tidal volume was less than 100 ml. Debridement of the trachea was performed, the position of the cannula was secured with no effect. While preparing for oropharyngeal intubation, the patient's saturation dropped to 70%, haemodynamics were unstable (BP 76/40), ECG showed bradycardia of 30 bpm, which quickly turned to asystole. Cardiopulmonary resuscitation was performed and the patient was intubated, mechanical ventilation was effective. The total time of cardiac arrest was around 2 minutes, when ROSC was achieved and sinus rhythm was registered on the ECG. In 6 hours after ROSC signs of acute coronary syndrome were registered, the patient received treatment accordingly. Despite the complications, the patient's condition improved and he was transferred to the therapeutics ward and later discharged home with no signs of neurological impairment.

The second case presents a similar clinical situation with an alternate outcome. A 32-year-old patient with COVID-19 was transferred to ICU due to signs of respiratory distress. His condition worsened and the patient was intubated, and soon percutaneous dilatational tracheostomy was performed. On day 9 of treatment in ICU an episode of desaturation to 75% was registered. Debridement of the trachea was not possible due to a block in the cannula. Due to rapid demise in the patient's condition, the cannula was removed and the patient was intubated. After bronchoscopy, re-tracheostomy was performed. During the procedure, it was noted that the standard cannula was displaced at an angle to the posterior wall of the trachea. The cannula was replaced by an armored cannula. In the following hours, hypoxemia was observed, as well as subcutaneous emphysema of the patient's face and upper body. Applying a thoracic X-ray, a left-side pneumothorax was diagnosed, which was urgently drained. In the following days of intensive care the patient's condition gradually improved, mechanical ventilation was effective and signs of respiratory distress were fading. Neurologically the patient was responsive, able to perform simple tasks. Unfortunately, on the 15th day of ICU care the patient's condition worsened: his fever spiked to 39-40,2C, CRP was 149, and CT showed signs of ARDS progression and vasopressors were administered due to hemodynamic instability. An episode of desaturation to 88% was noted. It was assumed that the tracheostomy cannula had been displaced, which was not proven by bronchoscopy. Later that day, while turning the patient to the side, bradycardia was noted on the monitor with progression to asystole. Cardiopulmonary resuscitation was performed for 5 minutes until ROSC. The tracheostomy cannula was then removed, due to inadequate ventilation and the patient was intubated and ventilated through an IT tube. After ROSC the patient's neurological status was closely monitored. Without sedation the patient was unconscious (coma), non-responsive, hyporeflexive with little response to pain stimuli. In two weeks his neurological condition was regarded as a vegetative state (GCS -6).

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Введение

Пациенты с тяжелыми формами COVID-19 часто нуждаются в проведении длительной инвазивной искусственной вентиляции легких (ИВЛ). [7], [8], [15]. В этих условиях трахеостомия обладает рядом преимуществ перед ИВЛ через оротрахеальную трубку: меньший уровень требуемой пациенту седации и меньшее количество инфекционных осложнений в связи с более легким уходом за дыхательными путями [1],[3],[14]. Трахеостомия увеличивает риск образования стенозов трахеи, сама процедура не лишена рисков геморрагических осложнений[9],[10]. Учитывая специфику COVID-19, потенциальным недостатком трахеостомии становится бóльшая потребность в проведении аэрозоль-генерирующих процедур [2], [5], [6]. Также, учитывая регулярную необходимость перемещения пациента в прон-позицию и обратно, возникают дополнительные риски утери контроля над дыхательными путями[4][11], [13]. Здесь мы рассмотрим два случая остановки кровообращения, вызванных респираторными проблемами и утратой контроля над дыхательными путями во время перемещения пациентов.

Хороший неврологический исход после остановки кровообращения

Пациент С, 74 года, находился на лечении в отделении общего терапевтического профиля с верифицированной коронавирусной двусторонней полисегментарной пневмонией, поступил на 15-й день болезни. По данным компьютерной томографии (КТ) объем поражения легочной ткани составлял 25-50%. Из сопутствующих заболеваний имелась гипертоническая болезнь II ст, 3 ст, высокого риска, распространенный атеросклероз, перенес стентирование сонных артерий. На вторые сутки пребывания в стационаре переведен в отделение реанимации и интенсивной терапии (ОРИТ) в связи с развитием острой дыхательной недостаточности 3 ст, синдромом системного воспалительного ответа.

При повторной КТ органов грудной клетки отмечено прогрессирование двусторонней вирусной пневмонии, с субтотальным объемом поражения. На следующий день в связи с невозможностью обеспечения адекватной оксигенации с помощью высокопоточной инсуффляции кислорода были выполнены интубация трахеи и перевод на ИВЛ. Учитывая большой объем поражения лшегочной ткани, предполагаемую длительность ИВЛ на 7-е сутки пребывания в стационаре пациенту была выполнена пункционно-дилатационная трахеостомия. Проводилась комплексная интенсивная терапия, седация пациента для обеспечения синхронизации с аппаратом ИВЛ. ИВЛ проводилась в прон-позиции в максимально допустимом объеме, на фоне чего отмечалась некоторая положительная динамика по показателям кислотно-основательного состава артериальной крови (КОС).

На 10-е сутки пребывания в стационаре состояние пациента по системе ABCDE:

A: Дыхание через трахеостомическую канюлю, проводится с обеих сторон.

B: Pressure SIMV с параметрами: PSV 16 см H_2O, Fr 14/min, t_{in}/t_{ex}=1/1,5, PEEP 14 см H_2O, FIO_2 40%, на этом фоне Vt 0,6 – 0,65 л. С респиратором на фоне проводимой седации синхронен.

C: артериальное давление (АД) 138/82, частота сердечных сокращений (ЧСС) 72 в мин. Ритм синусовый.

D: Проводится медикаментозная седация.

E: SOFA 9 баллов, Язык влажный. Живот мягкий, не вздут, питание через назогастральный зонд усваивает. Моча отводится по уретральному катетеру, обычного цвета, диурез сохранен.

Кислотно-основной статус (КОС, артериальная кровь, FiO_2 40 %, в прон-позиции): pH 7,41; pCO_2 52,8 мм рт.ст.; pO_2 112 мм рт.ст.; глюкоза 8,9 ммоль/л; лактат 1,52 ммоль/л; BEecf 9,1 ммоль/л; HCO_3 33,9 ммоль/л, индекс оксигенации (ИО) 280.

Для проведения контрольной КТ пациент в сопровождении реанимационной бригады был транспортирован в рентгенологическое отделение. Во время перемещения использовался транспортный аппарат ИВЛ с подачей 100% кислорода. При возвращении в ОРИТ возникла проблема с лифтом, закончился запас взятого с собой кислорода, вентиляция продолжена воздухом (осуществлялось в течение 5 мин), на фоне чего сатурация снизилась до 80%. При возвращении в ОРИТ пациент переключен на стационарный ИВЛ аппарат, FiO_2 100%. Во время перекладывания отмечалось дальнейшее снижение сатурации до 70%, снижение АД до 76/40 мм рт.ст. ИВЛ через трахеостому в прежних режимах была неэффективна, Рпик более 40 см H_2O, VT менее 100 мл. Проведена попытка санации трахеобронхиального дерева (ТБД), коррекции положения трахеостомической канюли – безуспешно. Сатурация достигла 64%, на ЭКГ синусовая брадикардия с ЧСС 30 в минуту, введено 1,0 мг атропина.

В связи с неэффективностью вентиляции через трахеостомическую канюлю было принято решение о проведении интубации трахеи с использованием виделаринготкопа. Отмечено исчезновение пульсации на сонных артериях, по ЭКГ – асистолия. Начаты реанимационные мероприятия в виде 30 компрессий грудной клетки, с последующей оротрахеальной интубацией, трахеостомическая канюля удалена. Было возобновлено ИВЛ через интубационную трубку (ИТ). При клинической оценке:

дыхание аускультативно проводится с обеих сторон. Выполнено ещё 30 компрессий грудной клетки. На мониторе отмечено возникновение синусового ритма, ЧСС 102 в мин. Восстановлена пульсация на сонных артериях, спонтанное кровообращение. Общее время остановки кровообращения составило около 2 мин.

Состояние пациента по системе ADCDE после возобновления спонтанного кровообращения (ROSC):

A: Дыхание через ИТ, проводится по всем легочным полям.

B: ИВЛ в режиме VOLUME A\S с параметрами: Vti 0,6; P peak 38; t_{in}/t_{ex}=1/3; PEEP 12 см H_2O; ЧДД 14; FIO_2 50%; SpO_2 92%.

C: синусовая тахикардия с ЧСС 102 в минуту, депрессия сегмента ST V_4-V_6. Проводится инфузия норадреналина 0,2мкг/кг/мин, АД 105/73 мм рт.ст.

D: Пациент в медикаментозной седации пропофолом.

E: Кожный покров сухой, бледный. Язык влажный. Диурез сохранен, моча по катетеру, желтая. Живот мягкий, не вздут.

КОС (артериальная кровь, FiO_2 70 %): pH 7,325; pCO_2 58,7 мм рт.ст.; pO_2 67 мм рт.ст.; глюкоза 9,6 ммоль, лактат 4,1 ммоль/л; BEecf 2,8 ммоль/л; HCO_3 38,6, K+ 3,94; Na 141; ИО 95.

Через 6 часов после ROSC по данным кардиомонитора синусовая тахикардия (98 ударов в минуту), с наджелудочковыми экстрасистолами, нарастание депрессии сегмента ST V_4-V_6 >2 мм. АД 140/75 мм рт.ст.

Учитывая повышение уровня высокочувствительного тропонина с 0,024 до 2,6 пг/мг был диагностирован острый инфаркт миокарда без Q зубца. Недоступность ангиографии и реваскуляризации в условиях ковидного госпиталя обусловило консервативную тактику ведения. В течение суток проводилась инфузия нитроглицерина (30 мкг/мин), добутамина (3-5 мкг/кг/мин), норадреналина до 0,1 мкг/кг/мин, медикаментозная седация. Спустя 48 часов отмечалась положительная динамика в виде стабилизации гемодинамики: АД 103-126/60 мм рт.ст., ЧСС 68 в минуту, инфузия нитратов прекращена. При оценке неврологического статуса вне седации отмечалось глубокое оглушение (ШКГ – 12 баллов). Выполнена ретрахеостомия.

КОС (артериальная кровь, FiO_2 50%): pH 7,34; pCO_2 76,2 мм рт. ст; pO_2 98 мм рт.ст.; глюкоза 6,49 ммоль, лактат 0,89 ммоль/л; BEecf 15,8 ммоль/л; HCO_3 41,7; K+ 3,27; Na 142,4; ИО 196.

Через две недели после остановки кровообращения состояние пациента стабилизировалось, дыхание с минимальным уровнем респираторной поддержки. Неврологический статус пациента так же с положительной динамикой: ясное сознание, выполняет простые инструкции, астенизирован, умеренно некритичен. Пациент вскоре был переведен на самостоятельное дыхание с последующим переводом в профильное отделение, а затем выписан из стационара. Динамика состояния пациента отображена на рисунке №1.

Плохой неврологический исход после остановки кровообращения

Пациент Х, 32 года, поступил в стационар с внебольничной двусторонней полисегментарной пневмонией на 7-й день болезни. Коронавирусная этиология пневмонии верифицирована ПЦР назофарингеального мазка. Сопутствующая патология – ожирение II ст (ИМТ – 38,6), умеренна артериальная гипертензия. На 9-й день болезни переведен в ОРИТ связи с нарастанием объема поражения легочной ткани по данным КТ с 50 до 80%, дыхательной недостаточности до III степени.

Несмотря на применение иммуномодулирующих препаратов (тоцилизумаб), отмечалось нарастание объёма поражения по данным КТ с 50 до 80 % (КТ3, затем КТ 4). На 10-й день болезни выпол-

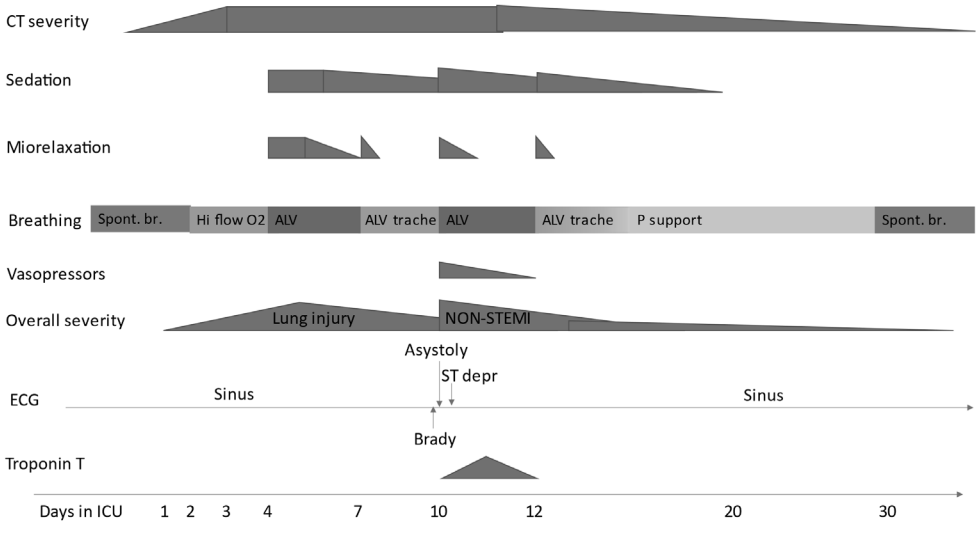


Рис .1. Динамика состояния пациента С. в период пребывания в ОРИТ.

нена интубация трахеи, переведен на ИВЛ. Через сутки проведена пункционно-дилятационная трахеостомия. По данным КТ – острый респираторный дистресс-синдром (ОРДС) и критическое поражение легких (Рис.2).

На 9-е сутки в ОРИТ, около 6:00 после санации и смены повязок у пациента по монитору ИВЛ отмечен рост пикового давления в дыхательных путях, по капнографу отсутствие волны, снижение сатурации до 75%. Проведена ревизия трахеостомической трубки, попытка провести санационный катетер безуспешна, причина окклюзии не установлена. Трахеостомическая трубка удалена, затем выполнена оротрахеальная интубация без технических трудностей, продолжена ИВЛ. На трахеостомическую рану наложена окклюзионная наклейка.

После интубации КОС (артериальная кровь, FiO_2 50 %): pH 7,359; pCO_2 57 мм рт.ст.; pO_2 75,2 мм рт.ст.; глюкоза 8,3 ммоль/л; лактат 1,02 ммоль/л; BEecf 16,7 ммоль/л; HCO3 42,4. ИО 114.

Далее была выполнена ретрахеостомия пункционно-дилатационной методикой под контролем фибробронхоскопии (ФБС). Установлена новая стандартная трахеостомическая канюля. При переходе на ИВЛ через канюлю отмечено высокое давление вдоха. При эндоскопическом контроле отмечено неадекватное положение трубки: дистальный ее срез расположен под углом к задней стенке трахеи. Причиной этого явилась большая толщина претрахеальных тканей вследствие ожирения. В связи с невозможностью проведения адекватной вентиляции принято решение об установке армированной трубки с изменяемой глубиной установки «Portex UniPerc». Под контролем ФБС выполнена замена трахеостомической трубки, во время выполнения манипуляции эпизодов десатурации не отмечалось. При дальнейшем наблюдении у пациента, несмотря на ИВЛ 100% кислородом, сохранялась тенденция к гипоксемии, снижение сатурации достигало 85%.

В ближайшее время после замены трубки появилась подкожная эмфизема на лице и передней поверхности грудной клетки. Рентгенографически - массивный пневмоторакс слева. Проведено экстренное дренирование левой плевральной полости.

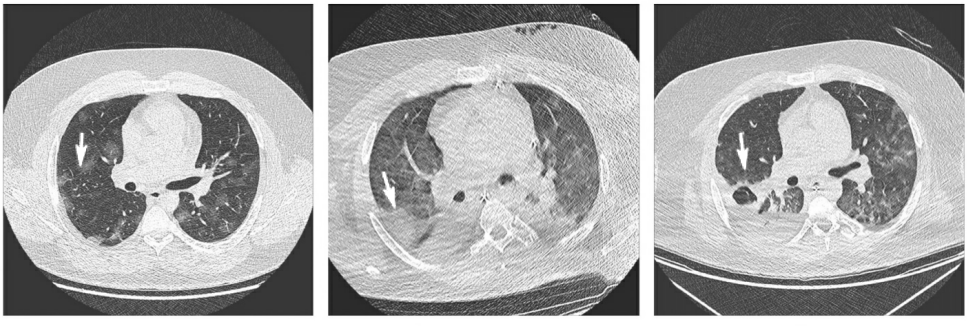
Эти мероприятия привели к увеличению ИО по данным КОС артериальной крови (до 285), фракция кислорода во вдыхаемой смеси была снижена до 45%. На 20-й день болезни прекращена седация пропофолом, пациент был доступен элементарному контакту, пытался выполнять простые команды, но с задержкой, зрачки симметричные. Очаговой неврологической симптоматики не выявлено.

На 23-й день болезни отмечен эпизод десатурации до 78-82%, сброс воздуха через ротовую полость. Для исключения дислокации трахеостомической трубки выполнена ФБС: положение канюли адекватное, проведена санация ТБД. Десатурация сопровождалась подъемом температуры тела до 39,0-40,2^{0}C, плохо поддававшейся купированию парацетамолом.

КОС (артериальная кровь, FiO_2 85%): pH 7,4; pCO_2 41,2 мм рт.ст.; pO_2 71 мм рт.ст.; глюкоза 6,7 ммоль/л; лактат 1,4 ммоль/л; BEecf 0,7 ммоль/л; HCO3 25,7, ИО 84. На фоне стойкой лихорадки нарастала азотемия, ферментемия, уровень СРБ (до 149), что было расценено как прогрессирование ОРДС.

В 17.00 при повороте пациента на левый бок по монитору зафиксирована брадикардия с переходом в асистолию. Пациент был повернут на спину, начаты реанимационные мероприятия: непрямой массаж сердца, в/в адреналин 0,1 % 1мл дважды с интервалом в 3 мин, ИВЛ с FiO2 100%. Через 5 минут восстановлена сердечная деятельность. Синусовая тахикардия с ЧСС 120-135 в мин АД 125/78-136/105 мм рт.ст. на фоне инфузии норадреналина 1 мкг/кг/мин.

После ROSC у пациента по монитору ИВЛ отмечалось нарастание пикового давления в дыхательных путях, по капнографу отсутствие капнограммы, снижение сатурации до 65-76%. Проведена очередная ревизия трахеостомической трубки, попытка провести санационный кататер безуспешна. Трахеостомическая трубка вновь удалена, выполнена оротрахеальная интубация без технических трудностей. При ФБС проведена репозиция интубационной трубки. Карина прямая, подвижная. Бронхи справа и слева проходимы, стенки эластичные, слизистая незна-



А Б В

Рисунок 2. КТ органов грудной клетки пациента Х. в динамике.

чительно гиперемирована с обеих сторон. Секрет с обеих сторон слизистого характера, мутный, вязкий. После ROSC

A: Дыхание через интубационную трубку, проводится по всем полям.

B: ИВЛ в режиме Volume-SIMV через трахеостомическую трубку с параметрами вентиляции: f 14/min, Vt – 600 ml, I: E =1:1,3 PEEP 15 смH_2O, FiO_2 100 %, SpO_2 93%.

C: Гемодинамика нестабильна, поддерживается инфузией норадреналина 0,5-0,7 мкг/кг/мин, на этом фоне АД 94/56-100/72 мм рт.ст. Синусовая тахикардия с ЧСС 112-118 в минуту, неспецифические изменения зубца Т, QT 324 мс.

D**:** Проводится седация, вне седации сознание не восстанавливает. Уровень сознания-кома. На осмотр не реагирует, продуктивному контакту не доступен. На болевой раздражитель реагирует сгибанием конечностей. Боль не локализует. Не синхронен с ИВЛ. Зрачки широкие, на свет реакция замедленная. Мышечная гипотония, адинамия, гипорефлексия.

E: Язык влажный. Живот мягкий, равномерно участвует в акте дыхания, не вздут, на пальпацию не реагирует. Питание в назогастральный зонд.
Мочеиспускание через установленный уретральный катетер, олигурия с последующей анурией.
КОС (артериальная кровь, FiO_2 80%): pH 7,250; pCO_2 60,5 мм рт.ст.; pO_2 87 мм рт.ст.; глюкоза 9,95 ммоль/л; лактат 3,2 ммоль/л; BEecf 0,9 ммоль/л; HCO3 26,5; K 3,80; Na 146,7; ИО 108**.**
Неврологический статус через сутки после остановки кровообращения: уровень сознания – кома (ШКГ 6 баллов). На осмотр адекватной реакции нет, продуктивному контакту не доступен. Спонтанно открывает глаза, адекватной реакции на обращение и осмотр нет. Корниальные рефлексы сохранены. Зрачки средней величины, симметричные, на свет реакция замедленная. Мышечный тонус в конечностях повышен, отмечается эпизодический кратковременный тремор, напряжение жевательной мускулатуры.
Через 48 часов после СЛР уровень сознания - кома (ШКГ 8 баллов). На осмотр не реагирует, продуктивному контакту не доступен. На болевой раздражитель реагирует сгибанием конечностей. Боль не локализует. Не синхронен с ИВЛ. Зрачки широкие, на свет реакция замедленная. Мышечная гипотония, адинамия, гипорефлексия.
Учитывая нарастание явлений почечной недостаточности, анурию проведена гемодиафильтрация с хорошим эффектом в отношении метаболических показателей, шлаков.
КОС (артериальная кровь, FiO_2 50%): pH 7,38; pCO_2 44,4 мм рт.ст.; pO_2 72 мм рт.ст.; глюкоза 6,69 ммоль/л; лактат 1,14 ммоль/л; BEecf 1,0 ммоль/л; HCO3 26,3; K 4,41; Na 146,0; ИО 144.
Через 2 недели соматическое состояние пациента улучшилось. Удалось снизить уровень респираторной поддержки, гемодинамика стабилизировалась, почечная функция сохранена. Неврологический статус пациента без существенной динамики: уровень сознания – кома (ШКГ 6 баллов). На осмотр адекватной реакции нет, продуктивному контакту не доступен. Спонтанно открывает глаза, адекватной реакции на обращение и осмотр нет. Корнеальные рефлексы сохранены. Зрачки средней величины, симметричные, на свет реакция замедленная. Мышечный тонус в конечностях повышен, отмечается эпизодический кратковременный тремор, напряжение жевательной мускулатуры.
КОС (артериальная кровь, FiO_2 30%): pH 7,36; pCO_2 46 мм рт.ст.; pO_2 84 мм рт.ст.; глюкоза 4,7 ммоль/л; лактат 0,52 ммоль/л; BEecf 1,0 ммоль/л; HCO3

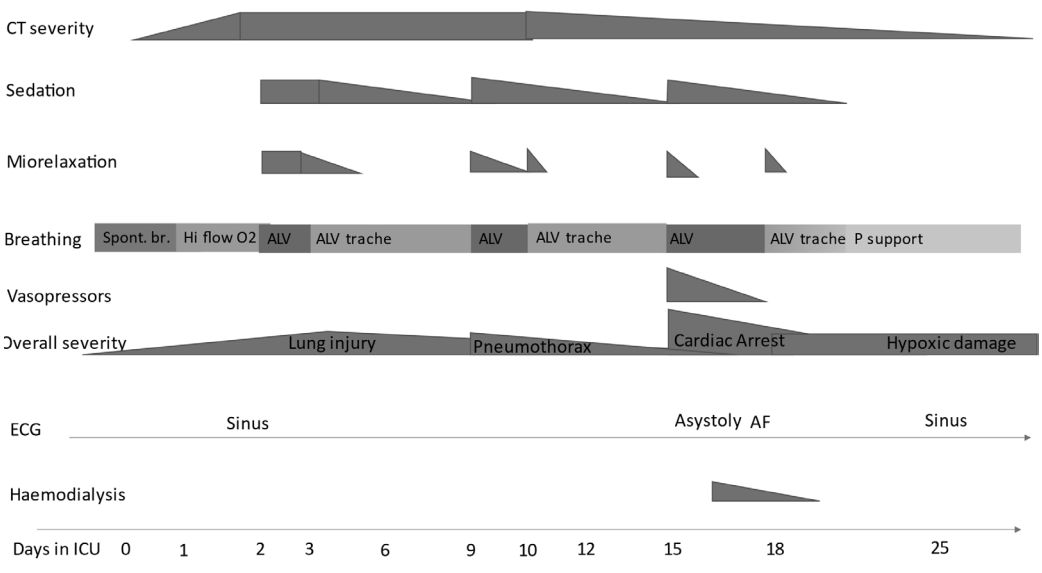


Рис.3 Динамика состояния пациента Х. в период пребывания в ОРИТ.

26,5; ИО 280.

Пациент провел в ОРИТ более 30 суток, далее был переведен в профильное учреждение для дальнейшей реабилитации. Динамика состояния пациента в ОРИТ отображена на рисунке №3.

Обсуждение и выводы

В обоих рассмотренных случаях развитие остановки кровообращения было связано с респираторными проблемами, с утратой контроля над дыхательными путями. В связи с тяжелым поражением легких у данных пациентов даже кратковременное нарушение дыхания ведет к тяжелым последствиям вплоть до остановки кровообращения[12].

Для восстановления контроля над дыхательными путями в обоих рассмотренных случаях приходилось выполнять оротрахеальную интубацию. Возможно, при наличии в свободном доступе эндоскопа в отделении ОРИТ 24/7 удалось бы избежать части осложнений, связанных с неоптимальным положением канюли. Однако, в условиях пандемии COVID-19 эти возможности ограничены из-за необходимости сокращения пребывания персонала в красной зоне, количества аэрозоль-продуцирующих процедур.

В случае пациента С. (благоприятный исход), обратимая причина неэффективной СЛР (гипоксия) была устранена в течение 1 минуты, длительность остановки кровообращения также составила менее двух минут. В случае с неблагоприятным неврологическим исходом для полного устранения обратимой причины неэффективной СЛР потребовалось больше времени. Время остановки кровообращения составило чуть более 5 мин.

В качестве основных выводов можно отметить следующее:

- Несмотря на ограничения, накладываемые пандемией, необходимо обеспечить возможность круглосуточного проведения эндоскопии в ОРИТ. Особенно остро стоит вопрос обучения реаниматологов базовым эндоскопическим навыкам.
- Очевидна необходимость максимального контроля за дыхательными путями при любом изменении положения тела пациента.
- Очень важен правильный выбор вида и размера трахеостомической канюли, особенно у пациентов с высоким ИМТ и большой толщиной подкожно-жировой клетчатки в области шеи.
- Очень высока роль качественной СЛР при развитии остановки кровообращения, выполнения качественных компрессий с минимальными перерывами и максимально быстрое устранение обратимых причин неэффективной СЛР.

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Literatura se navodi na sledeći način:

Članci u časopisima

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All other persons who have made substantial contributions to the work reported in the manuscript (e.g. data collection, analysis, and writing or editing assistance) but who do not fulfill the authorship criteria should be named with their specific contributions, with written permission of course. Sources and funding, sponsorships, scholarships, gifts, equipment and medicines should also be listed.

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[2] Bernard SA, Gray TW, Buist MD, Jones BM, Silvester W, Gutteridge G, et al. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. N Engl J Med 2002;346:557-63.
Books
[3] Armitage P. Statistical methods in medical research. London: Blackwell Scientific Publications; 1971.
Chapters
[4] Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: Pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995, p. 465-78.
References to electronic publications
[5] Working Group of the Resuscitation Council (UK). Emergency treatment of anaphylactic reactions. Guidelines for healthcare providers. London, Resuscitation Council (UK), 2008. (Accessed 11 August 2008, at http://www.resus.org.uk/pages/reaction.pdf)
[6] Oguro M, Imahiro S, Saito S, Nakashizuka T. Mortality data for Japanese oak wilt disease and surrounding forest compositions, Mendeley Data, v1; 2015. http://dx.doi.org/10.17632/xwj98nb39r.1
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