

# Alerting and organisation of the Flemish resuscitation teams

H. VERBORGH (\*), W. DEGRÈVE (\*), L. FOUBERT (\*,\*\*)

**Abstract:** *Introduction:* There are a number of important factors in in-hospital cardiac arrest (IHCA) that can potentially improve the outcome of patients such as fast initiation of resuscitation and fast defibrillation. To achieve this, a fast alarming of the resuscitation team and a correct treatment according to ALS guidelines are important. A European standardised cardiac arrest call number '2222' has been proposed by different scientific organisations to reduce the call-out time. It is unknown whether this is already applied in Flemish hospitals. In addition, there are no national guidelines for the composition and performance of the in-hospital resuscitation teams. We scored the Flemish hospitals on these important factors in our study.

*Methods:* A questionnaire was sent to the Flemish hospitals to determine their telephone number for cardiac arrest calls and to question the structure and training of the resuscitation teams.

*Results:* Nineteen out of 52 Flemish hospitals completed the questionnaire in full. Only 2 hospitals already use the proposed European emergency number 2222. All surveyed hospitals have an in-hospital resuscitation team. The time to arrival of the resuscitation team is estimated at 2 minutes in the fastest hospitals and < 5 minutes in the slowest. On all but 2 of campuses the members of the internal resuscitation team are required to have followed an ALS course, but 89 % of hospitals organize additional training. Standard debriefing of the team after a cardiac arrest call occurs only in 16% of hospitals.

*Conclusion:* The standardised cardiac arrest call telephone number '2222' has not yet been widely implemented in Flemish hospitals despite a recommendation by ESA, EBA and ERC. It might optimise important contributing factors to survival after in-hospital cardiac arrest. Resuscitation teams in the Flemish hospitals are generally well coordinated and trained. Attention should be paid to simulation training, debriefing and registration of cardiac arrests.

**Keywords:** In-hospital cardiac arrest; resuscitation team; cardiac arrest call; 2222.

## INTRODUCTION

### *In-hospital cardiac arrest (IHCA)*

IHCA is the loss of circulation with need for resuscitation by chest compressions, defibrillation,

or both, occurring during hospitalization (1, 2). One study described an incidence in Belgium of 2 per 1000 cases (3) which is comparable with other countries (4). This would mean that an estimated 5700 patients in Belgium are affected by IHCA every year (5).

In 2021 the new Advanced Life Support (ALS) guidelines of the European Resuscitation Council (ERC) were published (6). These specifically pay attention to the treatment of IHCA.

As it leads to a decreased frequency of IHCA, prevention remains a very important factor since circulatory arrest is often preceded by warning signs. The in-hospital cardiac arrest chain of survival could prevent deterioration to circulatory arrest and consists of staff training, monitoring, recognition, call for help and response by a specialized team. Another important factor in the management of IHCA is early care planning with appropriate do not resuscitate (DNR) arrangements which prevents futile cardiac arrest calls in patients who do not benefit from sustained therapy.

The medical treatment of a circulatory arrest in the hospital is similar to that of an out-of-hospital cardiac arrest. Especially important in resuscitation is the application of good chest compressions and early defibrillation, ideally within 3 minutes. Rapid initiation of CPR and defibrillation is associated with better survival (7). This means that hospital staff must be trained in Basic Life Support (BLS) and use of an Automated External Defibrillator (AED) (1,6,8). Upon arrival of the resuscitation team treatment is continued using the ALS protocol (9).

H. VERBORGH, MD; W. DEGRÈVE, MD; L. FOUBERT, MD, DSc, PhD.

(\*) Department of Anaesthesia, University Hospital Ghent, Belgium.

(\*\*) Department of Anaesthesia, Intensive Care and Emergency Medicine, Onze Lieve Vrouw Hospital Aalst, Belgium.

**Corresponding author:** Verborgh H., Poelstraat 74, 9820 Merelbeke, Belgium.

Email: hanneverborgh@hotmail.com

*Paper submitted on Oct 12, 2021 and accepted on Oct 14, 2021.  
Conflict of interest: None.*

We can state that there are a number of important factors that can potentially improve the outcome of patients with IHCA. The most important are a fast initiation of resuscitation and fast defibrillation. To achieve this, a good and fast alarming of the resuscitation team and their correct treatment, both during and after resuscitation, according to the ALS guidelines are of vital importance.

#### *Internal telephone number for cardiac arrest calls*

A possible contributing factor to a fast alarming is the existence, use and knowledge of the internal cardiac arrest telephone number. A 2010 study by Løfgren *et al* (10) surveyed staff at Danish hospitals about their knowledge of the number and found that 40-50% did not know it.

Since 2016, the European Resuscitation Council (ERC), the European Board of Anaesthesiology (EBA) and the European Society of Anaesthesiology (ESA) have been advocating the introduction of a common European cardiac arrest call telephone number (2222) in hospitals, similar to the 112 number (11). These organizations believe that, especially at a time of increasing collaboration between different hospitals, this may reduce the call-out time for IHCA. The implementation of the 2222 number has been included in the ERC guidelines of 2021 (6). This European number has already been applied in several countries (12, 13). However, the call for standardisation has not yet been widely picked up. For example a 2019 study in Italy showed that only 2.6% of the hospitals surveyed use the 2222 number (14).

#### *Resuscitation teams*

Other important contributors to survival after IHCA may be the composition, skills and experience of the resuscitation team. In Belgium, there are no clearly defined requirements for this team.

A guideline by the Nederlandse Reanimatie Raad (NRR) in 2014 states that the resuscitation team must consist of at least three members, at least one of whom must be a doctor (15).

A 2018 study by Nallamothe *et al* (16) in US hospitals described that in hospitals with better outcome after IHCA, there were pre-designated members of the resuscitation team with clearly defined roles and responsibilities during CPR. The team leader was a caregiver with extensive knowledge of ALS. Physician specialists in training were also part of the team, but were more supervised by more experienced clinicians. Leadership and clear communication were seen as essential.

The NRR also recommends that the Board of Directors of each hospital sets up a resuscitation committee and appoints a resuscitation coordinator to evaluate the hospital policies regarding IHCA. (15)

The skills and experience of the in-house resuscitation team are also factors that may be important in the success of resuscitation. Given the rather low incidence of IHCA and changing composition of the resuscitation team, this can lead to low exposure to this pathology with inadequate build-up of experience. Thorough education and training of the team may compensate for this. The NRR recommends ALS training supplemented by additional refresher training for all members of the resuscitation team (15). Studies (16, 17) have showed that mock codes with multidisciplinary approach, simulation training and structured debriefing can have a positive impact on the ALS skills of physician specialists and may contribute to improved survival. This training is sometimes lacking (18, 19).

In addition to the training of the resuscitation team, the training of the nursing department staff is also of great importance. Rapid initiation of CPR and defibrillation leads to improved survival (7) but often the resuscitation teams are not yet available in this short period of time. The nursing staff must therefore take on an important task and can only do so with at least training in BLS and the use of an AED. This is also confirmed in the recent guidelines of the European Resuscitation Council for Adult Advanced Life Support (6). It is currently unknown whether all nursing departments in Flanders require BLS training and/or have a defibrillator available.

The last important factor is the checking and adjusting of the quality of resuscitation by registration. This would ideally be achieved by using the Utstein criteria (2) because the collection of data in a standardised manner allows to compare data from different databases on IHCA worldwide.

#### *Goal*

In-hospital cardiac arrest (IHCA) is not an infrequent event. Prevention and adequate treatment can prevent a harmful outcome. The alerting, the composition and the performance of the in-hospital resuscitation teams are crucial. To date there is a lack of clear national guidelines on these items. Internationally, several guidelines or recommendations have been issued, but it is unknown if they are already applied in practice in Flanders. In our study we tried to score the Flemish

hospitals on these important factors to evaluate if improvements can be made.

## METHODS

A literature study was performed in Pubmed and Google Scholar by using the terms “in-hospital cardiac arrest”, “cardiac arrest team”, “2222”, “survival”, “outcome”, “etiology” and “training”. Results were limited by full text available and published the last 10-15 years. Eventually we withheld 26 articles.

A questionnaire was drafted in Redcap based on articles (2,8,16-18) about the performance and success of the resuscitation team and sent to the Flemish hospitals (n=52). Hospitals with a psychiatric or revalidation profile were excluded. This study (project number BC-09920 (+ E01)) was approved by the Ethics Committee of the University Hospital Gent on 7/05/2021 by Prof. dr. P. Deron. Inclusion of hospitals was started on 08/05/2021 and ended on 31/08/2021. The questionnaire was sent to the head physician through Redcap and informed consent was obtained through the questionnaire. If hospitals didn't answer after two weeks the questionnaire was repeated to a total of 3 times.

Results were processed through SPSS version 27.

## RESULTS

For this survey, 52 Flemish hospitals were contacted. Twenty four hospitals replied to the questionnaire fully or incompletely, a response rate of 46%. Nineteen hospitals (36%) completed the questionnaire in full. The analysis was based on the latter answers. The size of the hospitals was evaluated according to the number of beds. These ranged from 165 in the smallest hospital to 950 in the largest hospital. Only 3 hospitals replying to the questionnaire indicated that they had several campuses (maximum 3). Eighty percent of the hospitals reported having a resuscitation coordinator.

The 19 hospitals use 18 different emergency numbers of which the proposed European emergency number 2222 is used in only 2 hospitals. In 2 of 3 hospitals with multiple campuses, a different emergency number is used on each campus. Two hospitals do not use a phone number for internal CPR, only a CPR button (Table 1).

Fifty seven percent of hospitals use this emergency number exclusively for calls for IHCA. Thirty two percent also use it for fire calls, 32% for aggression and 26% for all acute situations such as acute deterioration of a patient.

Table 1

Cardiac arrest call telephone numbers of 19 Flemish hospitals

7000	8100	555
2233	9999	1000
100	147	9000
6222	1313	1414
2222	3333	6350
7001	9333	2003

The publication of the emergency number is done in the same way in many hospitals. In 95% of the hospitals it is posted on the intranet, in 95% it is discussed during the training of new staff members and in 74% of the hospitals it is printed on the phones.

All surveyed hospitals have an internal resuscitation team. For the majority of campuses, this team is part of the emergency department (46%) or a combination of emergency with intensive care and/or anaesthesia (42%). A minority is based solely on intensive care (12%).

At 92% of the campuses, the resuscitation team consists of a physician specialist, sometimes in combination with a physician specialist in training (21%). On all campuses, a nurse is part of the team and on 2 of the campuses (the ones with the least number of beds) a nurse is the only person in charge. A paramedic is provided as an extra team member on 13% of campuses. The composition of the team remains the same at all times of day at 83% of campuses.

In 87% of the teams, the decision as to who is part of the resuscitation team is made before the start of the shift, while in the other 13% this is decided at the time of the call.

The time to arrival of the internal resuscitation team is estimated at 2 minutes in the fastest hospitals and < 5 minutes in the slowest.

Only 29% of campuses provide an AED on the various nursing wards which can be used before the resuscitation team arrives.

On all campuses the members of the internal resuscitation team are required to have followed an ALS course except on the 2 smallest campuses where the team consists of a nurse only. They are required to follow an Immediate Life Support (ILS) course.

Eighty nine percent of hospitals organize additional training with simulation manikins (79%), mock calls (21%), scenario training (11%) or annual ALS retraining (26%).

All hospitals require ward nurses to have completed a BLS course. In 42% of hospitals all ward nurses have to follow mandatory training in the use of an AED.

Standard debriefing of the team after a CPR call occurs only in 3 of the 19 hospitals (16%). The course of the emergency call on campuses was registered in the patient file (42%), via a standard template (33%) or both (21%).

## DISCUSSION

### *Resuscitation number*

As shown by the results of our questionnaire, the call by the ESA, ERC and EBA to implement the standard emergency number 2222 (11) has not yet been picked up in our country. Only 2 of the surveyed hospitals already use this number. Possible causes could be that the hospitals are not aware of this project or that there is no motivation to implement this change.

It is undeniable that there are several advantages to implementing a standardized European cardiac arrest telephone number. In times of increasing internationalisation, the organisation of hospital networks on a national level and increasing collaboration agreements between hospitals, it seems logical that standardisation can eliminate any confusion when calling the internal resuscitation team. A good example are the trainee medical specialists who are often assigned to different hospitals during their training and have to memorise a different resuscitation number each time. In addition, standardization of care processes is important. It prevents mistakes and is a fundamental principle of patient safety (20). The number 2222 is also easy to remember and learn, and ensures that staff have to rely less on memory during a stressful event.

The main purpose however of changing to a European cardiac arrest telephone number is the hope that it will reduce the time to resuscitation and defibrillation with possibly a better outcome (7, 21).

What may be holding some hospitals back are the potential drawbacks. However, most of these can be easily circumvented. One important factor that hospitals may be concerned about is cost. Research shows that this is often limited (13). Another concern of hospitals is the potential risk involved

in changing the emergency number. This can be avoided by keeping the old CPR number temporarily parallel and providing adequate training to staff. On the other hand, it can also happen that the number 2222 is already in use for another application, but this is often easy to change. Finally, technical problems may arise, for example because it is not possible to use 4 digits as a telephone number. Then it is recommended to use the numbers 222 or 22222. However, this does not happen very often (22).

The implementation of a European emergency number can be initiated at different levels. International guidelines already exist, but implementation through for example the European Union is a very long process (i.e. 17 years for the 112 number). Implementation through the Ministry of Health, ideally backed-up by the Belgian Resuscitation Council and the Belgian Society of Anaesthesiology, Resuscitation, Perioperative Medicine and Pain Management, seems the most interesting option in order to guarantee uniformity across all hospitals. A third option is to start the project at a local level, i.e. per hospital.

The ERC, EBA and ESA have already launched a roadmap with the different steps to follow and possible pitfalls for hospitals wishing to implement the change of resuscitation number (22). It is important that the change takes place in a structured manner in order to make it as safe as possible. Certain safety measures such as continuing the old number parallel to the new one until it is no longer used, training of staff and ensuring visibility of the new number need to be implemented.

Another issue that emerged from the results of the questionnaire is that the emergency number is often used for other emergency calls besides cardiac arrest. There are currently no recommendations on the use of the internal emergency number for different applications. This is also not addressed in the ESA/ERC/EBA call. One can wonder if having to specify the type of call after calling the emergency number does not result in loss of time since it implies extra steps or clarification. It seems logical, in the framework of fast communication, to keep the European cardiac arrest call telephone number 2222 specifically for resuscitation, if possible within the hospital. Hospitals could for instance keep the original emergency number for aggression, fire, etc. and set up the new European number 2222 specifically for IHCA. The counter argument is that having to remember an extra emergency number can be a barrier to implementation and can lead to confusion and errors. Hospitals should therefore look at this individually.

### *Resuscitation Teams*

The composition and training of the internal resuscitation teams in the Flemish hospitals was also questioned in order to investigate how they are organised. A few things stood out.

With regard to the composition of the team, we were able to establish that in 92% of cases this consisted of a physician-specialist, always in combination with a nurse, and in 21% of cases a physician-specialist in training. This is as recommended by the NRR guidelines (15). The study by Nallamothu et al (16) describes that in the best performing hospitals in terms of outcome after IHCA there is clear supervision by an experienced physician which seems to be the case in most of our hospitals. In the two smallest campuses, a physician is not part of the resuscitation team. Maybe it would be better to include one in these teams.

On the majority of campuses (83%), the composition of the resuscitation team is maintained the same at all times of the day. Literature (15, 16) indeed suggests that this does increase the success rate of resuscitation. It also seems important to determine who is part of the resuscitation team at the start of a new shift (so before the cardiac arrest call). This was the case in 87% of the teams so there may be some room for improvement here.

According to our study, the resuscitation team arrives at the scene within 2 minutes in the fastest hospitals and within 5 minutes in the slowest (16% of hospitals). It has already been demonstrated that rapid defibrillation (within 2 minutes of the start of CPR) improves outcome (7). Some hospitals do not achieve this if defibrillation is only initiated after arrival of the resuscitation team. A possible solution to this problem is the use of AEDs by the ward nurses. In two of the three hospitals with response times of 5 minutes these appear to be effectively present. In the other hospital this may also be recommended.

In our research, 80% of the hospitals have a resuscitation coordinator, as is recommended by the NRR (15).

In terms of training most hospitals seem to be doing well. All members of the resuscitation team are required to have completed an ALS course. This is also recommended by the NRR (15), American Heart Association (8) and ILCOR (9). However, on the two smallest campuses, the resuscitation team consists solely of nurses who have completed an ILS course. We may recommend here that these nurses also be trained in ALS. In all hospitals the ward nurses are obliged to follow a BLS course.

This is also recommended by the American Heart Association (8) and ILCOR (9).

Furthermore, several studies (16,17) show that additional training such as simulation training or mock calls contribute to better retention of ALS skills. According to our research this is already applied in several hospitals, but maybe there is still some room for improvement here.

What stood out in our study is that only a limited number of hospitals routinely organize a resuscitation team debriefing after a cardiac arrest call. However, there is clear evidence that debriefing leads to improved survival, increased recovery of circulation and improved quality of resuscitation, especially if it is based on data about the quality of CPR, such as defibrillator readings (6).

In addition, the registration of the course of resuscitation is important in order to learn lessons and implement improvements. All hospitals in our study already do this, but not always in a standardized way. This makes it difficult to compare data from different resuscitations or even hospitals. Currently, 35% of the hospitals use a standard template. Ideally, registration should take place using the Utstein criteria (2) so that research into IHCA is possible on a larger scale. However, we must be careful that this does not increase the administrative burden on departments that already have a high workload, such as emergency departments.

### *Restrictions*

There are a number of limitations to this study. First of all, response to our study could be better. Only 36% of contacted hospitals completed the questionnaire, which makes it uncertain whether the results can be extrapolated to all Flemish hospitals.

The questionnaire was designed to collect raw data, without the possibility of drawing statistical conclusions.

Additional research could therefore be interesting, for example by writing to all Belgian hospitals and ensuring a larger response rate. In addition, sub-areas of this study can be better questioned with the possibility of making statistical conclusions with regard to outcome.

### CONCLUSION

At present, there are no guidelines regarding the organisation of the cardiac arrest call number and the resuscitation team in Flemish hospitals. Our research tried to explore and map the current

situation. Based on this we can make some recommendations for the future.

With regard to the emergency number it seems logical not to ignore the call by the ERC, ESA and EBA to implement a standardised European cardiac arrest call telephone number 2222. The influence on the outcome of in-hospital cardiac arrest has not been proven. However, given the clear advantages, fast applicability and easy to overcome disadvantages it is an intervention that possibly can lead to a quick win in time to start resuscitation and defibrillation and thus possibly also in improvement of outcome.

In general, the resuscitation teams of our Flemish hospitals seem to be well organised and follow the international guidelines. However, there is always room for optimisation.

Implementation of a uniform cardiac arrest call telephone number in all hospitals, as suggested by different European scientific societies, should be encouraged.

In hospitals with response times of >3 minutes after alerting of the resuscitation team, it seems advisable to provide AEDs – and training in their use – for ward nurses.

In addition, extra attention should be paid to the training of the resuscitation team using simulations or mock calls.

Standard debriefing after resuscitation is currently only applied in a small number of hospitals, even though studies have shown that this has a positive influence on the outcome of the patient after resuscitation.

Finally, attention should be paid to the registration of each resuscitation in the hospital, ideally using the Utstein criteria, in order to make comparisons between resuscitations and hospitals.

## Acknowledgements

We would like to thank Prof. Dr. Bjorn Heyse and Ann De Bruyne for the assistance with the application for the Ethics Committee.

## References

1. Andersen L, Holmberg M., Berg K., Donnino M., Granfeldt A. 2019. “n-Hospital Cardiac Arrest: A Review. *JAMA*. 321: 1200-1210.
2. Nolan J., Berg R., Andersen L., Bhanji F., Chan P., Donnino M., et al. 2019. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Template for In-Hospital Cardiac Arrest: A Consensus Report From a Task Force of the International Liaison Committee on Resuscitation. *Resuscitation*. 144: 166-177.
3. Cavallotto F., Mols P., Ramadan A., Taccone F., Claessens B. 2015. Comparison between in-hospital and out-of-hospital cardiac arrest: Epidemiology, etiology and outcome. *Re-suscitation*. 96: 115.
4. Nolan J., Soar J., Smith G., Gwinnutt C., Parrott F., Power S., et al. 2014. Incidence and outcome of in-hospital cardiac arrest in the United Kingdom National Cardiac Arrest Audit. *Resuscitation*. 85: 987-992.
5. Directoraat-Generaal Gezondheidszorg. Blikvanger gezondheidszorg [Internet]. Brussel: Tom Auwers; 2019 p. 13. Available from: [https://www.gezondbelgie.be/images/Blikvanger\\_Gezondheidszorg\\_2019\\_pdf.pdf](https://www.gezondbelgie.be/images/Blikvanger_Gezondheidszorg_2019_pdf.pdf)
6. Soar J., Böttiger B., Carli P., Couper K., Deakin C., Djäv T., et al. 2021. European Resuscitation Council Guidelines 2021: Adult advanced life support. *Resuscitation*. 161: 115-151.
7. Bircher N., Chan P., Xu Y. 2019. Delays in Cardiopulmonary Resuscitation, Defibrillation, and Epinephrine Administration All Decrease Survival in In-hospital Cardiac Arrest. *Anesthesiology*. 130: 414-422.
8. Morrison L., Neumar R., Zimmerman J., Link M., Newby K., McMullan P., et al. 2013. Strategies for improving survival after in-hospital cardiac arrest in the United States: 2013 consensus recommendations: a consensus statement from the American Heart Association. *Circulation*. 127: 1538-1563.
9. Panchal A., Bartos J., Cabañas J., Donnino M., Drennan I., Hirsch K., et al. 2020. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 142: S366-S468.
10. Løfgren B., Larsen C., Rasmussen M., Henriksen F., Krarup N. 2010. Limited knowledge of the crash call number among hospital staff— A call for standardisation. *Resuscitation*. 81: S28.
11. European Resuscitation Council, European Board of Anaesthesiology, European Society of Anaesthesiology. European Standardisation of the in-hospital ‘Cardiac Arrest Call’ Number – 2222 [Internet]. 2016. Available from: <https://www.esahq.org/uploads/media/ESA/Files/Resources/Cardiac%20Arrest/Joint%20Press%20release%202222%2020-9-2016%20v6.pdf>
12. Trenkler S., Simonova J., Grochova M. 2017. “- Implementing the standardised cardiac arrest call telephone number for all European hospitals - 2222. *Resuscitation*. 112: e5.
13. National Patient Safety Agency. Establishing a standard crash call number in hospitals in England and Wales: feasibility study report [Internet]. 2004. Available from: [https://www.psnetwork.org/wp-content/uploads/2018/07/NRLS-0058D-crash-call-num\\_report2004-02-24-v1.pdf](https://www.psnetwork.org/wp-content/uploads/2018/07/NRLS-0058D-crash-call-num_report2004-02-24-v1.pdf)
14. Giusti G., Reitano B., Lusignani M., Rasero L., Galazzi A. 2019. Italian in-hospital emergency number: A call for action. *Resuscitation*. 140:84-85.
15. Nederlandse Reanimatie Raad. De organisatie van de reanimatie van volwassenen, kinderen en pasgeborenen in het ziekenhuis [Internet]. 2014 [cited 9 July 2021]. Available from: [https://reanimatieraad.nl/app/uploads/2020/03/Organisatie-van-het-reanimatie-team\\_verse20140908.pdf](https://reanimatieraad.nl/app/uploads/2020/03/Organisatie-van-het-reanimatie-team_verse20140908.pdf)
16. Nallamothu B., Guetterman T., Lehigh J., Kronick S., Krein S., Iwashyna T. et al. 2018. How Do Resuscitation Teams at Top-Performing Hospitals for In-Hospital Cardiac Arrest Succeed? A Qualitative Study. *Circulation*. 138:154-163.

17. Wayne D., Didwania A., Feinglass J., Fudala M, Barsuk J., McGaghie W. 2008. Simulation-based education improves quality of care during cardiac arrest team responses at an academic teaching hospital: a case-control study. *Chest*. 133:56-61.
18. Lauridsen, K., Schmidt A., Caap P., Aagaard R., Løfgren B. 2017. Clinical experience and skills of physicians in hospital cardiac arrest teams in Denmark: a nationwide study. *Open access emergency medicine*. 9:37-41.
19. Hayes C., Rhee A., Detsky M., Leblanc V., Wax R. 2007. Residents feel unprepared and unsupervised as leaders of cardiac arrest teams in teaching hospitals: A survey of internal medicine residents. *Crit Care Med*. 35:1668-1672
20. Whitaker D., Nolan P., Castrén M., Abela C., Goldik Z. 2017. Implementing a standard internal telephone number 2222 for cardiac arrest calls in all hospitals in Europe. *Resuscitation* 115:14-15.
21. Sandroni C., Ferro G., Santangelo S., Tortora F., Mistura L., Cavallaro F. et al. 2004. In-hospital cardiac arrest: survival depends mainly on the effectiveness of the emergency response. *Resuscitation*. 62:291-297.
22. European Resuscitation Council, European Board of Anaesthesiology, European Society of Anaesthesiology. Standardisation of the “Cardiac Arrest Call”. [PowerPoint presentation]. [updated 25 november 2020; cited 20 july 2021]. Available from: <https://www.esaic.org/uploads/2020/11/standardisation-of-the-cardiac-arrest-call-25-november2020.pptx>