Current practice and perspective of hands-free defibrillation in Hungary – Investigating the obstacles of implementation

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Abstract: Defibrillation with self-adhesive pads is the gold standard method during resuscitation as it allows minimal interruptions of chest compressions. Unfortunately, the implementation of the new recommendations often requires the purchase of new equipment. We have conducted a nationwide survey by telephone interviews with senior clinicians in order to investigate the current position of the implementation and to identify possible obstacles. We have audited 56 hospitals and 92 departments across the country and interviewed the senior consultants of the intensive care units (ICUs) and emergency departments (EDs). Only 6.5% of all responders were using hands-free defibrillation routinely at the time of the survey. According to 67.4% of respondents, purchasing of new equipment was not likely within 2 years. The major obstacle was the perceived higher costs (59.8%); however, the majority of clinicians (92.4%) were aware of the potential benefits of hands-free defibrillation. Our results suggest that the implementation of the new guidelines is slower than expected due to the unavailability of hands-free defibrillators. The major obstacle is the perceived cost-efficiency concerns. The need for an interim recommendation for safe delivery of defibrillation using hard paddles might be considered to enhance the chance of survival for a large number of patients.

Keywords: defibrillation, implementation, self-adhesive pads

Introduction

It has been long recognized that interruptions during chest compressions have detrimental effect on the survival of cardiac arrest [1]. Hands-free defibrillation is widely used and recommended method for defibrillation for its safety and efficacy. Studies demonstrated that the techniques used for manual defibrillation have important impact on the no-flow times during resuscitation and interruptions of chest compressions are shorter using the self-adhesive pads compared to the manual defibrillation with hard paddles [2]. The 2010 Guideline for Advanced Life Support recommends continuous chest compression while charging the defibrillator, so the interruption needed for safe delivery of the shock could be reduced to as short as 5 s [3].

In order to follow this recommendation – and provide the safest and most effective defibrillation for patients in cardiac arrest – the use of self-adhesive pads are required as, currently, there is no safe method recognized and recommended to charge the manual paddles and carry on chest compressions simultaneously.

National Resuscitation Councils are working hard to distribute the knowledge and recommend the change in practice in order to increase cardiac arrest survival. In this particular case, the change in practice would also mean the change of available equipment, which has both financial and training implications. It has been recognized recently that, in spite of the time elapsed since the international recommendations was published, a significant proportion of clinical practices in Europe still use hard paddles instead of self-adhesive
investigated by measuring the level of agreement with choices; the subjective opinions (qualitative data) were simple or multiple adhesive electrodes in the near future (within 2 years) and also their professional opinion about this initiative. We asked the intention of changing hard paddles to self-adhesive pads [4]. It is not clear how these providers would try to implement the new guideline and minimize the interruptions while delivering safe defibrillation at the same time. Krawczyk et al. observed a number of different methods in the clinical practice and that some of them could even be unsafe [5, 6]. Also, a number of providers simply follow the safe defibrillation practice of the previous guideline interrupting chest compressions during charging which then leaves patients in risk of loosing chance for survival.

There is no doubt that clinical guidelines must advocate the best available clinical practice and health care providers have the responsibility to follow these recommendations the best they can. Nevertheless, a need for an interim recommendation for safe delivery of defibrillation using the hard paddles might be considered at least for the period while practices are equipped with the necessary hardware. This has been repeatedly recognized and regularly discussed especially among the resuscitation instructors who found themselves in the difficult situation when training providers with older equipment or being asked about the safe practice with the hard paddles. Ignoring the fact that a significant proportion of our trainees are still forced to use hard paddles in their every day practice cannot be an option. It seems evitable that, unless we could support the change of equipment and practice more effectively, a recommendation for safe and effective defibrillation with hard paddles would be needed. In order to deliver change effectively, we must know the current practice and identify the possible obstacles preventing or delaying development.

The aim of our study was to provide an up to date overview of the current clinical practice as well as the intentions for change in the practice of defibrillation within Hungary. We have tried to identify the possible obstacles and understand the reasons of the delay of introducing hands-free defibrillation.

Methods

We have conducted a survey by telephone interviews with a representative sample of the Hungarian hospitals across the country. Senior members (consultants) of intensive care units (ICUs) and emergency departments (EDs) of each hospital were interviewed. The structured questionnaire was focused on the type of defibrillator available (monophasic, biphasic) and defibrillation methods they use (hands-free or manual with hard paddles). We asked the intention of changing hard paddles to self-adhesive electrodes in the near future (within 2 years) and also their professional opinion about this initiative.

The questions about the current practice and future plans (quantitative data) were simple or multiple choices; the subjective opinions (qualitative data) were investigated by measuring the level of agreement with preset statements using a 1–5 scale (5 – strongly agree; 1 – strongly disagree).

The answers for the simple or multiple choice questions were counted, and the responses for the qualitative data were averaged within the similar groups (ITU and ED respondents) with standard deviation (STD) calculated.

Results

The survey has been conducted between the 1st and 31st of August 2012. We have contacted 56 hospitals across the country in 49 towns, which represented 46,502 beds – 65% of all hospital beds in Hungary. The distribution of hospitals was even around all 19 counties, and Budapest represented with 6 hospitals. Among the hospitals, 4 were smaller (less then 300 beds), 18 were medium size (between 300 and 500 beds), and 34 were major health care facilities (more than 500 beds). This distribution was representative according to the National Audit data of hospitals published in 2012 [7]. Out of the 56 hospitals, 36 had both intensive care unit (ICU) and emergency department (ED); 19 hospitals had only ICU but no ED, and 1 hospital had no ICU but only ED. All of these units were contacted, and one of the consultants of each unit had been interviewed over the phone.

The interview was supported by the Hungarian Resuscitation Council, lasted only 5 min, and was conducted anonymously. The aim was to contact all of the targeted departments and interview the senior consultant or deputy. Within 30 days, all of the units were contacted and 100% response rate was achieved.

All departments provided in-hospital cardiopulmonary resuscitation and defibrillation for patients in cardiac arrest. All of the interviewed units had one or more of their own defibrillators.

Detailed results for the qualitative questions are listed in Table I. Seventy-six of all units (82.6% of all) had biphasic defibrillators. Surprisingly, there are still 16 units (17.4% of all units contacted) which use predominantly monophasic defibrillators and 7 departments (7.6% of all respondents) have approximately 50–50% of both mono- and biphasic equipment. The hospitals using monophasic defibrillators were more likely rural and more likely smaller than 300 bed hospitals.

When asked about the current practice, the responses show that 78.1% of all ICU and 59.4% of all ED departments in the sample use manual defibrillation with hard paddles. Only 4 ITU (7.2%) and 2 (5.4%) ED seniors said that self-adhesive pads are routinely used for defibrillation. Enquiring about the availability of hands-free defibrillation, 7 (12.7%) ITU and 10 (27%) ED responded that it was available at least occasionally. There was no difference between smaller and larger hospitals, and there was no geographical pattern recognizable either.
We asked the consultants if they were aware of any plan to change the practice of defibrillation and to introduce self-adhesive pads instead of the hard paddles. Twelve (21.8%) ICU and 15 (40.5%) ED consultants who responded could not give an answer to this question. Only one ED consultant (2.7% of all ED and 1% of all respondents) answered that the introduction of hands-free defibrillation was on the agenda within 1 year for the emergency department. Unfortunately, 41 (74.5%) ICU and 21 (56.7%) ED departments responded that there is not even a plan for changing the hard paddles to self-adhesive electrodes for defibrillation.

We enquired about the reasons of not pursuing the change of practice to hands-free defibrillation. Thirty-three (60%) ICU consultants and 22 (59.4%) ED consultants who responded believed that the hands-free defibrillation was more expensive. Only 6 (10.9%) ICU and 1 (2.7%) ED respondents – which is 7.6% of all interviewed – said they felt that the traditional (e.g., hard paddles) method was good enough. There were only a few of respondents (2.2% of all respondents) who admitted they were not aware of the difference.

We have enquired about the senior clinicians’ opinion and awareness about the hands-free defibrillation and the necessary change in practice. This qualitative data were investigated by giving simple statements and asking the participants of the level of their agreement on a 1 to 5 scale, where 1 was “strongly disagree” and 5 was “strongly agree.” Results are summarized in Fig. 1.

The ITO and ED respondents gave an average of 3.90 (STD, 1.12) and 4.00 (STD, 1.15) points, respectively, to the statement that “hands-free defibrillation was safer method.” On the similar scale, the respondents gave 3.51 (STD, 1.32) points from ITU and 3.15 (STD, 1.16) points from ED to the statement that “hands-free defibrillation was more effective then hard paddles.” There was a strong agreement (4.37 [STD, 1.08] and 4.03 [STD, 1.34] points from ITU and ED, respectively) to the statement that “hands-free defibrillation was more effective than hard paddles.” We have also found that 41 (74.5%) ICU and 21 (56.7%) ED departments did not have any plan for changing the hard paddles to self-adhesive electrodes for defibrillation.
respectively) with the statement that “hands-free defibrillation allows less interruption of chest compression during resuscitation compared to hard paddles.” It was not surprising that the statement “hands-free defibrillation is cost effective compared to manual defibrillation with hard paddles” was predominantly rejected (1.48 [STD, 0.86] from ITU and 1.64 [STD, 1.01] from ED) by our respondents. Only one ICU and three ED consultants agreed to this statement (1.8% and 8.1%, respectively).

Discussion

It has been recognized already that implementation of the 2010 ERC Guideline in terms of defibrillation has suffered from the lack of universal availability of equipment [4] and consensus of an alternative safe technique [5, 6]. Though it potentially affects millions of people in Europe, the literature of this issue is rather scarce and recommendations are still lacking. So far, no study about the potential barriers of implementation either has been published.

We have conducted a survey among ICU and ED consultants nationwide in Hungary to investigate the current practice and future perspective of manual defibrillation. Our survey had covered 92 units in 56 hospitals in all counties within Hungary, which is a good representation of the current secondary health care provision of the country. Our structured interviews were carried out anonymously over the phone and were answered by senior consultants of the respective departments. Only a very small proportion (7.2% of ICUs and 5.4% of EDs) of all departments surveyed use currently hands-free defibrillation with self-adhesive pads routinely. There was no geographical pattern recognized in the distribution, and major hospitals in Budapest were as likely to use hard paddles than smaller rural units. On the other hand, the few hospitals already equipped with self-adhesive pads were equally likely small rural district hospitals as a major health care center in the capital. The results, however, suggest that more EDs than ICUs were equipped with the hands-free defibrillation (27% and 12.7%, respectively) at least occasionally. Emergency departments are relatively new establishments, and therefore, their equipment was purchased more recently. Also, there is a tendency over the past few years to allocate more budgets to the improvement of emergency services within the health care system.

It was disappointing that the vast majority of surveyed hospitals (74.5% of ICU and 56.7% of EDs) of all departments surveyed use currently hands-free defibrillation with self-adhesive pads routinely. There was no geographical pattern recognized in the distribution, and major hospitals in Budapest were as likely to use hard paddles than smaller rural units. On the other hand, the few hospitals already equipped with self-adhesive pads were equally likely small rural district hospitals as a major health care center in the capital. The results, however, suggest that more EDs than ICUs were equipped with the hands-free defibrillation (27% and 12.7%, respectively) at least occasionally. Emergency departments are relatively new establishments, and therefore, their equipment was purchased more recently. Also, there is a tendency over the past few years to allocate more budgets to the improvement of emergency services within the health care system.

It was disappointing that the vast majority of surveyed hospitals (74.5% of ICU and 56.7% of EDs) were not even considering the change of their practice. There were a high proportion of consultants (21.8% on ICU and 40.5% on ED) who could not tell if such a development might have been planned. This is partly because hospital developments including purchasing new equipment are often arranged by a central governing body and the involvement of bedside clinicians is not always emphasized enough. Therefore, targeting the clinicians with evidence based clinical arguments alone would unlikely be enough to facilitate the change.

The clinicians interviewed were usually aware that hands-free defibrillation is a safer method for delivering shock, but 10.9% of ICU and 2.7% of ED consultants...
still felt that the traditional method (e.g., manual defibrillation with hard paddles) was still satisfactory (“good enough”) and they, therefore, did not feel the need for a change. This is disappointing as the senior clinical leaders should be the engines of the change of practice. It seems that awareness of the 2010 Guidelines is still not satisfactory and that puts more responsibility to the National Resuscitation Council.

It is, however, an important finding that the majority of consultants interviewed thought that defibrillation with self-adhesive pads was more expensive and less cost effective than the use of hard paddles. Consequently, 60% of ITU and 59.4% of ED consultants said that the major obstacle in the process of changing the practice would be its financial implications to their hospital.

One might wonder why so many of the respondents are concerned about the financial implications of the hands-free defibrillation when 29.3% of them was seemingly not involved in the planning of purchasing new equipment anyway. The answer is that clinical leaders are heavily involved and usually directly responsible for the running costs and budget of their department but not necessarily involved in the purchase of new equipment. While procurement is often centrally distributed and funded from a different source, the running costs are directly budgeted to the departments often causing continuous headache for clinical leads. Changing the practice of defibrillation – and introducing the costs of self-adhesive electrodes – actually shifts the costs of defibrillation towards the bedside managers, and therefore, they might be reluctant to pursue this change and risk the overspending of their tight budget. Nevertheless, it seemed that most of the clinicians interviewed were open and honest about this obstacle while they also expressed their awareness of the increased safety and perhaps efficacy of the hands-free defibrillation.

Conclusion

In our survey, we have demonstrated that, during 2012, the majority of Hungarian hospitals were still not using hands-free defibrillation. This is in line with the results of international surveys in Europe [4]. The senior clinicians are mostly aware of the clinical benefits of the self-adhesive pads over the hard paddles but were mostly concerned about its financial implications. It seems to be a general perception that defibrillation with self-adhesive pads is more expensive and less cost effective, and most of our respondents identified this as the major obstacle to the change.

If we are to implement the guideline and, therefore, change the practice – which we certainly are – we must address these issues and tackle the obstacles. The cost effectiveness of hands-free defibrillation should be more effectively and widely communicated, and we might rely on the industry to support this move and provide evidence.

Unfortunately, our results also suggest that the change is not happening fast – most of the respondents are not aware of new equipment purchase and plans for a change in the defibrillation practice. This has another important implication: we should provide recommendation for safe defibrillation and limited interruption of chest compressions while using the hard paddles. The current practice is varying from place to place and occasionally even unsafe [5]. One possible risk of such a recommendation might be to slow down the progress of change to hands-free methods as clinicians might feel that this is a “good enough” solution. Nevertheless, without this recommendation, there will be a risk of losing lives due to prolonged interruptions or eliciting harm to rescuers due to unsafe practice.

Limitations

There are several limitations of this study. First of all, this is a survey conducted over the phone which had limited the time available (we used approximately 5 min each), allowing no opportunity for cross questioning to minimize bias. Also, explanation of terms (like hands-free defibrillation, self-adhesive pads, hard paddles, mono- and biphasic defibrillators) is more difficult over the phone without using pictures. Therefore, we intended to interview the lead consultants (or deputies) of the departments who were supposed to be aware of these technical terms.

We only focused on ED and ITU providers and disregarded the rest of the health care community (general practitioners, ambulance service, cardiology and coronary care units, high dependency units, postoperative wards, etc.) who also practice defibrillation. Nevertheless, we believe that the main opinion leaders of in-hospital cardiac arrest management are mainly the senior clinicians of the intensive and emergency care departments, and therefore, we aimed to map their current practice and opinion first.

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