EJA

Eur J Anaesthesiol 2017; **34:**792–796

EDITORIAL

KIDS SAVE LIVES

School children education in resuscitation for Europe and the world

Bernd W. Böttiger, Federico Semeraro, Karl-Heinz Altemeyer, Jan Breckwoldt, Uwe Kreimeier, Gernot Rücker, Janusz Andres, Andrew Lockey, Freddy K. Lippert, Marios Georgiou and Sabine Wingen

European Journal of Anaesthesiology 2017, **34**:792–796

Sudden cardiac death is the third leading cause of death in industrialised nations. It is estimated that in Europe and in the United States, more than 700 000 patients die annually following sudden cardiac death, even when the emergency medical service has been activated and started cardiopulmonary resuscitation.[1,2] The same applies to all other developed regions of the world. Despite many improvements in emergency medical services and hospital treatment of sudden cardiac death patients, the survival rates remain low. The key problem is that it can take a long time for an emergency medical service to arrive after the victim's collapse. The brain, however, starts to die some 3 to 5 min after circulatory arrest. Thus, the treatments that emergency medical services deliver arrive too late for most sudden cardiac arrest patients.

One of the most effective ways to increase survival in sudden cardiac arrest is swift onset of cardiopulmonary resuscitation by bystanders (who we know observe the victim collapse in at least 60% of cases[3]) and by educated and trained 'first responders' who are dispatched in parallel with the emergency medical services. Lay bystander resuscitation rates differ significantly across Europe, ranging from 10 to 20% in many countries, and higher than 60 to 80% in a few other countries.[4] Some countries have made remarkable progress with increasing bystander resuscitation rates over the last decade. Denmark in particular can serve as a blue print for national initiatives to successfully and markedly increase bystander resuscitation rates. In Denmark, over a period of more than 10 years, bystander resuscitation rates following sudden cardiac arrest increased from less than 20% in 2001 to more than 50% in 2012. This was not only associated with a tripling in survival of patients following sudden cardiac arrest, but also – and most interestingly – with lower rates of brain damage, nursing home admission and death from any cause within the first year after sudden cardiac arrest as compared with no bystander resuscitation.[5] Furthermore, the majority of survivors went back to work.[6] This success is because of nationwide initiatives including mandatory education in resuscitation in elementary schools since 2005 in Denmark.[7] In the years before, Norway and some states in the United States and Germany successfully established similar programs. To save the lives of hundreds of thousands of sudden cardiac arrest patients, it is, therefore, important to focus efforts on increasing bystander resuscitation. This is also one of the 10 recommendations emphasised by the Global Resuscitation Alliance as the most important to improve survival from out-of-hospital cardiac arrest.[8]

Educating school children in cardiopulmonary resuscitation is an effective and long-lasting way to increase bystander efforts.[9] This was recognised in 2015 by the WHO when they endorsed the KIDS SAVE LIVES statement.[10,11] Following such training, school children can also serve as multipliers,[11] and all this will have a significant positive influence on survival after sudden cardiac arrest.

From the Department of Anaesthesiology and Intensive Care Medicine, University Hospital of Cologne, Cologne, Germany (BWB, SW), Department of Anaesthesia and Intensive Care Medicine, Maggiore Hospital, Bologna, Italy (FS), Saarbrücken, Germany (KHA), Faculty of Medicine, University of Zürich, Zürich, Switzerland (JB), Department of Anaesthesiology, University Hospital of Munich (LMU), Munich, Germany (UK), Department of Anaesthesiology and Intensive Care Medicine, University Hospital of Rostock, Rostock, Germany (GR), Department of Anaesthesiology and Intensive Therapy, Jagiellonian University Hospital, Krakow, Poland (JA), Emergency Department, Calderdale Royal Hospital, Halifax, UK (AL), Emergency Medical Services Copenhagen, University of Copenhagen, Copenhagen, Denmark (FL) and American Medical Center Cyprus, Nicosia, Cyprus (MG)

Correspondence to Bernd W. Böttiger, MD, ML, DEAA, FESC, FERC, Department of Anaesthesiology and Intensive Care Medicine, European Resuscitation Council (ERC), German Resuscitation Council (GRC), University Hospital of Cologne, Kerpener Straße 62, D-50937 Cologne, Germany
Tel: +49 221 478 82054, 478 82052; fax: +49 221 478 87811; e-mail: bernd.boettiger@uk-koeln.de

0265-0215 Copyright © 2017 European Society of Anaesthesiology. All rights reserved.

DOI:10.1097/EJA.0000000000000713

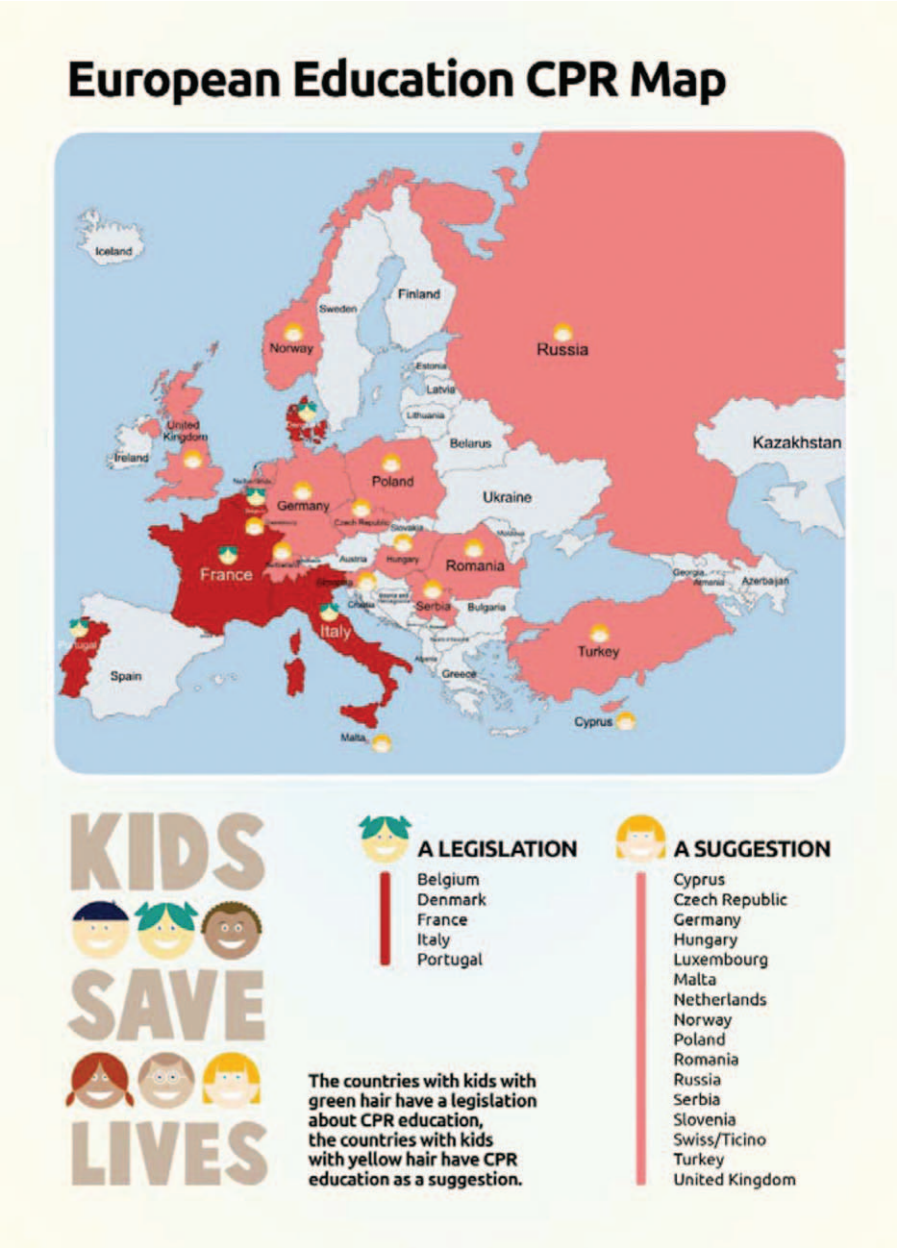
Copyright © European Society of Anaesthesiology. Unauthorized reproduction of this article is prohibited.

We recommend that resuscitation training for school children should start at the age of 12 years or earlier, with 2 h of theoretical and practical training per year, and as long as the children go to school. Educated teachers and medical personnel are both equally effective in training school children in cardiopulmonary resuscitation.

Following several initiatives, school children education in cardiopulmonary resuscitation is already mandatory in five countries in Europe, and it is a recommendation in 16 additional countries (Fig. 1).[12] Our aim is to have school children educated in resuscitation all over Europe and the rest of the world. To support this goal, we have summarised what we have experienced and, in part, actively initiated with regard to historical facts and milestones (Table 1).[13] Many of those have been initiated by anaesthesiologists,[13] and this editorial wants to motivate and activate as many colleagues as possible from all kinds of emergency medical disciplines.

What can be done to support the movement KIDS SAVE LIVES? There are different concepts, curricula and

Fig. 1



This is the 'KIDS SAVE LIVES' – European map of CPR education in school children. In the countries with yellow-haired kids, CPR education is a suggestion, and in the countries with green-haired kids, there is legislation about CPR education. Adapted with permission[12]. CPR, Cardiopulmonary Resuscitation.

Copyright © European Society of Anaesthesiology. Unauthorized reproduction of this article is prohibited.

Table 1 Historical milestones in school children education in resuscitation

Until 2009	In Norway, school children education in resuscitation was established in the 1960s. In Denmark, elementary school children education in resuscitation was made mandatory in 2005. Further initiatives and projects have been established in a few other European countries and in the United States[7,14,15]
2009	Annual congress of the European Resuscitation Council in Cologne, Germany. During the precongress of the German Resuscitation Council, 400 school children were trained by representatives of the German Resuscitation Council together with the 'miniSanitäter' organisation from Munich, Germany (http://www.minisanitaeter.de/projekte5.html)
2010	Annual congress of the European Resuscitation Council in Porto, Portugal: 200 school children were trained in resuscitation
	In Germany, anaesthesiologists from the Department of Anaesthesiology and Intensive Care Medicine of the University of Rostock started the education of school children and teachers in resuscitation all over the German Federal State Mecklenburg-Vorpommern – with the support from the Ministry of Schools and the 'Björn Steiger Stiftung'. The aim was to educate all school children in Mecklenburg-Vorpommern in resuscitation
2011	With the support from Cypriot members of the European Parliament, representatives of the European Resuscitation Council and the German Resuscitation Council started a European initiative for more awareness for cardiac arrest and resuscitation, including school children education in resuscitation (written declaration on establishing a European Cardiac Arrest Awareness Week), at the European Parliament in Strasbourg, France. This 'written declaration' was signed by 395 members of the European Parliament from different political parties – all over representing more than 50% of all members of the European Parliament (http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2012-0266+0+DOC+XML+V0//EN)
2012	The German Resuscitation Council published its Curricula for school children education in cardiopulmonary resuscitation in both English and German (at www.grc-org.de/reanimationsunterricht)
	Representatives from the European Resuscitation Council and the German Resuscitation Council visited the European Commissioner for Health at the European Parliament in Strasbourg. The only topic was the relevance and the importance of cardiac arrest, cardiopulmonary resuscitation and school children education in cardiopulmonary resuscitation. Our aim was to generate and establish more visibility for this topic at the highest European level and to start an annual European Cardiac Arrest Awareness Week – later named 'European Restart a Heart Day'
2013	The first 'European Restart a Heart Day' was launched on 16 October by the European Resuscitation Council – with the support from 32 National Resuscitation Councils within the European Resuscitation Council family and with initiatives in more than 20 European countries. The topic all over Europe was 'Children Saving Lives' (www.erc.edu/about/restart)
	In Germany, the 'Woche der Wiederbelebung' (week of resuscitation) was launched by the German anaesthesiologists (Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin, Berufsverband Deutscher Anästhesisten, Stiftung Deutsche Anästhesiologie) together with the German Resuscitation Council and with the support of the German Health Minister (www.einlebenretten.de)
	Representatives from the European Resuscitation Council and the German Resuscitation Council – together with the 13-year-old Nic and the 17-year-old Kea, who had successfully resuscitated Nic 1 year before at their school, when he had a sudden cardiac arrest because of cardiac abnormalities – showed the European Commissioner for Health and his colleagues at the European Commission in Brussels how easily cardiopulmonary resuscitation can be performed (www.erc.edu)
	Guinness World record of the Department of Anaesthesiology and Intensive Care Medicine in Münster, Germany: 11 840 school children were trained together in resuscitation at the Schloßplatz in Münster (https://www.youtube.com/watch?v=WvHJF0b_-wQ)
	In Poland since 2013 and every year on 16 October the Great Orchestra of Christmas Charity Foundation (Jurek Owsiak) in close collaboration with the Polish Resuscitation Council has organised the 'European Restart a Heart Day' – children from across Poland attempting cardiopulmonary resuscitation demonstration for half an hour to set records in numbers of children performing simultaneously cardiopulmonary resuscitation on manikins. For the first time, they came together in 2013 and proved that children in Poland know how to save lives – 83 111 people performed cardiopulmonary resuscitation simultaneously at 1132 various schools, public places and institutions that hosted the events (http://www.wosp.org.pl/uczymy-ratowac/rekord)
	In Italy since 2013 and every year on the second week of October, the Italian Resuscitation Council has organized a cardiac arrest week called 'Viva!' with the aim to increase awareness in the general population and younger generations. The Italian Resuscitation Council invested resources on digital communication with social network, serious games and apps (http://www.ircouncil.it/per-il-pubblico/settimana-viva/)
2014	In Germany, and upon an initiative of the German anaesthesiologists together with the German Resuscitation Council, the School Committee of the School Ministers of all 16 Federal States recommended training teachers in resuscitation to enable them to train school children in cardiopulmonary resuscitation – for 2 h per year, starting at the age of 12 years (www.grc-org.de)
	The European Patient Safety Foundation, the European Resuscitation Council, the International Liaison Committee on Resuscitation and the World Federation of Societies of Anaesthesiologists supported the 'KIDS SAVE LIVES' statement, which suggests 2 h of resuscitation training in school children per year, starting at the age of 12 years[13,14]
	In Poland, 67 396 school children all over the country jointly trained cardiopulmonary resuscitation for the 'European Restart a Heart Day' (http://www.wosp.org.pl/uczymy-ratowac/rekord)
2015	The 'KIDS SAVE LIVES' statement from European Patient Safety Foundation, European Resuscitation Council, International Liaison Committee on Resuscitation and World Federation of Societies of Anaesthesiologists was endorsed by the WHO[16,17]
	The Health Minister from the Republic of the Sudan pledged support for the 'KIDS SAVE LIVES' initiative
	In Italy, the School Minister established a law for nationwide mandatory education of school children in resuscitation; the Italian Resuscitation Council supported this legislation with a flash mob with school children and a press conference in the Italian Parliament (http://www.resuscitationjournal.com/article/S0300-9572(16)30299-4/abstract)
	In Italy, during 'Viva!' 2015 'Relive' was launched, the first 'serious game' with no profit purpose to increase awareness about cardiac arrest and cardiopulmonary resuscitation in children of secondary school (http://relivegame.org)
	In Poland, 92 049 children performed cardiopulmonary resuscitation demonstrations on 5411 manikins at schools and public places during the 'European Restart a Heart Day' event (http://www.wosp.org.pl/uczymy-ratowac/rekord)
	In the United Kingdom, the Resuscitation Council distributed free copies of its award winning Lifesaver app (http://www.lifesaver.org.uk/) to all secondary schools
2016	In France, first aid and resuscitation training became mandatory by national law for all schools
	Greece – with Hellenic Society of Emergency Prehospital Care – participated in the 'KIDS SAVE LIVES' movement: in Thessaloniki, 300 educated school children demonstrated in public how to perform cardiopulmonary resuscitation (https://m.youtube.com/watch?v=78AhihA9uHE)
	The European Resuscitation Council published the 'KIDS SAVE LIVES' position statement,[18] which has now been translated into 12 languages and is available on the European Resuscitation Council website. This statement demonstrates and explains the 10 fundamental principles of school children education in resuscitation
	The Italian, German and European Resuscitation Councils published the 'KIDS SAVE LIVES' video – Saving a life is a child's play, where the 10 principles of the European Resuscitation Council Position Statement are presented; this video is freely available and can and should be shared on websites, social media and other platforms and places (https://www.youtube.com/watch?v=0Yf4umHnD3c
	The European Society of Anaesthesiology supported the 'KIDS SAVE LIVES' initiative by publishing the European Resuscitation Council Position Statement on its website (http://newsletter.esahq.org/kids-save-lives-erc-position-statement-on-school-childrens-education-in-cpr-hands-that-help-training-children-is-training-for-life/)

Copyright © European Society of Anaesthesiology. Unauthorized reproduction of this article is prohibited.

	The European, Italian and German Resuscitation Councils – under the umbrella of the 'ERC Research NET' – performed a detailed survey on school children education in resuscitation in 34 European countries and published the results[12]
	The Italian Resuscitation Council developed an App entitled 'a breath-taking picnic' for 6 to 8-year-old children to show them how to perform resuscitation. With the help of other European national resuscitation councils, this App has been translated into Dutch, French and German (https://www.youtube.com/watch?v=UYlvdUcGjz0)
	The Romanian Health Minister supported the worldwide 'KIDS SAVE LIVES' initiative at the WHO
	In Italy, 2500 school children were trained in resuscitation and certified in Basil Life Support within the 'KIDS SAVE LIVES' activities during the annual congress of the Italian Resuscitation Council in Milan
	In Germany, and under the patronage of the German Health Minister, a National Initiative was founded (Nationales Aktionsbündnis Wiederbelebung) with the goal to educate school children and other lay people in resuscitation, and to increase the lay resuscitation rates in Germany to more than 50% by 2020. This National Initiative is supported by many organisations and specialties, and it was initiated during an event with 100 school children in front of the Brandenburger Tor in Berlin (www.wiederbelebung.de)
	Guinness World record in resuscitation was achieved by the University Hospital of Cologne, Germany – people from 74 different countries successfully performed resuscitation on a manikin in the attempt 'Most Nationalities in a CPR Relay' (https://youtu.be/83vCRWvw_lY)
	The 'European Restart a Heart Day' 2016 of the European Resuscitation Council – with activities and events by National Resuscitation Councils in more than 20 European countries – had the motto 'KIDS SAVE LIVES' (www.erc.edu)
	In Poland, close to 90 000 children were registered for the 'European Restart a Heart Day' event (http://www.wosp.org.pl/uczymy-ratowac/rekord)
	In the United Kingdom, the Resuscitation Council led a partnership with British Heart Foundation, St. John, British Red Cross and all ambulance trusts that trained 150 581 school children in resuscitation on the 'European Restart a Heart Day' of the European Resuscitation Council (https://www.resus.org.uk/events/rsah/)
And what is in 2017?	The European Resuscitation Congress 'Resuscitation 2017' of the European Resuscitation Council will be held on 28 to 30 September in Freiburg im Breisgau in Germany. On Thursday, 28 September the Germany Resuscitation Council will organise a big event with 'KIDS SAVE LIVES' during its German part of the congress (www.grc-org.de)

Adapted with permission.[13]

methods available to educate school children in resuscitation[14–25]:

1. Small and relatively cheap manikins that can also be taken home by the school children (school children as multipliers);
2. 'High-fidelity' manikins with feedback systems for group education;
3. Serious games and apps dedicated to school children;
4. School children education by medical personnel (doctors, nurses and paramedics);
5. School children education by educated school teachers;
6. School children education by other school children (peers)

The focus of the first steps of school children education in resuscitation is on chest compression resuscitation only (hands only).[19] In case of out-of-hospital cardiac arrest, 'hands only' resuscitation is sufficient in most adult patients until arrival of the emergency medical service. This is because following sudden cardiac arrest there is still remaining oxygen in the blood and in the whole body outside the brain. Usually, we do not train ventilation or the use of automated external defibrillators before the age of 16 to 18 years.[18]

What is most important?

It is well known that early commencement of resuscitation by laypersons is the most effective way to increase survival and improve neurological outcome following out-of-hospital cardiac arrest.[24–28] Education of school children and using them as multipliers plays a central role in increasing lay resuscitation rates and, thus, survival.[18] Therefore, we suggest implementation of mandatory education of school children in resuscitation nationwide and to support and secure this by national law.

Until this important goal is reached – which will save hundreds of thousands of lives annually – we all have to do our part. Society conferences are an excellent forum to spread the message and also to organise mass training events. Please, just start, help others and you will see it is effective – and it is also a lot of fun.

Further information, videos, presentations, curricula and concepts on school children education in resuscitation can be found here:

www.erc.edu

https://kids-save-lives.net/

www.grc-org.de

https://www.ircouncil.it/

www.einlebenretten.de

www.wiederbelebung.de

www.lifesaver.org.uk

http://www.wosp.org.pl/uczymy-ratowac/rekord

https://www.youtube.com/watch?v=0Yf4umHnD3c

https://www.youtube.com/watch?v=UYlvdUcGjz0

https://www.youtube.com/watch?v=EDp4krk2–M

Acknowledgements related to this article

Assistance with the Editorial: none.

Financial support and sponsorship: we cordially thank all colleagues, ministers, politicians, teachers, women and men, children, organizations, medical societies and business entities who have supported and will support the very important and positive impact of our 'KIDS SAVE LIVES' initiative in Europe and in other parts of the world. BWB is supported by the ERC Research NET.

Copyright © European Society of Anaesthesiology. Unauthorized reproduction of this article is prohibited.

Conflicts of interest: BWB is European Resuscitation Council (ERC) Board Director Science and Research; has received Speakers honorarium from Medupdate, FoMF, Baxalta, Bayer Vital, Bard; is Chairman of the German Resuscitation Council (GRC); is a Board Member of the German Society of Interdisciplinary Intensive Care and Emergency Medicine (DIVI); and is an Associated Editor of Resuscitation. FS is Chairman of the Italian Resuscitation Council (IRC). AL is Honorary Secretary of the Resuscitation Council (UK). FL is Board Member of Global Resuscitation Alliance, and Board member of Danish Resuscitation Council, and has received unrestricted research grants from the Danish TrygFonden and The Laerdal Foundation. MG is ERC Board Director of External Affairs and a board member of the Cyprus Resuscitation Council (CyRC).

Comment from the Editor: this Editorial was checked by the editors but was not sent for external peer review. BWB is an Associate Editor of the *European Journal of Anaesthesiology*.

References

1 Mozaffarian D, Benjamin EJ, Go AS, *et al.*, Writing Group Members, American Heart Association Statistics Committee; Stroke Statistics Subcommittee. Executive summary: heart disease and stroke statistics – 2016 update: a report from the American Heart Association. *Circulation* 2016; **133**:447–454.
2 Strategies to Improve Cardiac Arrest Survival. Available at: http://www.nap.edu/catalog/21723/strategies-to-improve-cardiac-arrest-survival-a-time-toact - [Accessed 23 June 2017]
3 Weisfeldt ML, Everson-Stewart S, Sitlani C, *et al.*, Resuscitation Outcomes Consortium Investigators. Ventricular tachyarrhythmias after cardiac arrest in public versus at home. *N Engl J Med* 2011; **364**:313–321.
4 Gräsner JT, Lefering R, Koster RW, *et al.*, EuReCa ONE Collaborators. EuReCa ONE-27 Nations, ONE Europe, ONE registry: a prospective one month analysis of out-of-hospital cardiac arrest outcomes in 27 countries in Europe. *Resuscitation* 2016; **105**:188–195.
5 Kragholm K, Wissenberg M, Mortensen RN, *et al.* Bystander efforts and 1-year outcomes in out-of-hospital cardiac arrest. *N Engl J Med* 2017; **376**:1737–1747.
6 Kragholm K, Wissenberg M, Mortensen RN, *et al.* Return to work in out-of-hospital cardiac arrest survivors: a nationwide register-based follow-up study. *Circulation* 2015; **131**:1682–1690.
7 Malta Hansen C, Zinckernagel L, Kjær Ersbøll A, *et al.* Cardiopulmonary resuscitation training in schools following eight years of mandating legislation in Denmark: a nationwide survey. *J Am Heart Assoc* 2017; **14**:6.
8 http://www.resuscitationacademy.org/– [Accessed 4 July 2017]
9 Böttiger BW. The new European Resuscitation Council guidelines on cardiopulmonary resuscitation and post-resuscitation care: great opportunities for anaesthesiologists: focus on lay people, hospitals and prognostication. *Eur J Anaesthesiol* 2016; **33**:701–704.
10 Böttiger BW, Semeraro F, Wingen S. 'Kids save lives': educating schoolchildren in cardiopulmonary resuscitation: a civic duty that needs further support for implementation!. *J Am Heart Assoc* 2017; **6.**
11 Böttiger BW. 'A time to act': anaesthesiologists in resuscitation help save 200,000 lives per year worldwide: school children, lay resuscitation, telephone-CPR, IOM and more. *Eur J Anaesthesiol* 2015; **32**:825–827.
12 Semeraro F, Wingen S, Schroeder DC, *et al.* Kids save lives implementation in Europe: a survey through the ERC research NET. *Resuscitation* 2016; **107**:e7–e9.
13 Böttiger BW, Semeraro F, Altemeyer KH, *et al.* Kids save lives: Schülerausbildung in Wiederbelebung. Eine Erfolgsgeschichte für Deutschland und die Welt. *Notfall Rettungsmed* 2017; **20**:91–96.
14 Bohn A, Lukas RP, Breckwoldt J, *et al.* 'Kids save lives': why schoolchildren should train in cardiopulmonary resuscitation. *Curr Opin Crit Care* 2015; **21**:220–225.
15 Cave DM, Aufderheide TP, Beeson J, *et al.*, American Heart Association Emergency Cardiovascular Care Committee; Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation; Council on Cardiovascular Diseases in the Young; Council on Cardiovascular Nursing; Council on Clinical Cardiology, and Advocacy Coordinating Committee. Importance and implementation of training in cardiopulmonary resuscitation and automated external defibrillation in schools: a science advisory from the American Heart Association. *Circulation* 2011; **123**:691–706.
16 Böttiger BW, Van Aken H. Training children in cardiopulmonary resuscitation worldwide. *Lancet* 2015; **385**:2353.
17 Böttiger BW, Van Aken H. Kids save lives: training school children in cardiopulmonary resuscitation worldwide is now endorsed by the World Health Organization (WHO). *Resuscitation* 2015; **94**:A5–A7.
18 Böttiger BW, Bossaert LL, Castrén M, *et al.*, Board of European Resuscitation Council (ERC). Kids save lives: ERC position statement on school children education in CPR: 'hands that help: training children is training for life'. *Resuscitation* 2016; **105**:A1–A3.
19 German Resuscitation Council. Recommended curriculum to teach and train resuscitation to school children in Germany. German Resuscitation Council; 2012. http://www.grc-org.de/reanimationsunterricht [Accessed 23 June 2017]
20 De Buck E, Van Remoortel H, Dieltjens T, *et al.* Evidence-based educational pathway for the integration of first aid training in school curricula. *Resuscitation* 2015; **94**:8–22.
21 Lukas RP, Van Aken H, Mölhoff T, *et al.* Kids save lives: a six-year longitudinal study of schoolchildren learning cardiopulmonary resuscitation: who should do the teaching and will the effects last? *Resuscitation* 2016; **101**:35–40.
22 Plant N, Taylor K. How best to teach CPR to schoolchildren: a systematic review. *Resuscitation* 2013; **84**:415–421.
23 Breckwoldt J, Beetz D, Schnitzer L, *et al.* Medical students teaching basic life support to school children as a required element of medical education: a randomised controlled study comparing three different approaches to fifth year medical training in emergency medicine. *Resuscitation* 2007; **74**:158–165.
24 Böttiger BW, Grabner C, Bauer H, *et al.* Long term outcome after out-of-hospital cardiac arrest with physician staffed emergency medical services: the Utstein style applied to a midsized urban/suburban area. *Heart* 1999; **82**:674–679.
25 Lockey AS, Barton K, Yoxall H. Opportunities and barriers to cardiopulmonary resuscitation training in English secondary schools. *Eur J Emerg Med* 2016; **23**:381–385.
26 Breckwoldt J, Schloesser S, Arntz HR. Perceptions of collapse and assessment of cardiac arrest by bystanders of out-of-hospital cardiac arrest (OOHCA). *Resuscitation* 2009; **80**:1108–1113.
27 Holmberg M, Holmberg S, Herlitz J. Effect of bystander cardiopulmonary resuscitation in out-of-hospital cardiac arrest patients in Sweden. *Resuscitation* 2000; **47**:59–70.
28 Wissenberg M, Lippert FK, Folke F, *et al.* Association of national initiatives to improve cardiac arrest management with rates of bystander intervention and patient survival after out-of-hospital cardiac arrest. *JAMA* 2013; **310**:1377–1384.

Copyright © European Society of Anaesthesiology. Unauthorized reproduction of this article is prohibited.