Northern Ireland Assembly

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The implementation of CPR and AED training in schools in Northern Ireland

The aim of this paper is to explore the proposed introduction of cardiopulmonary resuscitation (CPR) training and automatic external defibrillator (AED) awareness in schools in Northern Ireland. The paper examines the rationale for training school children in CPR and AED techniques as well as identifying facilitators and barriers to the implementation of this type of training in schools. The paper also reports on the Department of Education's decision to introduce mandatory CPR training in schools from 2022/23, and considers proposals to legislate for CPR training in schools in Northern Ireland.

1 Sudden Cardiac Arrest and the role of bystander CPR

A cardiac arrest occurs when a person's heart suddenly stops pumping blood around the body which in turn leads to the brain being starved of oxygen. Casualties become unconscious and lose a pulse within seconds. Unless attended to immediately the chances of survival are severely diminished – for every minute that passes without treatment, the chances of survival decrease by approximately 10%.[1]

In the UK, most cardiac arrests occur in the home (72%) or a workplace (15%). These incidences are described as of out-of-hospital cardiac arrests (OHCA). The rate of OHCA arrests in the UK is approximately 55 per 100,000 inhabitants.[2] Most of those occur in adults (98%), amongst whom one third (33%) are aged 15-64 years. Currently fewer than one in ten (9%) people survive to hospital discharge following an OHCA.[3] In Northern Ireland, approximately 1,500 Cardiac Arrests happen in the out of hospital environment every year with survival rates sitting at around 10%.[4]

1.1 Bystander CPR and the 'chain of survival'

When compared with the performance reported by other healthcare systems where OHCA survival rates include 21% (Seattle, USA), 21% (Netherlands), and 25% (Norway) it is apparent that better survival rates are possible than those currently being reported across the UK. Research has demonstrated that if overall UK survival rates could be improved to match Norway's for example, a further 3,250 lives could be saved annually.[5]

An affected person's best chance of surviving sudden OHCA is to receive immediate Cardiopulmonary Resuscitation (CPR). CPR is an emergency procedure that combines chest compressions and in some circumstances the use of an Automated External Defibrillator (AED) to a person in cardiac arrest. When professional emergency medical services arrive after cardiac arrest—which can be after 8–12 min or more—the brain has already started to die. Thus, a time window for lay bystander resuscitation exists.[6]

Bystander CPR is part of what is called the 'chain of survival' when someone's heart has stopped beating and they have stopped breathing or breathing normally. The 'chain of survival' which is set out in figure 1 includes:

- Early recognition and call for help;
- Early bystander CPR;

[1] Cardiac Arrest. British Heart Foundation Website. Online. Available at: https://www.bhf.org.uk/informationsupport/conditions/cardiac-arrest
[2] Perkins, GD; Nolan JP; Soar, J et. al (2021) Epidemiology of cardiac arrest Guidelines. Resuscitation Council UK
[3] Cited directly above
[4] Ruane, C (2021) NIAS launches "Community of Lifesavers Education Programme" Northern Ireland Ambulance Service Health and Social Care Trust Website. Online. Available at: http://www.nias.hscni.net/4039-2/
[5] National Confidential Enquiry into Patient Outcome and Death (2021) Time Matters. London.
[6] We applaud this statement urging all schools to teach CPR Sudden Cardiac Death. Cardiac Arrest Foundation Website, 2015. Online. Available at: https://www.sca-aware.org/index.php/blog/scafoundation/we-applaud-this-statement-urging-all-schools-to-teach-cpr

- Early defibrillation; and
- Early advanced life support and standardised post-resuscitation care.

Figure 1: chain of survival[7]

Lay resuscitation can fill the gap between cardiac arrest and arrival of emergency medical services in most cases. Several studies have indicated that bystander CPR, and early defibrillation are associated with increased survival rates of OHCA patients.[8] In fact, initiation of resuscitation by a lay bystander is associated with a two to four times increase in neurologically intact survival.[9]

1.2 The influence of training on bystander CPR rates

Bystander CPR rates vary between European countries. A recent study estimates an overall bystander CPR rate of 58% across Europe, ranging from 13% in Serbia to 83% in Norway.[10] In the UK, a survey carried out by the University of Warwick Out of Hospital Cardiac Arrest Outcome (OHCAO) Registry team found that nearly a third of UK adults (30%) wouldn't perform CPR if they saw someone suffer a cardiac arrest.[11]

Public hesitancy has been noted as an issue with regard to performing CPR. A key reason for this hesitancy is fear of "causing additional injuries with lack of appropriate

[7]Nolan, J; Soar, J; Eikeland, E (2006) The chain of survival. *Image in resuscitation* Volume 71, Issue 3, P270-271.
[8] Song, J., Guo, W., Lu, X. et al. (2018) The effect of bystander cardiopulmonary resuscitation on the survival of out-of-hospital cardiac arrests: a systematic review and meta-analysis. *Scand J Trauma Resusc Emerg Med* 26, 86. ***and*** Vaillancourt C, Stiell IG, Wells GA. Understanding and improving low bystander CPR rates: a systematic review of the literature. *CJEM*. 2008;10(1):51-65.
[9] Böttiger, BW. and Van Haken, h. (2015) Training children in cardiopulmonary resuscitation worldwide. *The Lancet*. Volume 385, Issue 9985, P2353
[10] Gräsner JT, Wnent J, Herlitz J, et al. (2020) Survival after out-of-hospital cardiac arrest in Europe - Results of the EuReCa TWO study. *Resuscitation.* 1; 148:218-226.
[11] Attitudes to CPR survey (2021) YouGov for University of Warwick, 2021. Online. Available at: https://warwick.ac.uk/fac/sci/med/research/ctu/trials/ohcao/publications/surveys/2021_attitudes_to_cpr_survey_ohcao_short.pdf

skills". Additionally, it was found that the likelihood of someone receiving CPR was influenced by the cardiac arrest victim's age and gender.[12]

Increasing the proportion of the population trained in CPR has been associated with increased bystander CPR and corresponding survival rates. In a recent study in King County, Washington, USA, 79% of the population were found to have attended CPR training, King County also reports one of the highest OHCA survival rates in the world.[13]

In Denmark in 2005, a low frequency of bystander CPR (<20%) and low 30-day survival (<6%) in incidences of OHCA were identified, which led to several national initiatives to strengthen both bystander resuscitation attempts and advanced medical care. Since 2006, a national school CPR training program has been underway, sponsored by Trygfonden, a national Danish foundation. Furthermore, learner drivers are required to complete a course in CPR training to acquire a license. These initiatives were complemented by 17,000 AED's placed in the community. The National Danish Out-of-Hospital Cardiac Registry documented a tripling of survival in the ten years after the implementation of these and other measures including improvements in cardiac treatment and Emergency Medical Training technician (EMT) training.[14]

Due to the co-occurrence of other initiatives to improve outcome after cardiac arrest in Denmark, a causal relationship between bystander CPR and survival cannot be confirmed, however, it does suggest that targeted CPR training to increase the bystander CPR rate can have a substantial effect on improving the survival rates after OHCA.

In the United Kingdom, like many countries, there are several initiatives that aim to increase numbers in the general population trained in CPR and to improve access to AED's. The British Heart Foundation (BHF) are central to these efforts with their Heartstart training courses, Call Push Rescue training initiative, and the national Restart a Heart campaign. The positive impact of these initiatives is that rates of trained members of the public have improved over the last number of years.[15]

In order to further increase rates of the population trained in CPR, policy makers are increasingly focused on the introduction of mandatory CPR training courses in the school setting. CPR training in school is mandatory in Norway and Sweden, both of whom have some of the highest rates of bystander CPR in Europe. Mandatory CPR

[12] Becker TK, Gul SS, Cohen SA On behalf of the Florida Cardiac Arrest Resource Team, et al (2019) Public perception towards bystander cardiopulmonary resuscitation *Emergency Medicine Journal*. 36:660-665.

[13] Hawkes CA, Brown TP, Booth S, et al (2017) Attitudes to Cardiopulmonary Resuscitation and Defibrillator Use: A Survey of UK Adults in 2017. J Am Heart Assoc. Apr 2;8(7).

[14] Improving Survival from Out-of-Hospital Cardiac Arrest. Acting on the Call. 2018 Update from the Global Resuscitation Alliance Including 27 Case Reports. Online. Available at: https://www.globalresuscitationalliance.org/wp-content/pdf/acting_on_the_call.pdf **and** Wissenberg M, Lippert FK, Folke F, Weeke P, et al. (2013) Association of national initiatives to improve cardiac arrest management with rates of bystander intervention and patient survival after out- of- hospital cardiac arrest. *JAMA*; 310:1377–1384.

[15] The National Confidential Enquiry into Patient Outcome and Death. Time Matters. 2021. London

training in schools had also been approved in 39 American states, Canada, several European countries and in Scotland, Wales and England.[16]

Although there are no longitudinal studies that assess the impact of school-based CPR training on the probability that students will provide CPR as adults, evidence demonstrates that training—undertaken at any point—increases the likelihood that a by-stander will provide appropriate care when faced with an OHCA.[17]

2 Teaching CPR in Schools

There is widespread support for the inclusion of classes in basic CPR in the school curriculum; the European Resuscitation Council have endorsed the policy since 1992.[18]

There is also a wide range of evidence that concludes that children and young people are able to reliably learn and deliver first aid.[19] Even younger children (5-7 years), after undertaking an age appropriate training programme, have shown capacity to give basic first aid and retain the knowledge learnt.[20]

Policy makers have also offered a number of reasons why it is important to teach children first aid and CPR. Primarily, that it increases the number of trained bystanders available to assist in emergency situations but also:

- Children and young people can be a catalyst for extending first aid to the wider community. A number of studies demonstrate positive multiplier effects from school students given instructions and manikins to take home to, in turn, teach CPR to family and friends;[21]
- Teaching first aid to children in schools can offer an opportunity to reach and include all social classes and ethnic groups;[22]
- First aid training can contribute to increased confidence and self-esteem in young people and a sense of contribution to the community; [23] and

[16] Malta Hansen, C., Zinckernagel, L., Ersbøll, A.K., et al (2017) Cardiopulmonary Resuscitation Training in Schools Following 8 Years of Mandating Legislation in Denmark: A Nationwide Survey. *Journal of the American Heart Association: Cardiovascular and Cerebrovascular Disease*, 6.

[17] Tanigawa K, Iwami T, Nishiyama C, Nonogi H, Kawamura T. Are trained individuals more likely to perform bystander CPR? An observational study. *Resuscitation*. 2011 May;82(5):523-8

[18] Basic life support working party of the European Resuscitation Council Guidelines for basic life support. *Resuscitation.* 1992; 24: 103-110

[19] He Z, Wynn P, Kendrick D (2014) Non-resuscitative first-aid training for children and laypeople: a systematic review. *Emergency Medicine Journal;* 31:763-768.

[20]Plischewski, Henning & Kucirkova, Natalia & Haug, Anda & Tanum, Iselin & Lea, Silje. (2021). Children save lives: evaluation of a first aid training in Norwegian kindergartens. *European Early Childhood Education Research Journal.* 10.1080/1350293X.2021.1985554.

[21] J. Stroobants, K. Monsieurs, B. Devriendt, C. Dreezen, P. Vets, and P. Mols (2014) Schoolchildren as BLS instructors for relatives and friends: impact on attitude towards bystander CPR. *Resuscitation*, vol. 85, no. 12, pp. 1769–1774.

[22] Wilks J, Pendergast D (2017) Skills for life: First aid and cardiopulmonary resuscitation in schools. *Health Education Journal*. 76(8):1009-1023.

[23]Bollig G.; Wahl H.A.; Svendsen M.V. (2009) Primary school children are able to perform basic life-saving first aid measures. *Resuscitation.* 80: 689-692

- First aid training may also assist young people to consider risks and adopt a healthier lifestyle. The International Federation of Red Cross and Red Crescent Societies (IFSRC) points to binge drinking and drug use as specific areas where teenagers can better understand risks and assist friends who get into trouble.[24]

In July 2015, a statement entitled *'Kids Save Lives – Training School Children in Cardiopulmonary Resuscitation Worldwide'* was jointly issued by the European Patient Safety Foundation, the European Resuscitation Council, the International Liaison Committee on Resuscitation and the World Federation of Societies of Anaesthesiologists.[25]

To address the global issue of sudden cardiac death, the statement recommends educating school children in resuscitation from the age of 12 years or earlier for 2 hours per year. The Kids Save Lives statement has been endorsed by the WHO and promoted widely in medical literature.[26]

However, while there is general agreement on the merit of teaching CPR to all school children, there is considerable debate about the precise syllabus, the optimal age to start, the educational methods used and who should provide the instruction. Furthermore, while teachers themselves support the concept of teaching CPR in schools, barriers that prevent this include finding time in a busy curriculum, funding the classes and equipment, scheduling instructors and in the case where classes are optional.[27]

Conversely, factors associated with effective CPR training in schools include the presence of a CPR training coordinator at the school, feeling competent to train students in CPR, having easy access to good training material, believing other schools are conducting training, and awareness of mandating legislation.[28]

The subsequent paragraphs further outline the key considerations related to the provision of effective CPR training in schools, as identified through the literature.

2.1 The role of mandatory training

Along with Norway, Denmark was one of the first countries to introduce legislation on CPR training in schools, stating that students should receive training before graduating from secondary school.[29]

[24] Everuzzi B, Buckley L, Sheehan M. (2016) School-based first aid training programs: a systematic review. *J Sch Health*. 86: 266-272

[25] Böttiger BW and Van Aken H (2015a) Kids save lives: Training school children in cardiopulmonary resuscitation worldwide is now endorsed by the World Health Organization (WHO). *Resuscitation* 94: A5–A7.

[26] Wilks J, Pendergast D (2017) Skills for life: First aid and cardiopulmonary resuscitation in schools. *Health Education Journal*. 76(8):1009-1023.

[27] Lafferty C, Larsen PD, Galletly D. (2003) Resuscitation teaching in New Zealand schools. *N Z Med J*. 2003; 116: U582.

[28] Malta Hansen C, Zinckernagel L, Ersbøll AK, et al. (2017) Cardiopulmonary resuscitation training in schools following 8 years of mandating legislation in Denmark: a nationwide survey. *Am Heart Assoc*; 6: e004128

[29] Zinckernagel L, Malta Hansen C, Rod MH, et al (2016) What are the barriers to implementation of cardiopulmonary

However, Danish legislation does not provide a framework for how CPR training should be implemented: who should conduct training, requirements for proficiency level of instructors, training material, length of training session or part of the school curriculum in which CPR training should be integrated.

Furthermore, little is known about how mandating legislation has translated into implementation of CPR training in Danish schools, including training rates as well as any barriers and facilitators to its introduction.

Two studies in Washington State, USA, and Toronto, Canada, found that despite mandating legislation, low rates of implementation of CPR training in schools were observed with only about half of the schools included in both studies found to be training students. School leaders cited a lack of time, funds, curriculum pressure, training materials and teacher training as barriers. The authors of both studies suggest that mandating CPR training in schools without providing corresponding resources and support in unlikely to lead to the systematic introduction of CPR training in schools or the expected public health benefits.[30] [31]

A 2017 study from Denmark found that 60% of ninth-grade classes had not received CPR training or AED training before graduating from middle school as stipulated in the legislation. School leaders cited barriers similar to those identified by the American and Canadian studies above. These findings suggest that barriers need to be addressed in parallel to promoting legislation.[32]

2.2 Time constraints

For many schools, the curriculum is already tightly packed and finding the time to add another subject as a permanent inclusion can be a barrier to introducing first aid.

To address this issue, in 2011 the British Red Cross designed a programme for primary school children requiring only 2 hours of teaching time. Evaluation showed that all age groups (5–6, 7–8 and 9–10 years) retained first aid skills and knowledge to a large extent, whether it was to put an unconscious person on their side, apply pressure to a severe bleed or phone 999.[33]

Other studies have suggested that first aid and CPR can be offered in schools with a similarly small investment in time. It is widely suggested that CPR can be taught to students in a 2-hour programme once a year, a position supported and endorsed by

resuscitation training in secondary schools? A qualitative study. *BMJ Open*; 6: e010481

[30] Salvatierra GG, Palazzo SJ, Emery A. (2017) High School CPR/AED Training in Washington State. *Public Health Nurs.* 34(3):238-244

[31] Allan KS, Jefkins TT, O'Neil E, Dorian P, Lin S. (2021) Mandating Training Is Not Enough: The State of Cardiopulmonary Resuscitation and Automated External Defibrillator Training in Ontario Schools. *Canadian Journal of Cardiology Open.* 12;3(6):822-826.

[32] Malta Hansen, C., Zinckernagel, L., Ersbøll, A.K., et al (2017) Cardiopulmonary Resuscitation Training in Schools Following 8 Years of Mandating Legislation in Denmark: A Nationwide Survey. Journal of the American Heart Association: Cardiovascular and Cerebrovascular Disease, 6. No 3.

[33] British Red Cross (2011) Right Place, Right Time: First Aid Education in Primary Schools.

the World Health Organization.[34] An earlier 2009 study also found that children as young as 10–11 years are capable of performing effective CPR after a single, 2-hour training session given in school.[35] Finally, a study among 8th grade students in America found that 'Proficiency' in CPR skills was achieved by 87.5% of 12–14-year olds after a 50-min condensed training programme.[36]

However, it should be noted that one of the complications in comparing the times needed for teaching programmes is the difference between CPR-only programmes and those involving a range of elements of first aid, with or without CPR.[37]

Schools provide an excellent platform for repeated training opportunities, and repeated training has been associated with better retention of resuscitation skills[38]. Studies looking at retention between 3 to 12 months after training demonstrate an expected improvement in knowledge and skills after training, which is then followed by a deterioration of skills following the initial training.[39] As a result refresher training has been identified as an important part of CPR programmes in schools but does involve an additional time commitment.

While the optimal frequency of refresher training is unknown, in a 4-year study, groups receiving annual or biannual refresher training were assessed annually (prior to repeat training and a minimum of 7 months after the last training session). There was no apparent advantage in bi-annual training, and the authors noted complaints of boredom at such frequent training and decreased motivation.[40]

2.3 Course content

The International Federation of Red Cross and Red Crescent Societies guidance regarding the content of CPR training is to:

> *'Restrict content to what is necessary and relevant for the learner – and vary content according to their needs'*[41]

Commentators have highlighted that particular attention should be paid to ensuring the content is relevant to the target group when implementing first aid training programmes

[34] Böttiger BW and Van Aken H (2015a) Kids save lives: Training school children in cardiopulmonary resuscitation worldwide is now endorsed by the World Health Organization (WHO). *Resuscitation* 94: A5–A7.
[35] Bollig G, Wahl HA and Svendsen MV (2009) Primary school children are able to perform basic life-saving first aid measures. *Resuscitation* 80: 689–692.
[36] Kelley J.; Richman P.B.; Ewy G.A. et al (2006) Eighth grade students become proficient at CPR and use of an AED following a condensed training programme. *Resuscitation*. 71: 229-236
[37] Wilks, J and Pendergast, D (2017) Skills for life: First aid and cardiopulmonary resuscitation in schools *Health Education Journal* 76(11)
[38] Plant, N and Taylor, Katherine (2013) How best to teach CPR to schoolchildren: A systematic review. *Resuscitation* 84; 415-421
[39] Christenson, J., Nafziger, S., Compton, S., Vijayaraghavan, K., Slater, B., Ledingham, R., Powell, J., McBurnie, M. A., & PAD Investigators (2007). The effect of time on CPR and automated external defibrillator skills in the Public Access Defibrillation Trial. *Resuscitation*, *74*(1), 52–62.
[40] Bohn A.; Van Aken H.K.; Mollhoff T. et al. (2012) Teaching resuscitation in schools: annual tuition by trained teachers is effective starting at age 10. A four-year prospective cohort study. *Resuscitation*. 83: 619-625
[41] International Federation of Red Cross and Red Crescent Societies (IFRC) (2016) International First Aid and Resuscitation Guidelines 2016. Geneva: IFRC

in school. The ideal situation is that students are introduced to first aid and CPR early in their school lives and taught material incrementally in a manner appropriate to their developmental level. [42]

For example, students aged 7–8 years could be taught how to recognise and treat a skin wound, treat a burn and a nose bleed, while students age 11–12 years should know how to administer first aid correctly in the event of a choking incident and know how to apply a compression bandage.[43] At age 13–14 years, students should know how to correctly resuscitate an unconscious victim who is not breathing normally and correctly treat a minor injury to bones, muscles or joints.[44]

It has also been suggested that physical factors play a role in appropriate course content. For example child age and gender have been linked to ability to perform mouth to mouth ventilation (MMV), with older children and children with a greater BMI providing greater tidal volumes (the volume of air moved into or out of the lungs during a normal breath).[45] [46] Studies also demonstrate significant correlations between weight, BMI, height and gender on chest compression depth (CCD).[47] One study identified a BMI > 15 in 9–18-year olds as the threshold above which adequate CCD could be provided.[48]

However, in a 4-year longitudinal study the difference in CCD between children starting regular CPR training at 10 versus 13 years of age was significantly in favour of older children at 1 year, but after 3 and 4 years (the younger children now 13–14 years old) those starting training earlier in life were performing significantly deeper compressions.[49]

2.4 Training delivery methods

Several class formats have been employed in school CPR programmes including self-instruction, instructor led classes, video or DVD instruction and interactive computer training. Not all have employed practical training on a mannikin although learning does appear to better when mannikin practice is an integral part of the class. For example, research indicates that while standalone theoretical training could reduce time and resources needed to introducing CPR training in schools, children receiving only

[42] St John Ambulance Australia (2014) Students First: Review of the Australian Curriculum (Submission to Professor K Wiltshire AO and Dr A Donnelly). Canberra, ACT, Australia: St John Ambulance Australia.
[43] De Buck E, Van Remoortel H and Dieltjens T (2015) Evidence-based educational pathway for the integration of first aid training in school curricula. Resuscitation 94: 8–22.
[44] Cited directly above
[45] Sherif C.; Erdös J.; Sohm M. et al. Effectiveness of mouth-to-mouth resuscitation performed by young adolescents on a mannequin. Am J Emerg Med. 2005; 23: 51-54
[46] Fleischhackl R.; Nuernberger A.; Sterz F. et al. (2009) School children sufficiently apply life supporting first aid: a prospective investigation. *Crit Car*e 13(4): R127
[47] Jones I.; Whitfield R. ; Colquhoun M. ; Chamberlain D. ; Vetter N. ; and Newcombe R (2007) At what age can schoolchildren provide effective chest compressions? An observational study from the Heartstart UK Schools Training Programme. *BMJ* 334: 1201
[48] Fleischhackl R.; Nuernberger A.; Sterz F. et al. School children sufficiently apply life supporting first aid: a prospective investigation. Crit Care. 2009; 13
[49] Bohn A, Van Aken HK, Möllhoff T et al. (2012) Teaching resuscitation in schools: annual tuition by trained teachers is effective starting at age 10. A four-year prospective cohort study. *Resuscitation.* 83: 619-625

theoretical training perform poorly on skills testing. In one study with 8–11-year olds those who received only theoretical training performed significantly less well on Multiple Choice Questions than those also receiving practical training.[50]

Similarly, in a study of high school students, two instructional methods; interactive-computer training and interactive-computer training plus instructor-led (hands-on) practice were compared. Students who received hands-on practice more successfully performed CPR actions than those in the computer programme only group. In the hands-on practice groups the scores for 3 of the measures ranged from 57 to 74%; they were 32 to 54% in the computer only group.[51]

There is general agreement on the value of incorporating both practical and didactic components in both the delivery of material and in facilitating the retention of knowledge.

2.5 Does the type of trainer matter?

Generally, CPR instructors in schools are either external trainers (volunteer first aid personnel, members of the emergency services, charitable organisations) or schoolteachers.[52] Available research does not indicate any greater success of one over the other with regard to accumulation and retention of skills by pupils.[53] A 6-year longitudinal study compared schoolteachers and emergency physicians as resuscitation trainers for schoolchildren. They found that trained teachers can provide adequate resuscitation training in schools and that healthcare professionals were not mandatory for CPR training.[54] The benefits of schoolteacher trainers include less use of external trainers which may reduce cost and scheduling difficulties. Furthermore, teacher training provides a long-term investment as they will train successive student groups.[55]

Teachers are willing instructors as long as they receive appropriate training, however, a number of studies report that some teachers do not feel competent to train students.[56] This hesitancy is based on the perception that an extraordinary level of skills are required to teach the subject[57]. Some school leadership and teachers express the attitude that CPR training is unlike other subjects because it is a matter of life and death, and teaching students correct and adequate CPR skills was thus perceived to

[50] Lubrano R., Romero S., Scoppi P et al. (2005) How to become an under 11 rescuer: a practical method to teach first aid to primary schoolchildren. *Resuscitation*; 64: 303-307

[51] Reder S., Cummings P., Quan L. (2006) Comparison of three instructional methods for teaching cardiopulmonary resuscitation and use of an automatic external defibrillator to high school students. *Resuscitation* 69: 443-453

[52] Learning CPR at school–Everyone should do it. *Resuscitation* 83 543–544

[53] Reveruzzi B, Buckley L, Sheehan M. (2016) School-Based First Aid Training Programs: A Systematic Review. *J Sch Health* 86(4):266-72

[54] Lukas RP, Van Aken H, Mölhoff T, et al. (2016) Kids save lives: A six-year longitudinal study of school-children learning cardiopulmonary resuscitation: Who should do the teaching and will the effects last? *Resuscitation* 101: 35–40

[55] Reveruzzi B, Buckley L, Sheehan M. (2016) School-Based First Aid Training Programs: A Systematic Review. *J Sch Health* 86(4):266-72

[56] Mpotos N, Vekeman E, Monsieurs K, Derese A, *Valcke M. Knowledge and willingness to teach cardiopulmonary resuscitation: a survey amongst 4273 teachers. Resuscitation.* 2013; 84:496–500.

[57] Zinckernagel L, Malta Hansen C, Rod MH, et al (2016) What are the barriers to implementation of cardiopulmonary resuscitation training in secondary schools? A qualitative study *BMJ Open*; 6

be of critical importance.[58] Teachers' CPR skills were therefore regarded as particularly important. For some, up-to-date CPR courses of a certain length (e.g., more than 4 h) are viewed as a prerequisite to train students.[59]

A Danish study reported that teachers who found it easy to acquire good training materials and felt competent to conduct CPR training were 2 and 3 times more likely to report that their class had completed CPR training. However, only 13.3% of teachers surveyed felt competent to conduct training, and only half the teachers found it easy to acquire good CPR training material.[60]

Furthermore, the study identified that CPR training was three times more likely to be completed if there was a CPR training coordinator at the school. Establishing a CPR training coordinator to ensure availability of CPR training material and teacher instructor skills may facilitate implementing a successful school CPR training programme.[61]

It has been suggested that training teachers to be CPR instructors during their initial teacher training, as is the case in Norway, could also build teachers confidence to deliver CPR training and reduce the costs associated with sending teachers on CPR training courses.

2.6 Cost

Lack of funding has been identified as a significant barrier to incorporating CPR training in schools.[62] In America, for example, despite existing mandates for CPR training in schools in 37 states, most of those states have not designated additional funds to support the training. Some states, such as Colorado and North Dakota, have established programs that reimburse the purchase of CPR and AED training equipment for schools.[63] As reported previously in this paper, a study of high schools in Washington found that approximately half of all schools were not carrying out CPR training despite a mandatory requirement to teach it. Reported barriers to implementation by the schools included cost and a lack of equipment.[64]

The available research indicates that legislation without resources and support will not ensure implementation of CPR/AED training in schools. Commentators have further highlighted that a clear delivery strategy for training pupils in CPR over their school

[58] Cited directly above
[59] Cited in footnote 57
[60] Malta Hansen, C., Zinckernagel, L., Ersbøll, A.K., et al (2017) Cardiopulmonary Resuscitation Training in Schools Following 8 Years of Mandating Legislation in Denmark: A Nationwide Survey. *Journal of the American Heart Association: Cardiovascular and Cerebrovascular Disease*, 6.
[61] Cited directly above
[62] Institute of Medicine (2015) Strategies to Improve Cardiac Arrest Survival: A Time to Act. Washington, DC: The National Academies Press
[63] As cited directly above
[64] Salvatierra GG, Palazzo SJ, Emery A. (2017) High School CPR/AED Training in Washington State. Public Health Nurs 34(3):238-24

career could assist with managing any financial burden through initiatives such as sharing the cost of equipment, trainers and implementation across schools.[65]

Moving learning out of the school and into the home by giving self-instruction kits or assigning computer-based training programmes as homework has also been suggested as a way to manage costs.[66] Conceivably, these methods would help to reduce the overall cost of delivering training by eliminating the cost of purchasing and maintaining CPR manikins, training teachers to become CPR instructors, or hiring an external company to provide training.[67] A further advantage of self-instruction kit training is that large numbers of children can be trained in this manner – over 54,000 in one Norwegian project. Another advantage is delivery of CPR training to adults or peers at home (a second tier). The same Norwegian study reported 2.9 and 3.8 persons trained per kit.[68]

However, more research is needed to assess whether they would result in pupils developing the same knowledge and skill as class-based programmes. Furthermore, the study did not include a cost appraisal of the project, and the purchase cost of the self-instruction kits themselves may impede uptake by schools.[69]

3 CPR education in schools across the UK

The UK Resuscitation Council recommends that all students across the UK should be taught CPR and awareness of AEDs.[70]

The UK government confirmed in January 2019 that CPR training was to be added to the national curriculum in England for students age 12+ from 2020 onwards. Administering CPR is now part of the wider compulsory health education classes that educate young people in key life skills. It states that pupils should know life-saving skills, including how to administer CPR and the purpose of defibrillators and when one might be needed.[71]

The Save a Life for Scotland campaign brought together partner agencies - including The British Heart Foundation, St Andrew's First Aid, the Royal Life Saving Society and the British Red Cross as well as public sector groups - to create learning resources to support the teaching of CPR across all ages and stages including schools. To support

[65] Plant, N and Taylor, Katherine (2013) How best to teach CPR to schoolchildren: A systematic review. *Resuscitation* 84; 415 421

[66] Everuzzi B, Buckley L, Sheehan M. (2016) School-based first aid training programs: a systematic review. *J Sch Health*. 86: 266-272 and Reder, R, Cummings, P, Quan, L (2006) Comparison of three instructional methods for teaching cardiopulmonary resuscitation and use of an automatic external defibrillator to high school students. *Resuscitation,* Volume 69, Issue 3, Pages 443-453

[67] Allan KS, Jefkins TT, O'Neil E, Dorian P, Lin S. (2021) Mandating Training Is Not Enough: The State of Cardiopulmonary Resuscitation and Automated External Defibrillator Training in Ontario Schools. *CJC Open*. 12;3(6):822-826.

[68] Lorem, T., Palm A., Wik L. (2008) Impact of a self-instruction CPR kit on 7th graders' and adults' skills and CPR performance. Resuscitation. 79: 103-108

[69] Plant, N and Taylor, K (2013) How best to teach CPR to schoolchildren: A systematic review. *Resuscitation* 84; 415 421

[70] Resuscitation Council UK Website. CPR in Schools. Online. Available at: https://www.resus.org.uk/public-resource/cpr-schools

[71] Cited directly above

the campaign, all 32 local authorities in Scotland have committed to introducing CPR lessons in all their secondary schools.[72]

In March 2021, the Curriculum and Assessment (Wales) Act 2021 (the Act) was passed in the Senedd. The Welsh Government agreed to include lifesaving skills in the statutory guidance as part of this process. This means CPR will be taught in Welsh schools from 2022[73].

There is limited information available across the three regions to indicate what, if any, funding is being provided to implement the training. With regard to guidance, Education Scotland have established an information hub that schools can access to plan their training.[74] The Department for Education in England has published guidance on how to plan CPR training into the curriculum and best practice with regard to training.[75] The Welsh government has not yet indicated whether guidance will be available to support the mandatory introduction of CPR training in 2022.

4 CPR training in Schools in Northern Ireland

Until recently there was no obligation on schools in Northern Ireland to teach CPR as part of the curriculum. However, a number of organisations have been offering support and resources for several years to schools who want to engage pupils in learning first aid and CPR. For example, a CPR training kit is available free to all post-primary schools through the BHF's Call Push Rescue programme which includes reusable inflatable manikins and practice-while you-watch DVDs. The charity has indicated that it provides training equipment to 65 per cent of eligible post primary schools in Northern Ireland via their programmes.[76] The UK Resuscitation Council, the Red Cross and St John Ambulance also offer a range of supports including lesson plans and resources.[77]

4.1 The Community of Lifesavers Education Programme

Recently, the Northern Ireland Ambulance Service (NIAS) launched the "Community of Lifesavers Education Programme". The programme is a joint initiative between NIAS, CCEA, the Northern Ireland Education Authority and the four teacher education universities in Northern Ireland. The purpose of the programme is to integrate a "train

[72] Save a Life for Scotland, Learning Resources, National Improvement Hub, Education Scotland Website. Available at: https://education.gov.scot/improvement/learning-resources/save-a-life

[73] Resuscitation Council UK Website. CPR in Schools. Online. Available at: https://www.resus.org.uk/public-resource/cpr-schools

[74] Save a life for Scotland, learning Resources, National Improvement Hub, Education Scotland Website. Available at: https://education.gov.scot/improvement/learning-resources/save-a-life

[75] Department for Education (2020) Guidance Teacher training: basic first aid. Practical materials for primary and secondary schools to use to train staff to teach about basic first aid. Online. Available at: https://www.gov.uk/government/publications/teacher-training-basic-first-aid

[76] Campaigning and influencing in Northern Ireland. British Heart Foundation website. Online. Available at: https://www.bhf.org.uk/what-we-do/in-your-area/northern-ireland/campaigning-and-influencing-in-northern-ireland

[77] Department of Education (2021) Letter to Principals about post-primary pupils having access to CPR training. Online. Available at: https://www.education-ni.gov.uk/sites/default/files/publications/education/Letter%20to%20School%20Principals%20-%20CPR%20at%20Key%20Stage%203%20-%2020%20September%202021.pdf

the trainer" model for Emergency Life Support, including CPR, into the teacher education curriculum.[78]

The aim of the partnership is to create and deliver "Lifesaver Ambassador" training to student teachers, whereby they will bring into the school environment, as newly qualified teachers, the skills necessary to deliver Emergency Life Support skills to their pupils. The training will be delivered to undergraduate and postgraduate students in Stranmillis University College, Queen's University Belfast, Ulster University and St Mary's University College.[79]

4.2 Introduction of CPR Training to the Key Stage 3 Curriculum

In September 2021, the Department of Education advised Schools that, from the 2022/23 academic year, they will be expected to deliver CPR training within the curriculum at Key Stage 3. The Department has further advised that CPR training should be delivered through Learning for Life and Work (LLW) where it is a statutory learning outcome that all pupils should 'develop an awareness of emergency first aid procedures'.[80]

LLW is considered the ideal context for learning first aid and CPR as it provides opportunities to develop practical knowledge alongside the skills and attributes necessary to put such knowledge into practice in a real-life emergency, for example, through development of self-confidence and empathy and learning to identify and manage risk.[81]

The Department of Education has indicated that it has commissioned CCEA and the Education Authority to develop and provide a range of resources and training during 2021/22 to support the universal roll-out of CPR training at Key Stage 3.[82] The Minister of Education Michelle McIlveen, stated that the Department will provide £70,000 of funding to support this work during the 2021/22 financial year and further funding in future years, as required.[83]

As yet, the Department has not specified the precise details regarding the content and procedure for the delivery of CPR training from 2022/23. Correspondence[84] to schools proposes that further information and guidance will be provided by the Department during the 2021/22 academic year to signpost the additional support and training available. RaISe has requested information from the Department on the nature of

[78]Ruane, Callain (2021) NIAS launches "Community of Lifesavers Education Programme". Northern Ireland Ambulance Service Health and Social Care Trust Website. Available at: http://www.nias.hscni.net/4039-2/

[79] Cited directly above

[80]Department of Education (2021) Letter to Principals about post-primary pupils having access to CPR training. Online. Available at: https://www.education-ni.gov.uk/sites/default/files/publications/education/Letter%20to%20School%20Principals%20-%20CPR%20at%20Key%20Stage%203%20-%2020%20September%202021.pdf

[81] Cited directly above

[82] Cited in footnote 80

[83]AIMS Official Report: Monday 08 November 2021, Northern Ireland Assembly. Available at: http://aims.niassembly.gov.uk/officialreport/report.aspx?&eveDate=2021/11/08&docID=356094#3724165

[84] Cited in footnote 80

training, guidance, and resources to support schools to deliver CPR training during 2021/22 and from 2022/23 onwards. Information will be shared with the Committee for Education once received.

In its correspondence to schools[85], the Department has made clear that it will consider CPR training an essential element of Key Stage 3 LLW provision from the 2022/23 academic year, and that this will be reflected within the Education and Training Inspectorate's safeguarding pro-forma. Schools are also advised that they may wish to consider providing refresher training at Key Stage 4 and post-16. RaISe has requested further information on the arrangements for monitoring schools' delivery of CPR training from 2022/23 onwards. Further information will be shared with the Committee once received.

5 Legislating for CPR training in schools in Northern Ireland

The Education (Curriculum) (CPR and AED) Bill was introduced to the Northern Ireland Assembly by the Bill sponsor, Colin McGrath MLA, on 4th October 2021. The second Stage of the Bill passed on 8th November 2021. The Bill sought to make cardiopulmonary resuscitation (CPR) training and automatic external defibrillator (AED) awareness a compulsory part of the curriculum by obliging the Department of Education to exercise its power under the Education (Northern Ireland) Order 2006 to place training in CPR and AED awareness onto the curriculum for Key Stage 3.

Under Article 7(2) of the 2006 Order, the Department has a power to specify the minimum content of that curriculum for different key stages. This is the power which allows the Department to set out the details of what needs to be on the curriculum. The main current exercise of that power is set out in the Education (Curriculum Minimum Content) Order (Northern Ireland) 2007. At present, the 2007 Order includes a general requirement for the curriculum to include emergency first aid awareness[86] through LLW at Key Stage 3.

If enacted, the Bill obliged the Department to produce secondary legislation to ensure that CPR and AED awareness are taught as part of LLW at Key Stage 3.

5.1 Secondary legislation proposed by the Department of Education

Since the Bill's introduction to the NI Assembly, the Department of Education has proposed to make a Statutory Rule, the Education (Curriculum Minimum Content) (Amendment) Order (Northern Ireland) 2022, under powers conferred on it by Articles 7(2) and 43(5) of the Education (Northern Ireland) Order 2006.

The proposed Rule amends the Education (Curriculum Minimum Content) Order (Northern Ireland) 2007 by inserting reference to CPR training and AED awareness at

[85] As cited directly above.

[86] Education (Curriculum) (CPR and AED) Bill. Explanatory and Financial Memorandum. Northern Ireland Assembly Website. Available at: http://www.niassembly.gov.uk/globalassets/documents/legislation/bills/non-executive-bills/session-2017-2022/education-cpr/education-bill---efm---as-introduced-full-print-version.pdf

Part 5 of Schedule 2 under 'Learning for Life and Work: Personal Development'. The Department has stated that the amendment supports the work the Minister has already undertaken in advising schools that it is the Department's expectation that schools will introduce CPR training for all pupils at Key Stage 3 from September 2022.

The Department's proposal achieves the same policy intention as the Education (Curriculum) (CPR and AED) Bill, without recourse to primary legislation, by placing training in CPR and AED awareness onto the curriculum for Key Stage 3. On 24th January 2022, the Bill Sponsor expressed his intent to withdraw the Education (Curriculum) (CPR and AED) Bill.

6 Conclusion

To summarise, in Northern Ireland, approximately 1,500 Cardiac Arrests happen in the out of hospital environment every year with survival rates sitting at around 10%. Several studies have indicated that bystander CPR and early defibrillation are associated with increased survival rates of out-of-hospital cardiac arrest (OHCA) patients. Increasing the proportion of the population trained in CPR has been associated with increased bystander CPR and corresponding survival rates.

There is widespread support for the inclusion of classes in basic CPR in the school curriculum; the European Resuscitation Council have endorsed the policy since 1992. The UK Resuscitation Council recommends that all students across the UK should be taught CPR and awareness of AEDs. Although there are no longitudinal studies that assess the impact of school-based CPR training on the probability that students will provide CPR as adults, evidence demonstrates that training, undertaken at any point, increases the likelihood that a by-stander will provide appropriate care when faced with an OHCA.

There is general agreement on the merit of teaching CPR to all school children, however, there is considerable debate about the precise syllabus, the optimal age to start, the educational methods used and who should provide the instruction.

Research suggests the critical importance of teacher training, and access to quality materials and resources, to increasing teacher confidence, competence and willingness to deliver CPR training. Significantly, the available research indicates that legislation without resources and support will not ensure implementation of CPR/AED training in schools or the expected public health benefits.

The other jurisdictions within the UK have recently introduced compulsory CPR lessons within the curriculum. In September 2021, the Department of Education Northern Ireland advised Schools that from the 2022/23 academic year, they will be expected to deliver CPR training within the curriculum at Key Stage 3 through Learning for Life and Work (LLW). The Education (Curriculum) (CPR and AED) Bill was introduced to the Assembly in October 2021. In December 2021, the Department outlined its proposal to

produce a Statutory Rule which amends the Education (Curriculum Minimum Content) Order (Northern Ireland) 2007 to add cardiopulmonary resuscitation (CPR) and automatic external defibrillator (AED) awareness to the list of topics that must be taught as part of Learning for Life and Work at Key Stage 3 in post-primary schools. This, in effect, will achieve the same policy intention as the Education (Curriculum) (CPR and AED) Bill. On 24th January 2022, the Bill Sponsor expressed his intent to withdraw the Education (Curriculum) (CPR and AED) Bill.