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Resuscitation teaching in New Zealand schools

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Abstract

Aims Resuscitation skills such as cardiopulmonary resuscitation (CPR) are taught as an optional component of the New Zealand school curriculum. This study was conducted to determine the frequency of, and factors influencing, CPR teaching in New Zealand primary and secondary schools.

Methods At the end of the 2001 school year, we surveyed by questionnaire every school in New Zealand asking which schools taught CPR skills during 2001, what other resuscitation skills were taught, and what the barriers to greater teaching of resuscitation were.

Results Seven hundred and fifty four of 2205 (34.9%) primary schools and 173 of 456 (38.6%) secondary schools returned the survey. Of primary schools, 37.5% taught resuscitation skills during 2001, as did 81% of secondary schools. In secondary schools, resuscitation was most commonly taught during year 12 (pupil age 16–17 years), but then only as an elective subject to 10–30% of students. For both primary and secondary schools there was a positive correlation between school size (number of pupils) and the teaching of resuscitation ($p = 0.0001$). The most significant barriers to resuscitation teaching were identified as funding, an overfull curriculum and, in primary schools, the question of the suitability of teaching resuscitation to young children.

Conclusions This survey indicates that the majority of primary schools are not teaching CPR skills, or other life-saving first aid, and that the majority of secondary schools are treating these subjects as optional, taught only to a small proportion of students. If New Zealand is to achieve widespread community CPR knowledge, it is suggested that greater funding needs to be available to schools for resuscitation/first-aid training and the subject must become a compulsory, rather than optional, component of the school curriculum.

As in other developed countries, New Zealand has an incidence of out-of-hospital cardiac arrest of approximately one in two thousand per annum. Most arrests are associated with myocardial ischaemia, and 95% of the victims die[1] (personal communication, T Smith, St John, Northern Region, 2002 and P Roberts, Wellington Free Ambulance, 2001). New Zealand has one of the highest incidences of death associated with drowning compared with other developed countries and likewise with motor vehicle crashes.[2]

For most causes of sudden unexpected death, a bystander's ability and willingness to perform cardiopulmonary resuscitation (CPR) will increase the chance of the victim's survival. For out-of-hospital cardiac arrest, bystander CPR increases the likelihood of survival two to three times,[3] and for drowning, CPR may be all that is required to resuscitate the victim. In order to ensure that victims of cardiac arrest and drowning have the greatest possible chance of survival, it is desirable that as many people as

possible within the community have the knowledge and skill to perform CPR. It has been suggested that in order to achieve this CPR should be taught at an early age, as part of the school curriculum to all school students.[4–9]

In 1999 the New Zealand Ministry of Education introduced a new Health and Physical Education curriculum for New Zealand schools. This curriculum comprises a set of achievement objectives expressed at eight progressive levels, each level catering for the students' development and maturity as they move from year 1 to 13 (corresponding to ages 5 to 18). Preliminary aspects of resuscitation and first aid are first *suggested* at Level 1 (years 1–5: ages 5 to 10), rescue breathing at Level 3 (years 2–8: ages 6 to 13), CPR at Level 5 (years 6–12: ages 11 to 17), and CPR repeated at Level 7 (years 9–13: ages 14 to 18). Throughout this staged introduction the topics are given as *suggested* inclusions to the curriculum and can be expanded on, or replaced by other unrelated topics, at the teacher's or school's discretion.[10]

Given the importance of CPR teaching to a national strategy for cardiac arrest survival, and given a non-mandatory school curriculum, this present study sought to assess the frequency of resuscitation teaching in New Zealand primary and secondary schools and to identify perceived barriers to this teaching.

Methods

In October 2001, a questionnaire with prepaid reply envelope was posted to the 'health coordinator' of every New Zealand school listed in the Ministry of Education database. Those schools not responding within four weeks were sent a reminder letter via email, and another copy of the questionnaire at the end of November 2001.

For the purposes of this study resuscitation training was defined as the formal teaching of one or more of the following: access to the emergency services (dial 111), rescue breathing, adult chest compression and CPR in children.

The questionnaire sought information based upon the 2001 school year, and included (a) whether resuscitation had been taught at the school; (b) by whom; (c) to which year groups; and (d) which skills were taught. The health coordinator was also asked to rate the importance of a number of listed factors that might limit the teaching of resuscitation and, in an open-ended question, to list any other barriers that they identified. Finally, we asked how many pupils were enrolled at the school, how many teachers were employed and how many of these held current CPR/first-aid certificates.

The returned surveys were divided into primary (years 1 to 8) and secondary schools (years 9 to 13) for separate analysis. Responses from composite schools (schools with both primary and secondary pupils) were split into primary and secondary school categories according to year.

School decile ratings were obtained from the Ministry of Education. Decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students. Statistical analysis was performed using Statview 5.0 (Abacus Concepts, USA).

Results

Primary schools (years 1–8: ages 5 to 12) Seven hundred and fifty four of 2205 (34.9%) primary schools completed the survey, and of these 277 taught resuscitation during 2001 (37.5%). Teaching of resuscitation was most likely to occur in schools with larger school rolls ($p = 0.0001$, logistic regression). There was no relationship between a school's decile rating and the teaching of resuscitation (logistic regression).

Of the 277 schools teaching resuscitation, in 104 the resuscitation trainer was a school teacher. External training agencies supplemented, or were used instead of, teachers as

follows: Red Cross (107 schools), Order of St John (57 schools), Royal Life Saving (43 schools), Surf Life Saving (30 schools), other outside agency (34 schools).

Of those schools teaching resuscitation, the health coordinators of 146 (53%) were able to list the skills taught at the school. The health coordinator was less likely ($p < 0.05$) to do this if the teaching had been conducted by an outside agency. The number of schools teaching rescue breathing, adult chest compression and CPR in children are given in Table 1.

Table 1. Resuscitation skills (child CPR, mouth-to-mouth rescue breathing and adult chest compression) taught by year group*

Year	Child CPR	Mouth-to-mouth rescue breathing	Chest compression
1	4	5	5
2	4	5	5
3	5	6	6
4	9	18	14
5	29	55	36
6	42	86	57
7	47	88	60
8	51	93	65
9	10	17	12
10	17	27	22
11	27	24	34
12	70	75	73
13	22	27	28

*146 primary schools and 121 secondary schools answered this section of the survey

The cited barriers to teaching resuscitation in primary schools are given in Tables 2 and 3. The significant barriers identified were (a) the perception that primary children were too young to be taught resuscitation skills; (b) that resuscitation was not a mandatory part of the primary school curriculum; and (c) funding. Seventy primary schools indicated that they taught resuscitation only every second or third year, and did not teach resuscitation during 2001 for that reason. A very full curriculum was noted by 4% of schools, and 4% had never thought of teaching resuscitation.

In 734 primary schools with a total of 7042 teaching staff, 3359 (48%) teachers were identified as holders of first-aid/CPR certificates.

Table 2. Barriers to greater teaching of resuscitation in primary and secondary schools

Barriers	Primary schools*	Secondary schools*	p value†
Time restrictions	2.5 (1.3)	3.5 (1.4)	ns
Resuscitation is not mandatory in the school curriculum	2.2 (0.7)	4 (1.4)	0.01
The age groups in our school are not suitable to be taught resuscitation skills	2.0 (1.0)	5.0 (0)	0.001
Funding is inadequate to bring in external trainers	2.5 (1.8)	2.0 (1.4)	ns
Funding is inadequate to train teachers as instructors	2.5 (1.4)	2.0(1.3)	ns
Funding is inadequate for purchase of equipment	2.4 (1.8)	1.5 (0.7)	ns
Few staff interested in teaching resuscitation	3.6 (1.0)	4.0 (1.4)	ns

*mean (Standard Deviation) score on a scale of 1 (greatly limits teaching) to 5 (does not limit teaching at all) for how important these factors were in limiting the extent of resuscitation teaching in 2001; †unpaired t test was used to compare scores for primary and secondary schools, with $p < 0.05$ indicating statistical significance

Table 3. Other barriers to teaching resuscitation cited by health coordinators

Barriers	Primary schools (%)	Secondary schools (%)
Alternating yearly cycle, did not teach in 2001	9	3
The curriculum is too full	4	15
Student ages are inappropriate to teach resuscitation	4	-
School has not ever thought about teaching resuscitation	4	-
Resources are not available	2	3
Resuscitation is not important	1	2
It is difficult to organise resuscitation teaching	1	-
Previous bad experience with external resuscitation instructors	0.6	-
Lack of written resources in the Maori language	0.4	1

Secondary schools (years 9–13: ages 13 to 18) One hundred and seventy three of 456 secondary schools returned the survey (38.6%), and of these 140 taught resuscitation to at least some pupils during 2001 (81%). As with the primary school group, there was a significant positive correlation between the number of students on the school roll and the teaching of resuscitation ($p = 0.001$, logistic regression). There was no relationship between a school's decile rating and the teaching of resuscitation (logistic regression).

Resuscitation was taught by school teachers at 100 schools, Red Cross at 47, Order of St John at 40, Royal Life Saving at 8 and Surf Life Saving at 10 schools. Other external instructors were used at 17 schools.

Of the 140 responding secondary schools teaching resuscitation during 2001, the health coordinator indicated which skills were taught to each age group in 121 (86%). The health coordinator was less likely ($p < 0.001$) to indicate the skills taught if

resuscitation had been taught by an external agency. The number of schools teaching rescue breathing, adult chest compression and CPR in children are given in Table 1.

Resuscitation was most commonly taught (95 schools) in year 12 (corresponding to age 17 years), where most schools (71%) indicated that they treated it as an optional subject taught to between 10% and 30% of the year group. Only two secondary schools taught resuscitation to a portion of students within each year group, 42% taught resuscitation to students within only one year group, and a further 33% within two year groups. On the basis of the proportion of students taught in each year group, we estimate that 45% of secondary school students are not taught resuscitation, 20% are taught once, 22% twice and 13% more than twice during their five years at secondary school.

The cited barriers to teaching resuscitation in secondary schools are given in Tables 2 and 3. The most important barriers identified by the schools were funding, and a curriculum that was too full.

In 165 secondary schools with a total of 6888 teachers, 1689 (25%) teachers were identified as holders of first-aid/CPR certificates.

Discussion

In New Zealand cities, the likelihood that a victim of out-of-hospital cardiac arrest (OHCA) receives *any* attempt at CPR is approximately 50%; the proportion of these receiving *effective* CPR is not known, but is thought to be approximately 30%. In the remaining 50%, bystanders are either unable or unwilling to provide CPR. With an OHCA survival rate of 5–13% in New Zealand, and a known two- to threefold increase in cardiac arrest survival with bystander CPR, the overall number of lives lost as a result of failure to provide CPR is likely to be significant[1] (personal communication, T Smith, St John, Northern Region, 2002 and P Roberts, Wellington Free Ambulance, 2001). Community CPR skills and education are therefore important issues for public health education.

The school years have the potential to provide guaranteed exposure of future adults to CPR skills. Thereafter, the learning of CPR will involve cost, self-motivation or legislation. A New Zealand adult's exposure to CPR is largely determined by (a) workplace first-aid regulations; (b) voluntary, paid attendance at commercial CPR training courses; and (c) exposure to depictions of CPR in the media (which are infrequent and often inaccurate).

The teaching of resuscitation skills to school children was introduced in Norway as early as 1961. Subsequent international experience has shown that school-age children are more likely to accept CPR training than older people,[11] are motivated to learn, and do so quickly and easily.[5,6,12,13] The European Resuscitation Council, the American Heart Association and the American Academy of Paediatrics have all recommended that resuscitation be taught to all school children.[6,8,9]

Resuscitation is not a mandatory component of the New Zealand school curriculum, and from the present survey we would estimate that only approximately 55% of secondary school pupils are exposed to CPR teaching during those school years. Students at different schools receive widely disparate exposure and, despite the staged introduction described by the curriculum, current teaching lacks continuity, with CPR being taught, if at all, at the end of both primary and secondary years. This lack of

continuity is coupled with confusion as to *what* should be taught *when*. Further, where training is provided by outside agencies, schools may have little knowledge as to what is actually being taught.

The status of resuscitation in the curriculum means that it is ultimately up to schools to decide whether to allocate funds and manpower to its teaching. The reasons for a school choosing to teach or not to teach CPR are therefore important. The most common barriers to CPR teaching cited by schools relate to funding, appropriateness of teaching to young children, the non-mandatory curriculum, and an overfull curriculum.

Health coordinators noted inadequate funding for training aids, purchase of training from external training agencies, and for training teachers in order to conduct in-house teaching. Although training aids such as manikins are certainly necessary, the most important CPR and first-aid skills can be learnt quickly by people of average intelligence, and do not require extensive training or clinical experience. Given a teacher's educational background, and their ability to adhere to a defined curriculum, it is likely that schools already possess much of the manpower necessary to deliver CPR training. Although external agencies would provide useful additional exposure for students, the presence of skilled and interested teachers would allow skills to be taught and revised whenever timetabling allowed, could provide a role model and would promote a school as being committed to producing caring adults. Several authors have also reported successful use of peer training,[14] where selected older pupils are used to teach younger pupils alongside a fully trained teacher. The advantages of peer training are that it can reduce costs, provide positive role models for younger children and reinforce the skills of the older pupils. Further reductions in cost could also come about from the use of innovative teaching methods such as video training,[15] where students use video instruction coupled with training manikins to learn CPR skills.

An important consideration for primary schools is the suitability of teaching resuscitation to young children of differing age, size and intellectual maturity. For the delivery of effective chest compressions rescuers must be of a suitable size and strength. For New Zealand primary schools there was considerable confusion in this regard. Schools taught a widely disparate range of skills and a number of primary schools reported that instructors from external agencies had informed them that it was inappropriate to teach any resuscitation skills in primary school. In contrast, other schools reported that at least one of these agencies was teaching children as young as five years how to perform chest compressions and expired-air rescue breathing. The literature clearly indicates that children from the age of 10–11 years are capable of learning how to perform CPR[6,12,13] and, prior to this age, how to access emergency medical services (dial 111) and provide other simple forms of first aid. We believe that these observations indicate that the school curriculum must contain explicit national guidelines on *what* should be taught *when*, rather than leaving this to the interpretation of individual schools or training agencies.

One of the most important problems in resuscitation education is the rapid fall off in skills and knowledge following initial training.[16] For this reason, those within the health professions are often required to repeat CPR tuition, and certification, on an annual basis. Repetition of learning, as well as over-training to a higher than expected level, increases the likelihood of long-term basic skill retention.[4] The school years

would provide an ideal setting within which to deliver high-quality, structured annual tuition from year 6 onwards.

Since CPR can be taught in training sessions taking little more than one hour, annual training would therefore require five hours of the entire secondary school curriculum. If an overfull curriculum is a significant barrier to teaching CPR, and this truly cannot be accommodated as part of the present curriculum, we would argue that the subject must displace other components. CPR, simple first aid and actions to take at the scene of an accident are critical life skills that may need to be employed at any time, without notice and without reference to books or consultation with others. This is in contrast to the bulk of the curriculum, for which there is no life-threatening urgency requiring the possession of immediate 'off-the-cuff' knowledge.

A limitation of the current study was the low response rate, but this is not unusual for postal surveys. Some recently published reports of postal studies investigating resuscitation teaching show response rates of 43% from European medical schools,[17] and 32% from cardiac-arrest survivors,[18] where it could be expected that these groups would have a high interest in the teaching of resuscitation. We cannot accurately determine whether the non-responders are more or less likely to be teaching resuscitation than those schools that did respond to the survey, and therefore caution must be used in extrapolation of the data in the current study to all schools.

Despite the view of international resuscitation councils that the teaching of resuscitation in schools should be regarded as the primary educational strategy to achieve widespread learning of CPR,[9] and the *suggested* inclusion of resuscitation in the New Zealand school curriculum, the present study indicates that only 55% of secondary school pupils receive exposure to CPR teaching. In order to achieve widespread, effective community resuscitation knowledge we believe that the teaching of simple emergency care must become a fully funded, mandatory part of the school curriculum provided annually to all children, according to a clearly defined progressive curriculum. Given cost restraints, we believe this can best be accomplished by internal training provided by school teachers, perhaps supplemented by appropriate and experienced external health professional trainers. Simple skills for managing cardiac arrest, road trauma and drowning must be promoted to children as important life skills to be possessed by all responsible adults.

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