Impact of the national cardiopulmonary resuscitation guidelines in primary health care: a nation-wide mail survey

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ABSTRACT:

BACKGROUND: The national resuscitation guidelines were published in Finland in 2002 and are based on international guidelines published in 2000. The main goal of the national guidelines, available on the Internet free of charge, is early defibrillation by nurses in an institutional setting. The aim of the current study was to evaluate changes in resuscitation practices after publication of the national guidelines in health centres which provide the public primary health care in Finland.

MATERIAL AND METHODS: Mail survey to chief physicians of every health centre in Finland (N=279), followed by a reminder if necessary.

RESULTS: One hundred and eighty three (65.6%) health centres responded to the study. In almost half (48.9%) of them, the resuscitation practise was not based on any resuscitation guidelines, 40.7% used national guidelines, 1.1% used international guidelines and 9.3% used other guidelines. Compared with a similar study performed in 2001, the proportion of health centres allowing nurses to perform defibrillation without the presence of a physician had increased from 24% to 42%. The proportion of those having at least one automated external defibrillator had increased from 56% to 66%. The training was still estimated to be insufficient in basic life support and advanced life support in the majority of health centres (69% and 76%, respectively).

CONCLUSION: A significant change has occurred in resuscitation practices in primary health care after publication of national resuscitation guidelines.

KEYWORDS: Automated external defibrillator (AED), Cardiopulmonary resuscitation (CPR), Guidelines

Introduction

Clinical Practice Guidelines (CPG) are developed to improve quality of health care by decreasing inappropriate variation in care and by promoting the effective treatments into practice[1]. Despite the frequently published guidelines which introduce newly developed resuscitation techniques to clinical practice, the outcome of cardiac arrest patients has shown no significant improvement[2,3]. The influence of publishing resuscitation guidelines on clinical practice have not been well studied, but studies regarding other guidelines have shown that guidelines usually have only a limited impact on the behaviour of the caregivers[4]. Thus, the reason for no improvement in outcome of cardiac arrest patients may be that the new resuscitation guidelines are not adhered to in clinical practice. For example, recent studies have shown that only a quarter of health care professionals place defibrillation electrodes as recommended in the guidelines[5,6] and that in the majority of cases, administration intervals of adrenaline during resuscitation appears not to be in line with the guidelines[7].

International Guidelines 2000 for cardiopulmonary resuscitation and emergency cardiovascular care were published in 2000 by American Heart Association (AHA) in collaboration with International Liaison Committee on Resuscitation (ILCOR)[8]. Based on these international guidelines, Finnish national resuscitation guidelines were published in 2002 by The Finnish Medical Society Duodecim in the evidence-based clinical practice guidelines series, Current Care[9]. Both guidelines include substantial changes to the earlier practices on resuscitation, e.g. defibrillation training for non-physician staff is strongly recommended and amiodarone is the first line of antiarrhytmic drug for recurrent or prolonged ventricular fibrillation (VF)[8,9].

Our recent study[10] showed that resuscitation training in primary care in Finland was insufficient in 2001, i.e., one year after the publication of the international resuscitation guidelines. At the time of the study, only in 24% of health centres nurses perform defibrillation before a physician arrived to the patient. The current study was undertaken two years after the publication of the national resuscitation guidelines, to evaluate the possible changes in resuscitation practices in primary care setting, especially concerning early defibrillation.

Materials and methods

In Finland, with a population of 5.2 million, the municipal health centres are responsible for public primary health care. The health centres offer a wide range of services, including

physician consultation, public health nurse consultation, home nursing and dental care. Two hundred and twenty of 279 health centres also has their own hospitals, with total bed capacity of 24000 beds. Health centre services can be given in several locations in the area of a municipality.

In May 2004, two years after the publication of the national resuscitation guidelines, we sent a survey to the chief physician of every health centres in Finland (N=279), followed by a reminder, if necessary. The receivers were asked to answer the questionnaire themselves or to forward the questionnaire to the person in charge of resuscitation training and equipment in the health centre. The data collection form included detailed questions of resuscitation training after the publication of the national guidelines as well as current resuscitation practices in the health centre.

For proportions, we calculated 95% confidence intervals (CI) using modified Wald method. The comparisons of categorical data between two groups were performed using Fisher's exact test and between three groups using Chi-square. A P-value of less than 0.05 was considered statistically significant.

Results

Of 279 health centres, 183 (65.6%) answered and the answers represented geographically the whole country. The background information of health centres is shown in Table 1. The hospital ward capacity in the health centres represented 69.2% of the total capacity in health centre hospitals of the country. Of the health centres included in the earlier study conducted before the publication of the national guidelines[10], 97 (68.8%) responded also in the current one, representing 53.0% of the answers. The answerer was the chief physician in 105 (57.4%), other physician in 38 (20.8%), the head nurse in 16 (8.7%) and other nurse in 24 (13.1%). The majority of the respondents (176, 96.2%) participated in clinical work.

Table 1. Characteristics of respondents and health centres.

Number of beds mean (standard deviation, range)	91 (228, 0 – 2031)
Physician available	
Only in daytime	137 (74.9%)
In daytime and some nights	18 (9.8%)
In daytime and all nights	28 (15.3%)
Posts of physicians and nurses	
All filled	42 (23.0%)
Nearly all filled	113 (61.7%)
Substantial amount vacant	28 (15.3%)
Appointed person in charge of resuscitation training and equipment*	
Yes	134 (73.2%)
No	48 (26.2%)
Profession of the person in charge **	
Physician	81 (44.3%)
Nurse	55 (30.1%)
EMT/Paramedic	29 (15.8%)
Public health nurse	8 (4.4%)

* Data not available from one health centre.
** Many professional may be appointed in the same health centre, EMT=Emergency Medical Technician.

Resuscitation guidelines and training

In almost half of the health centres the resuscitation practice varied depending on the physician and was not necessarily based on any guidelines (Table 2).

Table 2. Use of various guidelines for resuscitation in health centres in 2001 and 2004. Data of 2001 collected by the survey performed in 2001 (10).

	2001 N=141 %	2004 N=183 %	Δ%	P value
National guidelines (9)	–	40.7	+ 40.7	<0.0001
Guidelines 2000 (8)	0.0	1.1	+ 1.1	0.5065
ERC* 1998 (16)	19.1	1.1	- 18.0	<0.0001
AHA** 1992 (17)	3.5	0.0	- 3.5	0.0152
Guidelines produced in the health centre	12.8	6.0	- 6.8	0.0764
Other guidelines	27.0	2.2	- 24.8	<0.0001
No guidelines used, practices vary between physicians	37.6	48.9	+ 11.3	0.0545

* European Resuscitation Council
** American Heart Association

Table 3. Resuscitation training of the staff in health centres during two last years.

	CPR %	Defibrillation %	ALS lectures %	ALS practical %
Physicians	66.7	68.9	65.6	50.3
Registered nurses	85.8	79.8	59.9	62.8
Public health nurses	62.3	43.2	40.4	39.3
Enrolled nurses	81.4	65.6	45.9	51.4
Non-medical staff in wards	27.9	9.3	-	-
Non-medical staff in office	18.6	10.9	-	-
None	12.6	15.8	18.0	32.2

CPR=Cardio Pulmonary Resuscitation, includes only chest compressions and artificial ventilations;
ALS=Advanced Life Support, includes use of invasive airway methods and pharmaceutical therapy

Resuscitation training for the staff after publication of the national resuscitation guidelines was provided in the health centres as shown in Table 3. Of the respondents, 30.6% (95% CI 24.4 to 37.6) considered training to be sufficient in basic life support and 24.0% (95% CI 18.4 to 30.8) in advance life support.

Impact of the guidelines to certain practices

The introduction of certain practices recommended in the resuscitation guidelines and the impact of the national resuscitation guidelines to the introduction are shown in Figure 1.

In case of a cardiac arrest occurring on the ward, the performer of first defibrillation was likely to be a nurse in 76 (41.5%, 95% CI 34.6 to 48.8), a physician in 65 (35.5%, 95% CI 28.9 to 42.7) and a member of ambulance staff in 27 (14.8%, 95% CI 10.3 to 20.7) of the health centres. Fifteen (8.2%) health centres did not have a hospital ward.

Forty-one (22.4%, 95% CI 16.9 to 29.0) health centres used only AEDs, 62 (33.9%, 95% CI 27.4 to 41.0) used only manual defibrillators, and 74 (40.4%, 95% CI 33.6 to 47.7) used both AEDs and manual defibrillators. Five (2.7%, 95% CI 1.0 to 6.4) health centres did not have a defibrillator and one

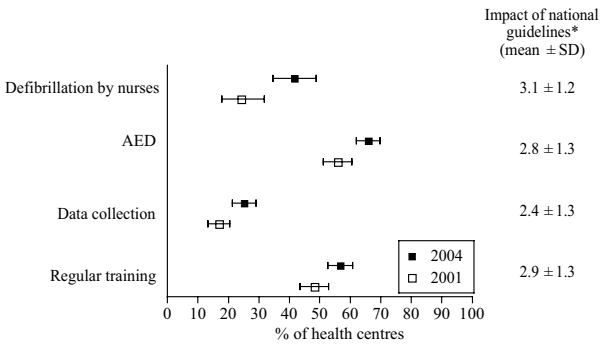

Figure 1. The proportions of health centres allowing nurses to defibrillate, having an automated external defibrillator (AED), collecting data of resuscitation attempts and having regular training on resuscitation before (2001) and after (2004) publication of national resuscitation guidelines in 2002. 2001 data is based on the earlier survey (10). Error bars represent 95% confidence intervals.

** The impact of the national guidelines to the change in resuscitation practice in the health centres where new a technique was introduced, estimated by the answerer in scale from 1 (very small) to 5 (substantial).*

Table 4. The antiarrhythmic drugs used for recurrent or prolonged ventricular fibrillation in health centres.

	n (%)	
Amiodarone	15	(8.2)
Lidocaine	44	(24.0)
Lidocaine and beta-blocker	60	(32.8)
Beta-blocker	4	(2.2)
Varies depending on the physicians	49	(26.8)
No antiarrhythmic drugs are used	11	(6.0)

(0.5%) respondent did not know the type of the defibrillator. The use of AEDs and nurse-performed defibrillation was neither associated with number of beds, person in charge of resuscitation, availability of physician around a clock nor availability of employees. In a case of a prolonged ventricular fibrillation, amiodarone, the recommended drug, was used only in a minority of the health centres (Table 4).

Discussion

The major findings of the current study are:

1) The proportions of the health centres having at least one AED or allowing nurses to defibrillate without the presence of a physician have increased after the publication of the national guidelines (56% to 66% and 24% to 42%, respectively) in comparison with the situation three years earlier[10].
2) Insufficient training in resuscitation is still common in health centres.

Early defibrillation in the health centres

Early defibrillation is a high priority goal of the national resuscitation guidelines, and it is recommended to be done with an AED if the personnel is not used to work in emergency situations[9]. Regarding the guidelines, all health care professionals should be trained in the use of an AED. Before the publication of national resuscitation guidelines the proportion of health centres where nurses performed a defibrillation was only 24%[10]. The current study found that the majority of health centres has at least one AED and has organized training in defibrillation for physicians, registered nurses and enrolled nurses. In some health centres, even the non-medical personnel in wards and in office was trained in defibrillation. However, only in 42% of the health centres a nurse usually performed the first defibrillation before a physician arrived to the patient. In the resuscitation guidelines, the goal for the time interval from the collapse to the defibrillation in the institutional setting is three minutes[9]. Considering the fact that only in 15% of the health centres a physician is available around the clock, it is obvious that the goal is not achieved in majority of health centres.

Practical training with a manikin is essential to adopt new practices, and maintain the resuscitation skills[11-14]. Training in CPR and defibrillation for physicians and nurses was organized in the majority of the health centres after publication of the guidelines. However, the training was often irregular and reported to be insufficient. In what extent the training was based on the current guidelines is unknown.

Antiarrhythmic drugs

Only 15 health centres reported using amiodarone for treatment of recurrent or prolonged ventricular fibrillation. However, some of 49 health centres where choice of antiarrhythmic drug varies depending on the physicians may use amiodarone among the other drugs. The reason for slow change in use of amiodarone may be the fact that in the instructions by the marketing company, use of amiodarone was limited to be used only in hospital setting until year 2003. The instructions have been changed after results of suitability study suggesting that undiluted amiodarone can be given in pre-hospital setting without unmanageable haemodynamical side effects[15].

Impact of the national guidelines

In the health centres where new practices (e.g. defibrillation by nurses) were introduced, the role of national resuscitation guidelines as trigger for a particular change was estimated to be only moderate. However, the practices aimed at performing early defibrillation has been included only in national resuscitation guidelines and international Guidelines 2000[8], but not in earlier guidelines. In the survey performed in 2001, none of the health centres[10], and in the current study only two health centres used the Guidelines 2000. The national resuscitation guidelines in contrast were used in 41% of the health centres, indicating probably a greater role of the national guidelines than Guidelines 2000.

The national cardiopulmonary resuscitation guidelines were published in the journal as well as Internet portal of The Finnish Medical Society Duodecim. The journal is sent to the members of the society, who represent 80% of the physicians in Finland. According to the log files of the Internet portal of the society, the resuscitation guidelines are visited two times more frequently than the second most visited Current Care guidelines, the guidelines for treatment of hypertension. The impact of different methods used in dissemination of

the national resuscitation guidelines was not compared in the current study. After publication of national resuscitation guidelines, none specific implementation program was organized. One reason for the moderate impact of national resuscitation guidelines can be the fact that the publishing organization is highly valuated regarding the clinicians in the country and have published several clinical practice guidelines in series Current Care.

Limitations of the study

Firstly, the major limitation of the study is that the response rate amounted only to 66%. Secondly, even tough the questionnaire was designed to be comprehensible to general practitioners, the respondents not working in the field of acute care may not have understood all the questions as intended.

Conclusions

The publication of national resuscitation guidelines appears to have had a significant effect to the resuscitation practices in primary care setting.

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