

Reduced Hospitalisation of burns patients following a multi-media campaign that increased adequacy of first aid treatment

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Abstract

Context: Concern engendered by a previous study that showed inadequate first aid for burn injuries was prevalent in the community led to a novel multi-media public health campaign ensued to address the issue. *Objective:* To determine whether this public health campaign influenced behaviour by altering first aid treatment for burn injuries (BFAT). *Design, setting and population:* Prospective intervention study. Consecutive patients with acute burn injuries over two 4-month intervals, presenting to a regional burn service, Auckland, New Zealand. This research was ethically approved by the Local Research Ethics Committee. *Main outcome measures:* Demographics, burn size, adequacy of burn first aid, outpatient/inpatient wound care and operative intervention requirement. *Results:* Adequacy of BFAT improved following the campaign (59% versus 40%, $P = 0.004$). Fewer inpatient admissions (64.4% versus 35.8%, $P < 0.001$) and surgical procedures (25.6% versus 11.4%, $P < 0.001$) were undertaken following the campaign with a corresponding increase in outpatient care. Greatest decreases were observed in Maori and Pacific Islanders, and in children <10 years old. *Conclusions:* Adequacy of BFAT together with a reduction in the numbers of patients requiring inpatient surgical care was improved by a multi-media public awareness campaign.

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Keywords: Hospitalisation; Burns first aid treatment; Burn size

1. Introduction

Immediate cooling of burns as a first aid measure significantly determines burn outcome, and decreases morbidity and healthcare costs by limiting the degree of tissue damage [1–5]. Consequently, the need for surgery and subsequent reconstruction is reduced [5]. Immediate, continuous application of cool running water (10–15 °C/50–60 °F) for 10–30 min, if available, is recommended as adequate burn first aid treatment (BFAT), although this may need to be tempered to suit circumstance in preventing hypothermia, particularly in children [6–10].

Awareness of appropriate burns first aid was unclear to many of the burn-injured population of Auckland, New Zealand, especially Maori and Pacific Island people and parents of children <10 years when studied [1]. Inappropriate and sometimes deleterious first aid was also commonplace. In addressing this problem, a multi-media public education campaign was undertaken.

This study examines the effect of that campaign, and highlights the beneficial effect for burn patients of adequate BFAT.

2. Methods

All patients, with an acute burn injury, treated at a regional burn centre over two 4-month study intervals (November 1997–March 1998 and November 2001–March 2002) separated by an intervening publicity campaign were considered for enrolment. Those who were unable to be interviewed due to death or mechanical ventilation were excluded. Patients/caregivers were interviewed in the emergency department or subsequently during inpatient care (Box 1). Patients were followed for 6 months post-injury. Ethics committee approval for this study was granted (#AKY/02/00/218).

Adequacy of initial first aid treatment was defined as cold water treatment involving immersion of the burn in either running or stationary water for at least 10 min. This was chosen as it was in accordance with a 1997 New Zealand government education campaign [11].

Other data collected included patient demographics, burn size as a proportion of the total body surface area and cause

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Box 1. Questions asked of patients/caregivers

Demographics

- Age
- Sex
- Place of residency
- Occupation

Burn

- Causative agent
- Immediate action
- Clothing worn at time of injury
- TBSA (%)
- Anatomical location
- Geographical location at time of burn

Knowledge of BFAT

- What level of understanding?
- What is their source of knowledge?

General first aid training

- Any?
- When?

Awareness of campaign

- Post-campaign patients only

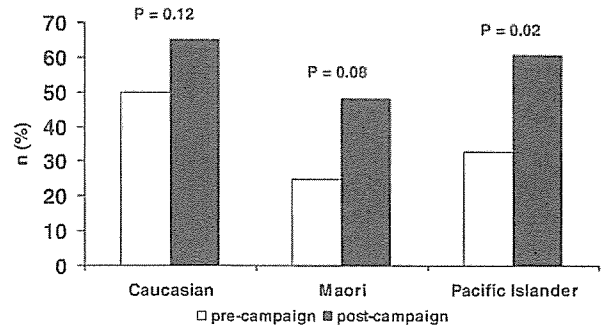


Fig. 1. Proportion of patients receiving adequate first aid (BFAT) by ethnicity.

nificance set at $P < 0.05$. For ethnicity comparisons, a Chi-square test was used [13].

3. Results

One hundred and twenty-one patients (of a total 165) were included pre-campaign, and one hundred twenty three patients (of a total 153) following the campaign. Comparison of patient demographics demonstrated no significant differences between populations studied in the pre- and post-campaign (Table 1).

Seventy-three percent of inpatients resided in areas of lower economic status. In all age groups, hot liquid was the predominant cause of injury (46%). Fire (18%), flash (15%) and other causes such as electrical, hot oil and hot metal (21%) accounted for the remaining injuries. However, in children less than 10 years old, scalds predominated in both pre (66%) and post-campaign (54%) groups. Eighty-one percent of burns occurred in the home. Of the participants interviewed following the campaign, 76% were aware of the burn first aid campaign.

Pre-campaign, 40% of patients were given adequate BFAT compared to 59% post-campaign ($P = 0.004$) with the greatest improvement occurring in children from 30.4 to 62.5% post-campaign ($P < 0.001$), Pacific Island patients from 33 to 61% ($P = 0.02$) and Maori 25 to 48.2% ($P = 0.08$) (Fig. 1).

of burn. Low socio-economic status was defined by household income less than NZ\$ 30,000 (approx. US\$ 14,000) per annum and socio-economic index (SEI) ≤ 45 [12]. Patients were directly questioned regarding the source of their first aid knowledge. Subsequent inpatient or outpatient care including any surgical intervention was documented.

Extensive multi-media coverage included advertisements on television and radio, billboards, articles in local newspapers and popular magazines. Maori and some Pacific Island language versions were used in addition to English. The campaign message specifically highlighted common causes of burn injury in the home and their avoidance, and also enunciated what appropriate first aid measures should be taken in the event of an accident.

Comparison of data was by Student's *t*-test and Mann-Whitney *U*-test for small sample size, with sig-

Table 1
Pre- and post-campaign patient populations

	Number	Gender (m/f) ^a	Age	Ethnicity (C/M/PI/O) ^b	Low SEI (%) ^c	TBSA (%) ^d (<1/1–5/6–10/11–25/>26)
Pre-campaign	121	83/38	3 months–77 years	50/24/33/14	73	23/50/25/21/2
Post-campaign	123	84/39	3 months–83 years	49/27/36/11	75	27/57/23/14/2
<i>P</i> -value	NS	NS	NS	NS	NS	NS

NS: non-significant result.

^a Male/female.

^b Caucasian/Maori/Pacific Islander/other ethnicity.

^c Population with low socio-economic index (SEI) [27].

^d Total body surface area burned.

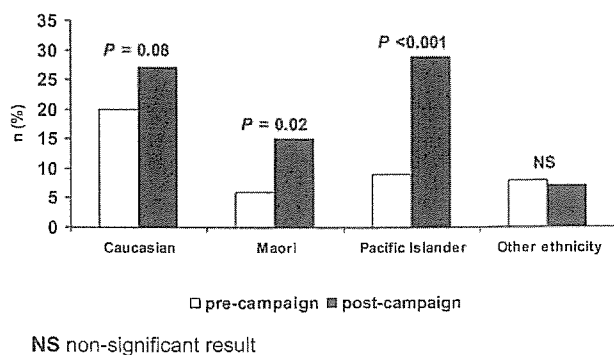


Fig. 2. Proportion of patients receiving outpatient care by ethnicity. NS: non-significant result.

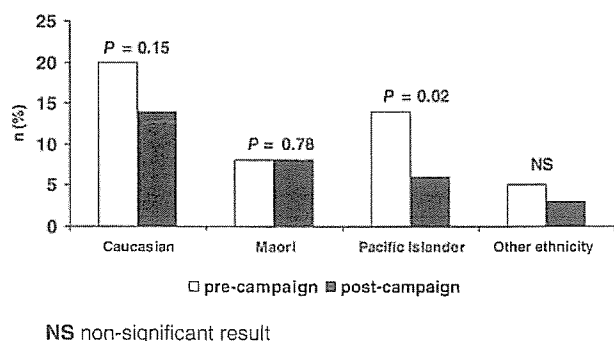


Fig. 3. Proportion of patients requiring inpatient wound care by ethnicity. NS: non-significant result.

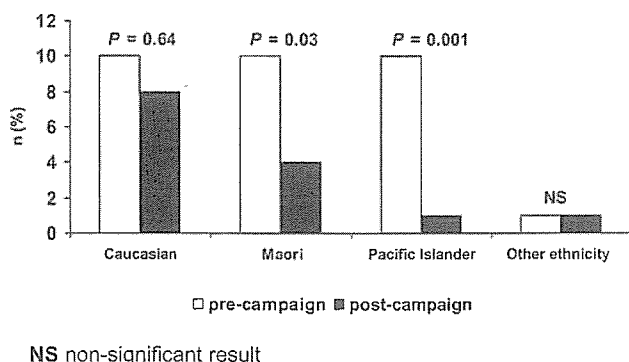


Fig. 4. Proportion of patients requiring surgical treatment by ethnicity. NS: non-significant result.

Inpatient wound care or operations were reduced post-compared with pre-campaign ($P < 0.001$), with a corresponding increase in number of outpatients (35.6% versus 64.2%) (Figs. 2–4).

4. Comment

Adequate first aid for burn injury is application of cool water over the injury for at least 20 min. Whilst this advice may need to be tempered in very large burns or in small

children, the publicity campaign did not address these issues. It was considered that by complicating the message with riders and *addendum*, more burn injuries were likely to be under treated initially. It was for these reasons, now supported by the following study, that no aspect of the campaign highlighted the possibility of developing hypothermia as a result of first aid. A German study of 212 adult patients found that unless a patient was either anaesthetised or artificially ventilated, hypothermia did not result from cold-water treatment [14]. Whilst this may not be the case for paediatric patients, during both study periods no cases of hypothermia were seen, which we believe justifies the approach taken.

Interesting BFAT practices, such as application of toothpaste, exist in the community, which do not cool the wound and may even contribute to tissue destruction [1]. Factors not unique to any group in this study, such as culture, educational status and health service accessibility, influence such practices [2,3]. Folk-remedies are often self-perpetuating and generational unless education is provided from an authoritative source. We have no way of knowing whether the campaign influenced the prevalence of these practices (which may be harmful), and what contribution that reduction may have made to the improvement seen in the study. We previously demonstrated the prevalence of these issues within our community and the need for re-education. No study has previously reported an effect of a public health campaign on appropriate burn first aid. Moreover, the subsequent effect on the spectrum of wound severity presenting to the burn service is unique to this study.

Unfavourable health outcomes are more common within minority groups and the financially disadvantaged [15,16]. In New Zealand, the standard of health amongst Maori and Pacific Island people is recognised to be below that of European New Zealanders. It is not surprising therefore that Maori and Pacific Island people were over represented in the burn injured population compared to regional data from published census information both in 1998, and in the most recent census of 2001 [17]. Whilst we have no explanation for this inequality, it is pleasing to note that the most frequently injured received greatest benefit as a result of the first aid campaign. We are unable to fully explain this result, although an element of the campaign was delivered in the languages of Maori and Pacific Island peoples. Any conclusion is in part speculative, as effects may be due to surrogate variables including cultural practice, socio-economic status and educational level, rather than ethnicity alone [10,18].

Television and radio were found to be the most effective communication media in the campaign. It is likely therefore that the caregiver of younger children is exposed to the campaign via radio and television as they are, by necessity, more often based in the home. Frequent exposure to the multi-media message in this way is conceivably an explanation for the dramatic increase in BFAT in the under 10-year-old age group. Burn injuries are more common in children with a proportion, reportedly as high as 20%, inflicted non-accidentally [19,20]. We suggest that those

who are injured non-accidentally are unlikely to ever receive adequate BFAT, regardless of any educational efforts [3–5]. We fear therefore that there will always be some individuals unlikely to receive adequate BFAT.

It is curious that the adult group has not reflected the improvements in BFAT seen in the paediatric group. We suggest that perhaps adults with children were more responsive to the campaign message than those without children. In addition, our impression is that burns in adults often occur during periods of intoxication, rendering the victim incapable of appropriate self-care and sometimes oblivious to the injury that they have sustained.

Improved BFAT adequacy was associated with reduced inpatient admission and requirement for operative procedures. We postulate that these outcomes are a surrogate for decreased burn severity, although the present study did not specifically examine this aspect.

Mass media are leading sources of health information and can influence health professional and patient behaviour [21–27]. A simple, positive, behaviour-specific message targeted towards at-risk groups, is known to optimise behavioural change, especially if delivered through television and newspapers [28]. Cyclical repetition is important to maintain this improvement [29]. Due to its proven success, the burn first aid awareness campaign has been repeated and plans are afoot to continue repeating its message in a cyclical fashion every 2 years. However, both the advertising company and Burn Service personnel are aware of the possibility of ‘tolerance’ to the campaign, and novel strategies will be required for delivering the same message repeatedly to keep it fresh and in the public consciousness.

5. Conclusions

We have reported a multi-media publicity campaign directed towards first aid treatment of burn injury that impacted significantly on health behaviour. In addition, the injuries seen by the burn service subsequent to the campaign required significantly less inpatient and operative treatment, implying a reduction in their severity. In view of our success, we would encourage others involved in both burn care and public health to undertake similar campaigns.

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The Australian National Asthma Campaign: Effects of Public Education Activities Based on Mass Media

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Introduction: The National Asthma Campaign (NAC) was formed in 1990 as a coalition of the key professional organizations concerned with asthma and its management in Australia. It has conducted multifaceted educational activities targeting health care professionals, people with asthma, and the general public. Between November 1991 and March 1993, an educational mass media campaign was developed to inform people about new approaches to preventive asthma therapy and how people with symptoms of asthma should talk to their doctor or pharmacist about new management and monitoring strategies. Evaluation was based on McGuire's communication/persuasion model for assessing the impact of mass media campaigns. **Methods:** Four serial cross-sectional population surveys of persons over the age of 18 years were conducted in four major Australian cities using structured telephone interviews. Information was sought on asthma campaign awareness and knowledge or use of appropriate asthma management practices.

Results: There was an increasing trend in awareness of asthma messages in the media and of appropriate message recall across the two-year period. Knowledge about the need to use preventive therapy for asthma improved significantly. Among those with asthma there was a significant upward trend in the proportion who discussed asthma with their doctor or pharmacist and who used peak flow meters and written asthma management plans.

Conclusions: The net impact of the NAC and other activities has been an increase in awareness about asthma in Australia. These campaigns relied on the relatively nonselective medium of television to raise awareness and to start to change attitudes to asthma. The challenge is to build on these trends to further reduce morbidity and mortality due to asthma.

Medical Subject Headings (MeSH): asthma, disease management (prevention and control), evaluation studies (program evaluation), mass media, education. [Am J Prev Med 1997;13:251-6]

The past 10 years have seen an increasing recognition of the public health burden imposed by asthma on Western countries.¹⁻³ Increasing prevalence rates and evidence of possible increases in severity⁴ point to greater needs for the health system to develop and implement asthma strategies to reduce the burden of ill health attributable to asthma.^{5,6} National consensus statements

have been developed providing standardized guidelines for clinical management and defining the educational and behavioral needs of people with asthma.^{7,8}

Over the past decade, while research has focused on the search for aetiological and provoking factors for asthma, clinicians, public health practitioners and educators have sought to increase community awareness about asthma and improve asthma management in those with the condition.^{9,10} Yet asthma is still inadequately diagnosed and managed in Australia and elsewhere,^{11,12} and strategies for informing and teaching people with asthma are required at the population level.¹³

Public health approaches to asthma are multidisciplinary and integrate public and professional educational activities.¹⁴ Such initiatives have commenced with the National Asthma Education Program in the United States,² national initiatives in Britain,¹⁵ and with the National Asthma Campaign (NAC) in Australia.^{16,17}

The NAC was developed in response to the high asthma preva-

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Table 1. Themes used in the NAC public education campaigns

Campaign	Major theme	Message	Iterations	Other activities
"Robot" November 1991 30-second television message	Used a "robotic" character who used inhaled bronchodilators (reliever medication) in an automatic manner. When he acquired an asthma action plan, he became more human.	Asthmatics should turn to their health professional to learn about new ways of managing and preventing asthma, leading to a symptom free life.	(22) National Television	Cable TV (Sky Channel) Compass Airlines Inflight PSAs
"Geoff Marsh" 1 March 1992 60-second television message	Screened during the World Cup Cricket Competition, featured Australian Cricketer (Marsh) putting on his pads to face the bowling (to portray prevention of asthma)	Voice-over identified prevention of asthma and having an action plan developed with doctor as the way to reduce asthma symptoms; prevent rather than relieve asthma.	(185) National Television	Cable TV (Sky Channel) National Billboard campaign McDonalds tray mat promotion
"Geoff Marsh" 2 February 1993	Repeat of 1992 Geoff Marsh message		(24) National Television	Car bumper stickers, leaflets General media articles radio PSAs, ethnic radio

PSAs: public service announcements.

lence in Australia and the need to recognize, diagnose, and appropriately manage asthma.¹ The forerunner of the NAC was a brief six-week public education program, the "Could it be Asthma?" campaign conducted in 1988.¹⁸ This was the first report of the use of the mass media to raise awareness about asthma, but was limited by its brevity and by the lack of a subsequent comprehensive and integrated program.

By 1990, the NAC had become established as a coalition of key professional organizations concerned with asthma care, along with the consumer representative organizations, the State Asthma Foundations. The strategic objectives of the NAC were to conduct public and professional education activities to disseminate the principles of the accepted "6-point plan" for asthma management.⁷ This plan included the fundamental clinical and educational guidelines for optimizing asthma care. The expectations of the program were increased awareness of asthma in the community, improved management in accordance with management guidelines, and improved disease outcomes.

The first phase of NAC activities targeted health professionals, especially general practitioners (family physicians) and pharmacists. It aimed to inform doctors of new preventive approaches to asthma management, to encourage them to develop written asthma management plans for patients, and to regularly review lung function with their patients. This phase included the production and dissemination of professional education materials and conduct of a range of in-service education programs about asthma management. These educational programs emphasized the important skills required by people with asthma, including self-assessment and objective monitoring, allergen avoidance, and the use of preventive medication. Professional educational materials such as the "Asthma Management Plan 1990" were mailed to all medical practitioners throughout Australia. Included with this were patient education material and a pad of asthma management plans for the doctor to give to patients with asthma. A national evaluation of the NAC education programs

for general practitioners demonstrated a significant increase in reported management practices; the changes were limited to the major messages of asthma prevention and monitoring, as disseminated by the NAC.¹⁹ Educational activities for doctors have continued and overlapped with the public education activities.

The second phase of the NAC activity focused on public education. The aim of the campaign was to inform people about a new approach to asthma management⁷ based on an individualized asthma management plan and to emphasize that, with appropriate treatment, people with asthma could achieve an optimal lifestyle. It advised people who had or suspected that they had asthma to see their doctor or pharmacist. It targeted people with undiagnosed and undertreated asthma. The key component was a mass media campaign composed of 30-second television messages shown nationally in November 1991, March 1992, and March 1993. The campaign themes were developed following formative research. Focus groups with young adults identified overreliance on inhaled bronchodilators and limited understanding of preventive therapy for asthma. Message development involved further focus-group research based on use of key frame mock-ups and audiotapes of the educational concepts.

The mass media themes and schedules are shown in Table 1. The first campaign was based around an anonymous robotic figure who repetitively overused bronchodilator medication until a new message about asthma management and prevention changed his life. The second campaign revolved around a well-known Australian sportsman (Geoff Marsh), with the media schedule running during the 1992 World Cup Cricket competition. The 1993 campaign repeated the Geoff Marsh message, again during an International Cricket Series, but with substantially less paid media time than the 1992 campaign. All three campaigns were supported by a range of community-based and public relations activities, including media releases, sponsorship of public events, and promotions. For example, for a month in 1992 McDonald's restaurants across Australia sponsored a tray

mat with asthma recognition and management messages.

The campaign involved the application of social marketing principles: product, price, promotion, and place to increase awareness of asthma and its management in the community. The product was the asthma management plan; the promotion aimed to motivate people with asthma to visit their doctor or pharmacist to find out about the new strategies for improved management. The campaign was based on McGuire's model of communication/persuasion, which suggests that changes in awareness and attitudes are outcomes of mass media campaigns and may be precursors of behavior change.²⁰ The aim of this article is to present the results of evaluation of these campaigns upon asthma awareness, knowledge, and management in the Australian population.

METHODS

The impact of these campaigns was assessed during the two weeks following the campaign by four major cross-sectional community surveys of persons older than 18 years in four major Australian cities. These surveys are described in sequence as O₁ and O₂ before and after the robot campaign, O₃ following the 1992 Geoff Marsh campaign, and O₄ following the 1993 Geoff Marsh campaign. The surveys were undertaken by a commercial research organization with substantial public health survey experience.²¹ They included questions in a household computer-assisted telephone omnibus survey based on random-digit dialing methods that obtained population samples stratified by age and gender.

Standard demographic questions asked about age, gender, level of education, country of birth, and employment status. Participants in the survey were asked whether they or anyone in their immediate family had asthma.

Participants were then asked whether they were aware of any messages about asthma in the media during the previous two weeks. Asthma message awareness was coded as appropriate recall if "prevention," "action plans," "better management," or "normalize life/reduce symptoms" were mentioned. Knowledge about therapy was assessed by the level of agreement/disagreement (on a 5-point Likert scale) with the statement "the best asthma treatment is to keep taking only bronchodilator medication." Disagreement with this statement was the desired response.

Asthma management strategies were assessed in those with asthma themselves or in their immediate family. Participants were asked whether they (or the person with asthma) had, in the previous two weeks, discussed asthma with their doctor or pharmacist, used preventive medication, received an asthma management plan from their doctor or pharmacist, or used a peak flow meter (to measure their airway function).

The four independent cross-sectional telephone surveys (shown in Table 2) were analysed using the χ^2 for trend statistic for categorical data.²² Adjusted odds ratios (OR_{adjusted}), derived from forced entry logistic regression models using SPSS-PC 4.0, assessed the sociodemographic characteristics that predicted awareness and appropriate recall of the media messages in the pooled data. For the 1991 campaign, before and after surveys were conducted, but for the 1992 and 1993 programs, only post-

Table 2. Characteristics of respondents to the four population surveys

	O ₁ : November 1991	O ₂ : December 1991	O ₃ : April 1992	O ₄ : April 1993
<i>n</i>	1,203	1,204	1,807	1,807
% male	50.0	49.8	49.9	49.9
Age (%)				
18-29	29.5	29.6	29.6	29.1
30-49	40.5	40.0	39.3	40.3
≥50	30.0	30.5	31.0	30.5
Australian-born (%)	68.4	70.3	70.2	71.1
Tertiary education (%)	32.5	33.2	32.4	38.6
Respondent has asthma (%)	9.3	9.1	9.4	10.6
Family member has asthma (%)	34.1	33.8	34.3	31.7

campaign data were collected and the earlier surveys were used to provide comparative data.

RESULTS

The demographic characteristics of participants were similar among the survey samples (Table 2) and were not different from census characteristics for the Australian population.²³ The reported prevalence of asthma was 9.7% (95% confidence intervals [CI] = 9.0, 10.5%) across the four surveys. Within cities, pooled asthma prevalence in participants was 8.3% for Sydney, 11.2% for Melbourne, 10.0% for Brisbane, and 9.2% for Adelaide. In all surveys, 70.6% of the study participants were aware of someone with asthma (9.7% had asthma themselves, 33.4% reported someone in their immediate family with asthma, and 33.1% knew of someone else with asthma).

The percentage of participants who were aware of any messages about asthma in the media, and an appropriate message about asthma on television in the previous two weeks, is shown in Figure 1. Overall, there was an increasing trend in awareness ($\chi^2_{\text{trend}} = 263.4, P < .001$) and in appropriate message recall ($\chi^2_{\text{trend}} = 301.9, P < .001$) across the two-year period. There was a nonsignificant decrease in awareness following the robot campaign, (O₁ to O₂, $P = .27$), but a significant increase following the 1992 Geoff Marsh Campaign (O₂ to O₃, $P < .01$). The level of awareness was reduced in 1993 (O₄).

In multivariate analyses, age, gender, employment status, and having diagnosed asthma were associated with awareness of the media messages. Participants older than 50 years were more likely to be aware of asthma messages than younger people (OR_{adjusted} = 1.30, 95% CI = 1.09, 1.49); men more so than women (OR_{adjusted} = 1.20, 95% CI = 1.04, 1.44); participants in paid employment more than those not in the workforce (OR_{adjusted} = 1.27, 95% CI = 1.10, 1.44); and those with asthma themselves or in their family more than others (OR_{adjusted} = 1.27, 95% CI = 1.13, 1.47).

The recall of appropriate messages related to the campaign themes increased from a background level of 10.1% at O₁ and

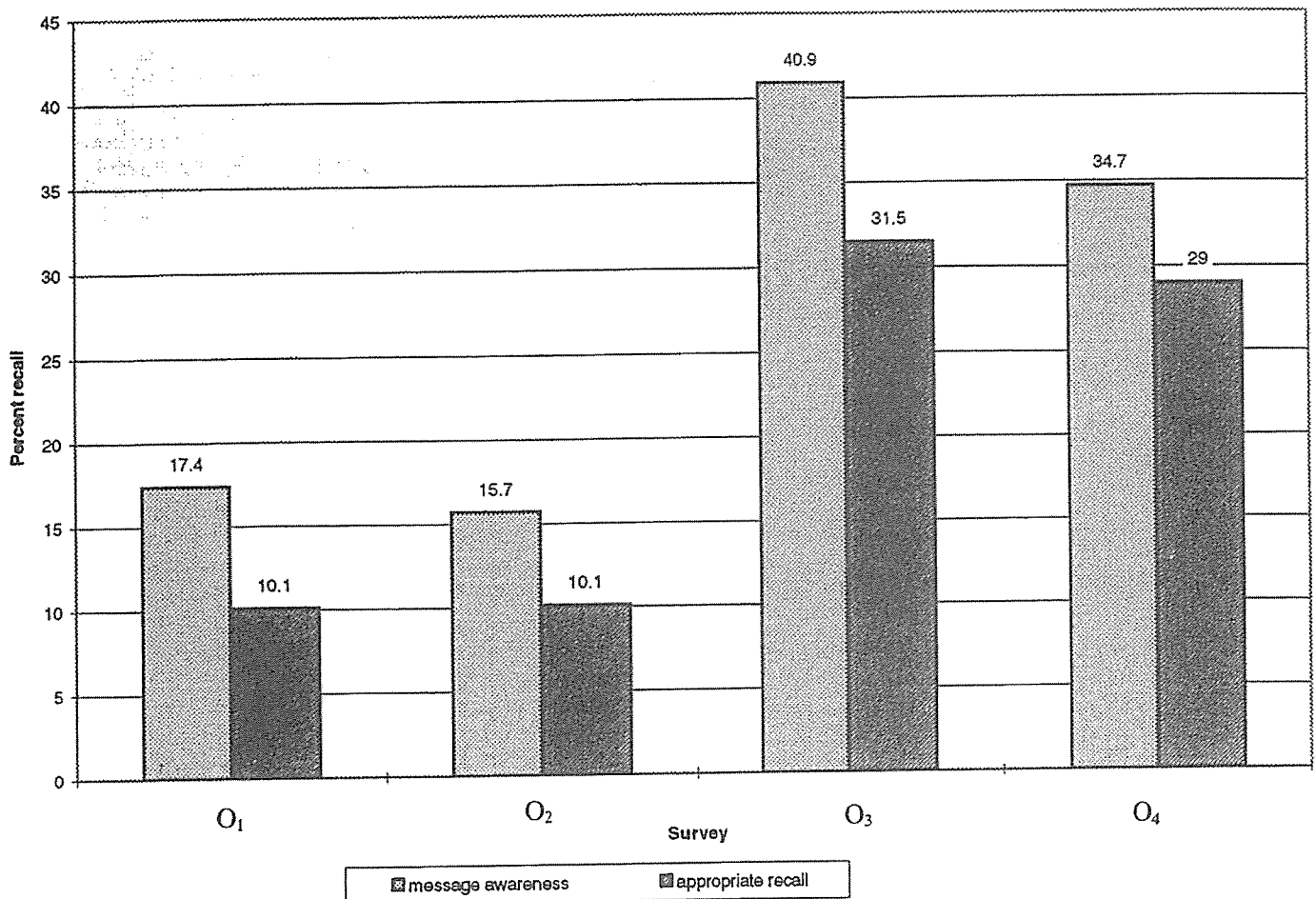


Figure 1. Recall of media messages about asthma.

O₂ to 31.5% at O₃ and O₄. Those survey participants with asthma themselves or in their immediate family were 1.3 times more likely to recall an appropriate message (95% CI = 1.05, 1.67) than those without an immediate asthma contact. Recall of the appropriate message was not associated with age, gender, education, employment status, or country of birth.

Responses to the "knowledge about asthma medication" question were compared across the four surveys (Table 3). The percentage of survey participants who disagreed with the statement that "the best treatment was to only take bronchodilator medication" increased from 25.2% at O₁ and 28.1% at O₂ to 36.3% at O₃ and 37.7% at O₄ ($\chi^2_{trend} = 67.9, P < .001$), suggesting improved awareness of appropriate treatment in the community. However, multivariate analysis showed that men ($OR_{adjusted} = 0.69, 95\% CI = 0.61, 0.80$), older people ($OR_{adjusted} = 0.77, 95\% CI = 0.62, 0.96$), participants not in the workforce ($OR_{adjusted} = 0.72, 95\% CI = 0.61, 0.84$), people from a non-English-speaking background ($OR_{adjusted} = 0.71, 95\% CI = 0.58, 0.86$), and those without asthma in their immediate family ($OR_{adjusted} = 0.51, 95\% CI = 0.45, 0.59$) were less likely to disagree with the statement; that is, they seemed to be less aware of the need to treat asthma with preventive therapy.

Changes in reported asthma management practices are shown in Table 3. Significant increases were noted in the percentage who discussed asthma with their doctor or pharmacist ($\chi^2_{trend} =$

5.8, $P < .05$), and who used peak flow meters ($\chi^2_{trend} = 6.7, P < .01$) and written action plans ($\chi^2_{trend} = 7.4, P < .01$) in the last two weeks. The most substantial changes occurred between O₂ and O₃, with further (nonsignificant) increases between O₃ and O₄. No trends were noted in the percentage who used preventive medication in the previous two weeks ($\chi^2_{trend} = 1.2, NS$).

DISCUSSION

This article is the first report of a sustained community-wide mass communications approach to asthma. It demonstrates that mass media-led public education campaigns can contribute to community awareness of preventive approaches to a chronic condition. In accordance with the national focus of the NAC, the campaign messages were disseminated across Australia and were intended to act as a catalyst for supplementary activities by its member bodies and other organizations.

The net impact of the national activities conducted by the NAC and other bodies between 1991 and 1993 was to increase public awareness about asthma and its management in Australia. This continued the success of the public education strategy that had been piloted three years earlier.¹⁸ The present evaluation showed that there was already a high level of awareness of asthma in the community and that 70.9% of survey participants

Table 3. Changes in reported asthma care and management

Measure	O ₁	O ₂	O ₃	O ₄	χ ² trend
Asthma knowledge about medication use (% disagree)	25.2	28.1	36.3	37.7	67.9**
Discussed asthma with doctor/pharmacist (%) ^a	13.0	10.6	12.7	16.9	5.8*
Used preventive medication (%) ^a	25.6	25.2	25.0	28.3	1.2
Used peak flow meter (%) ^a	7.3	6.1	9.9	10.6	6.7**
Received written asthma management plan (%) ^a	2.8	3.3	4.9	5.7	7.4**

^aDuring the last two weeks.

*P < .05.

**P < .01.

reportedly knew someone with asthma. The media messages were recalled by participants and there was a positive trend in awareness of appropriate treatment.

The public education activities between 1991 and 1993 were multifaceted, building on the 1990–1991 programs of health professional education¹⁹ and then developing mass media strategies to inform the community about this common and undertreated health problem in Australia. The NAC used the nonselective medium of television to raise awareness and began to change attitudes toward asthma management. The campaign messages reached all population segments including older adults, men, and those at socioeconomic disadvantage, a group of people with asthma who may be at risk of suboptimal asthma management.¹² Evaluation showed that recollection of the appropriate content of the message among those groups who were more likely to initially report awareness of messages was less than desirable and was not associated with change in knowledge of recommended asthma treatment practices among these groups.

Methodologically, interpretation of these results is limited, since the national focus of the NAC precluded the use of a controlled evaluation design. However, the results suggest that the NAC and other activities have resulted in improved awareness of asthma treatment and management strategies. The population surveys used to evaluate the campaign impact provided representative data in a timely manner.²⁴ The method used achieved a response of around 75%–80% of contacted numbers with a noncontact rate of 20%–30% for random-digit dialing.²⁴ Any sampling biases were consistent over time and did not affect observed trends. The samples closely resembled the census distribution in terms of age, gender, and socioeconomic characteristics, except that the participants were slightly more educated. The estimates of adult asthma prevalence in participants (9%–10%) were similar to other concurrent epidemiological estimates^{25,26} of adult asthma prevalence.

The maximal impact of the NAC campaigns occurred following the Geoff Marsh campaigns in 1992 and 1993, which were based upon a credible role model²⁷ who was recognized by the audiences watching international sport (more likely to be young men and the socially disadvantaged). In addition to raising awareness, the Geoff Marsh campaigns appeared to be associated with

a general increase in several asthma management practices, with a lesser effect on preventive medication use. However, there may be a slower uptake of preventive medication prescription and use across the population, or there may be intermittent use or compliance problems with longterm preventive therapy.²⁸

The results of these serial surveys also suggest the differential effectiveness of the three mass media health campaigns. The robot campaign was conducted close to Christmas, at a time when community attention is typically saturated by commercial media messages. Further, the robot image may not have been understood or may have been misinterpreted, in spite of formative research comprising focus groups, message testing, and piloting.²⁹ The 1991 Geoff Marsh campaign achieved a good degree of media penetration at a time when public attention was focused on the television coverage of sport. The 1993 Geoff Marsh campaign was less successful because planning was well advanced when a sudden federal election was announced. The result of this was to divert funding and attention away from the media activity. These problems illustrate some of the difficulties in developing schedules for health-related media campaigns. In these asthma campaigns, since the condition affects all age groups and has a wide range of symptoms and levels of severity, it is not always possible to generate sufficient funding to compete for prime time media space with commercial organizations.

It seems that being aware of the educational messages has not translated into evidence of improved knowledge of new approaches to asthma management. Older men who were not in paid employment were more likely to be aware of the messages. However, they were not more likely to recall what the message was about. This implies that, while these people may watch more television and thus show greater awareness of messages, there is limited comprehension of the message. This observation was further emphasized in the multivariate analysis of knowledge about preventive therapy. Participants who were younger, female, in paid employment, and from an English-speaking background were more likely to disagree with the “knowledge” question. This may suggest that the relationship between awareness, attitudes, and behavior is more complicated than has been suggested.²⁰

The limitations of cost and respondents’ time in population research precluded more detailed questioning of asthma knowledge and management. More detailed epidemiologic studies have now been conducted and have confirmed and documented improvements in the asthma management practices that were suggested in this article.²⁵ Data from the Australian Bureau of Statistics have demonstrated a marked decline in asthma deaths in Australians 5–54 years of age between 1989 and 1994, falling from 233 to 115 per year. Although this cannot be causally attributed to NAC activities alone, it does point to the possible contribution of improved asthma care.

The strength and innovativeness of health-promoting coalitions such as the NAC lie in their integrated public health approaches to clinical problems. Using a range of strategies, including health professional and public education, as well as community activity and public relations, provided a successful framework for increased interest in asthma across the health system and the community. The achievements of the NAC occurred in the areas of health professional education¹⁹ as well as in public education campaigns. The challenge is to build on the climate of increased interest in asthma in Australia, to further reduce the preventable mortality and morbidity attributed to this condition.

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ELSEVIER



EXPERIMENTAL PAPER

Reaching the public via a multi media campaign as a first step to nationwide public access defibrillation[☆]

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KEYWORDS

Automated external
defibrillator (AED);
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Summary Public access defibrillation (PAD) is a promising strategy to fight sudden cardiac death. The Austrian Red Cross provided automated external defibrillators (AEDs) and basic life support (BLS) training as an "all inclusive package" combined with on site consultation and maintenance with annual retraining as a part of a nationwide PAD programme. A multi media campaign was started to promote the package and to increase awareness about sudden cardiac death. Data about the campaign, its recognition by the public in Austria and the number of packages were recorded. Sixty-eight percent of the Austrian public above the age of 15 years were able to recall the multi media campaign. Comparing the periods before and after the campaign, the number of website hits climbed significantly from 2931 hits/month (1866–6168) to 4812 hits/month (3432–13,434) ($p=0.0276$). The number of AED services implemented before the campaign increased significantly ($p=0.0026$) in the time after the campaign. Therefore, we conclude that a multi media campaign is useful to stimulate public discussion and it encourages companies to buy "all inclusive packages" containing AEDs, BLS training, on site consultation and maintenance. These measures represent a possible first step in introducing PAD but it seems that they have to be continued on a constant basis.

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Introduction

Sudden cardiac death is a major health issue in the industrialized world.^{1,2} Survival rates in western countries after out-of-hospital cardiac arrest (OHCA) are low, from 2 to 14%.^{3,4} Located in the middle of Europe, Austria has a population of 8.05 million people. In 2002, 36,906 of 76,131 (48.5%) Austrians died of cardio-vascular diseases, and 9860 (26.7%) sudden cardiac death (SCD) victims never reached hospital.⁵ In Vienna, the capital of Austria, a 10.8% hospital discharge rate after OHCA was documented.⁶

Although every link in the chain of survival needs to be improved, two interventions—basic life support (BLS) and early defibrillation—have been shown to increase survival rates significantly.^{7–9} The implementation of advanced cardiac life support facilities into the emergency medical service (EMS) did not improve survival after OHCA.¹⁰ The time to initiation of life saving efforts is crucial and the single most important determinant of outcome.^{11,12} Strategies involving lay bystanders providing BLS and using automated external defibrillators (AEDs) provide hope for improvement.^{13–15} However, there is a lack of experience of how to involve an entire nation in such activities and how to create affordable and sufficient AED networks with trained bystanders. Increasing data are available, which show (i) the benefit of including AEDs into life saving measures provided by bystanders and targeted responders in OHCA¹⁶ in comparison to basic life support without an AED and (ii) the cost effectiveness of public access defibrillation (PAD) programmes.^{17–19} Thus, ideas designed to assist the widespread introduction of PAD should be developed. Reports of successful first steps by governmental organizations are available,²⁰ but data on non-governmental institutions and institutions, without governmental funding or with only limited financial resources, are scarce. To overcome financial obstacles, unconventional strategies might be appropriate. The Austrian Red Cross started an initiative providing the logistics for implementation of AED programmes with BLS training as a package to interested customers.

The media plays a major role in informing the general public and may possibly increase awareness about medical topics.^{21–23} Therefore, a multi media campaign was started to inform the public about SCD and to promote the package. The overall aim of the initiative was to create a snowball effect that would result in the installation of a network of AEDs with educated bystanders covering all of Austria.²⁴ Data about the campaign, its recognition by Austria's public and the num-

ber of packages sold are presented in the enclosed study.

Methods

Informing the public

A team of communication and media professionals coordinated the needs of the media representatives and journalists. Medical expertise, information on the rationale of the programme and practical details were provided by the Austrian Red Cross. Experts on OHCA and sudden cardiac arrest survivors were ready for interviews. Folders, postcards, stickers, posters and a website with detailed information were made available. The standardized logo for Austria indicating an AED location was determined as a key visual (Figure 1). The slogan "Wer hilft? – Defi hilft." ("who helps? – a defibrillator helps.") was selected. Austria's largest national broadcasting company "ORF" was asked to provide broadcasting time for TV and radio spots. All other Austrian TV and radio stations, newspapers and journals were also invited to join. Sponsors were encouraged to finance the production of TV and radio advertisements and the additional media as needed.

Descriptive data have been obtained and are reported as the absolute numbers of broadcasts produced. Furthermore, their time on-air and market shares (if available) are provided to allow



Figure 1 Key slogan and logo of the multi media campaign: "who helps? – a defibrillator helps."

an overview of the extent that the information was presented via TV and radio broadcasts.

We estimated the percentage of Austrians who were able to recall the multi media campaign by a face-to-face poll. This investigation was performed by a professional market research institute and was embedded into a multi theme survey. Three hundred and two trained and controlled investigators were appointed to conduct this survey all over Austria. The 1180 Austrians older than 15 years were interviewed between February 5 and 24, 2004. To be representative for the Austrian public above 15 years of age, people were selected according to standardized quota. At least 1000 Austrians had to be included to reach a standard deviation of 3.16%, regarding a $p < 0.05$ as statistically significant.²⁵

As a further outcome measure, overall number of visitors to the webpage "http://defi.rotekreuz.at" per month was monitored from July 2002 until March 2004. We compared the hits to the website grouped in the periods before (Group 1, July 2002–December 2002), during (Group 2, January 2003–February 2003) and after (Group 3, March 2003–March 2004) the campaign. As the TV campaign lasted from January 13 until February 9, 2003, the entire months of January and February were considered as the period of the media campaign.

Designing an "all inclusive" package

All AED manufacturers active in the Austrian market were invited by the Austrian Red Cross to join the initiative. Two AED models were finally selected because their manufacturers provided 100 training units at no charge and offered low prices for subsequent items. The AEDs had a simple two button design and recorded electro-cardio-graphic (ECG) data automatically. One model provided additional recording. Download software to retrieve stored data from the AEDs was provided by the manufacturers as well. Potential customers chose their favourite AED model and were able to nominate up to 18 volunteers per device to be trained in basic life support and the use of their specific AED model. Annual retraining and replacement of disposable items (batteries and electrodes)²⁶ was offered within a 5-year contract. A manufacturer's guarantee was also granted for 5 years. On site consultation was provided by the Red Cross for questions concerning the right location^{13,14,27} for the AED, marking, storage and routine maintenance checks of the AED by a responsible person on site. Immediate psychological counseling was offered for lay helpers after use of the devices. However, this

service was not monitored in the deployment data. Prewritten press releases and media support was provided by the Red Cross to add value for the purchasing companies. The packages were distributed in all provinces of Austria via the local branches of the Austrian Red Cross, a non-governmental and non-profit organization. The number of packages sold per month was regarded as an indirect indicator of awareness about OHCA because we did not expect anyone to buy a life savers package without knowledge of SCD and the possible advantages of using an AED as a part of life saving measures. We recorded this information according to the customer database of the distributing units of the Red Cross to report it as our third indicator of success. For data analysis, two groups were defined beforehand. We did not expect a significant impact of the multi media campaign on implementation figures during January and February due to delay needed for decision making. Therefore, one period before (October 2002–February 2003) and one after (March 2003–March 2004) the multi media campaign were defined.

Targeting non-traditional and traditional first responders

Austrian companies (e.g. shopping centres, cinemas, supermarkets, banks with self service foyers, petrol stations, etc.) were encouraged to join the project and buy the package. They were understood to be the most powerful and promising investors to fund this first step of the nationwide implementation of PAD. The employees of these Austrian companies were regarded as non-traditional first responders. Training in basic life support, including the use of AEDs, was offered. Another target group included police officers and fire fighters not routinely involved in medical emergencies. Furthermore, community officials, public transportation providers and employees of recreational or wellness facilities were considered as non-traditional first responders. General practitioners (GPs) and other health care professionals were encouraged to participate as they act as first responders in some communities. As a special group, private individuals and their relatives and friends were invited to join. They were also encouraged to become trained in first aid.²⁸

Statistical analysis

Descriptive data were obtained to describe the multi media campaign. The results of the face-to-face poll are presented in percentages. The

absolute numbers of webpage hits are displayed time dependently. Data regarding packages and AED implementation are presented as median, minimum and maximum and as absolute numbers and percentages.

Differences in the numbers of defibrillators sold between the two periods were compared with the exact Wilcoxon test. Differences in the number of hits to the internet page were tested with the exact Kruskal–Wallis test. Pair wise comparisons between two groups are corrected using the Bonferroni–Holm method. A two-sided p -value < 0.05 was regarded statistically significant.

Results

Austria’s national TV agency (ORF) joined the campaign and provided free broadcast time from January 13 to February 9, 2003. Online content was available at “<http://events.orf.at>”.

ORF produced four different 30s radio advertisements sponsored by a petrol company, a large Austrian bank and the Chamber of Commerce. Additionally, four TV spots (31–39s each) were provided to be broadcast during the daily prime times.

On the first day of the campaign, national ORF TV stations reported the PAD project on the evening news (7.00 and 10.00 p.m.) for 156s (2 min 36s) each and reached 1.672 million (25% market share) and 611,000 (9% market share) Austrians.

The four different TV spots were broadcasted 51 times nationwide. This represents 1811 advertisement seconds (30 min 18s). On a national level, six TV shows were on-air for 1465s (24 min 42s) reaching between 588,000 and 899,000 viewers (9–13% market share). Twenty-four TV shows referred to the campaign and offered information about OHCA and AEDs in their local area.

The four radio spots were aired 40 times, in summary 1200s (20 min). Six different radio shows reported about survivors and broadcast interviews with experts on a national level. Additionally, local broadcasting companies provided information about the PAD project 56 times.

During the planned period, 1180 people were interviewed in a face-to-face poll. Sixty-eight percent of the overall Austrian public aged 15 years and older were able to recall the multi media campaign. Although there was sufficient impact over all of Austria, the media campaign was only recalled by 51% of the interviewees in Vienna, the nation’s capital. Further details of the face-to-face poll are displayed in Figure 2.

The time course of hits to “<http://defi.rotekruz.at>” from July 2002 until March 2004 is

Did you recall the Public Access Defibrillation campaign of the Austrian Red Cross?

total	Yes, I did 68 %
age	
15 to 29	58%
30 to 39	61%
40 to 49	78%
50 to 59	78%
60 and older	69%
education	
compulsory education	67%
qualification for university	67%
university education	74%
employment	
company employee	70%
executive employee	79%
self-employed	68%
place of residence	
cities	53%
villages	73%
rural country	78%

Figure 2 Details of the face-to-face poll: data is presented as percentage, $N = 1180$, S.D. 3.16%, a two-sided p -value < 0.05 was regarded statistically significant.

shown in Figure 3. The three groups proved to be significantly different ($p = 0.001$).

Comparing Groups 1 and 3, the number of hits climbed significantly from 2931 hits/month (1866–6168) to 4812 hits/month (3432–13,434) ($p = 0.0276$) showing that more people visited the webpage even after the end of the cam-

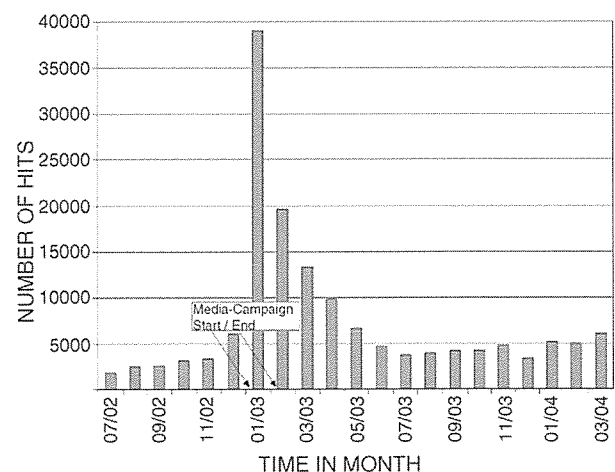


Figure 3 Time course of hits of the webpage <http://defi.rotekruz.at>; data is presented as absolute number of hits per month.

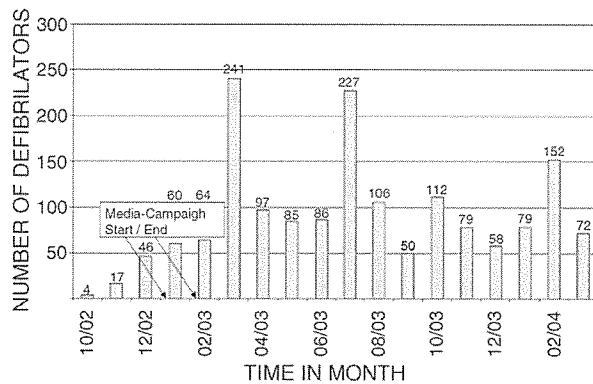


Figure 4 Number of AEDs implemented per month by the Red Cross initiative; data is presented as absolute number of AEDs implemented per month.

paign. ORF reported 4000 hits to its webpage “<http://events.orf.at>” in February.

After a period of 18 months, 1635 AEDs had been introduced all over Austria. The ratio between the two AED models was calculated to be 55%:45%. The absolute number of devices introduced per month are displayed in Figure 4. The number of AEDs introduced during the Group 1 period increased significantly ($p=0.0026$) compared to the Group 2 period.

Discussion

The main result is that the multi media campaign was an effective tool to increase awareness about a device called an “AED” that was nearly unknown in Austria, and to promote the implementation of “all inclusive packages” as a part of a nationwide PAD programme temporarily.

Our decision to produce radio and television spots was based on data that identify TV as an important source of information about resuscitation, even if the information given sometimes does not correlate with real conditions.²² The rate of bystander aid has been increased significantly by televised public service announcements.²¹ Also, the quality of first aid performed by lay helpers was improved by a multi media campaign.²³ Nevertheless, daily newspapers and periodicals were asked to print advertisements free of charge, which some did for a short period of time. Some newspapers also printed interviews or stories of survivors from sudden cardiac arrest. We had the impression that periodicals appearing on a national level were more difficult to reach than smaller ones concentrating on a local area only. However, the impact of this type of media remains unclear. Stimulating public discussion turned out to be a crucial factor for success.

The overall effect measured by the face-to-face poll was surprisingly high, even if a smaller number of people in urban areas were able to recall the campaign compared with rural regions. This may be due to a higher frequency of advertisements and a greater presence of a variety of types of media in densely populated areas. Interestingly, persons of the age of 40–60 years and employees in leading positions remembered the campaign especially well. These groups help more often in emergencies including cardiac arrest than others.²⁹ In summary, it seems that the multi media campaign reached its key target groups.

As shown by the time of hits to the index-page of “<http://defi.rotekreuz.at>”, the broadcasted trailers, news and shows had an immediate effect. Although lower afterwards, the number of hits still remained above the level documented before the campaign had started. However, an increase in hits from about 3000 to 5000 per month does not indicate constantly increased public awareness, or as was our goal, a snowball effect.

Website visits before the multi media campaign can be explained by early local marketing efforts of local branches and by interested Red Cross Members. One dissemination strategy was to reach the 47,000 voluntary helpers of the Austrian Red Cross. They were informed in detail and motivated to encourage their employers or personally known decision makers to join the project and to buy the packages.

The packages were available from July 2002 on but none could be introduced during the first 3 months due to the flood disaster that struck several Austrian States in July 2002. The Red Cross had to concentrate on this issue first. After that, some local branches started marketing efforts before the multi media campaign was launched. The campaign’s direct impact on implementation figures showed a slight delay, may be due to time needed for decision making within the companies (Figure 4). Thereafter, introduction numbers were far beyond our expectations and even caused delivery delays. However, the number of devices sold dropped again, and therefore, the effect created has to be regarded as temporary.

Originally, we had planned to start the campaign in November. Early elections for the Austrian parliament endangered the response to our efforts. We did not expect too much response during Christmas and rescheduled the start to January 2003. This unexpected circumstance made clear that the starting points of such campaigns should be flexible in order not to compete with other topics of broad public interest.

The combined AED plus BLS package¹⁶ encouraged Austrian companies to educate potential bystanders and to introduce the devices in appropriate locations. Companies bought the all inclusive packages to demonstrate social awareness. They understood their involvement as added value for their customers and their employees. Also, politicians took advantage and ordered great numbers of devices in the view of oncoming local elections.

It was our aim to distribute the two AED models nearly equally and not to favour one company. Only rare exceptions occurred in regional EMS services that recommended one specific device to enable compliance with their existing EMS equipment. Therefore, both devices were offered equally in the majority of the presentations. Particularities of the different models were explained to potential customers to enable a free choice of their favourite device. Feedback data by local Red Cross site consultants demonstrate that companies select the most reliable model with the easiest user interface³⁰ (self explaining design, clear guidance through voice prompts). The very subjective judgments of AED particularities are underlined by the nearly equal distribution of the two AED models.

Limitations

The results of our study may be limited to the local or national particularities of Austria. For example, ORF has a dominating position in Austria's media landscape and its participation was crucial for the success of our campaign. The success of our campaign is also explained by the fact that critical questions concerning legal issues were clear beforehand. Anyone is allowed to buy and to operate an AED in Austria, even without prescription or authorization. Thirdly, powerful lobbies like the Austrian Medical Association, the federal ministry for health and crucial opinion leaders did not try to inhibit our efforts, as is known from experience in other countries.

Last but not least, the Austrian Red Cross has a powerful position in Austria providing a nationwide network of EMS and first aid training facilities. The standardized package was distributed equally all over Austria by Red Cross Units, which may not be possible in larger countries or if more than one organization or company is involved.

Conclusions

A multi media campaign seems to be effective to increase awareness about sudden cardiac death,

at least temporarily. It encourages companies to buy "all inclusive packages" containing AEDs, BLS training, on site consultation and maintenance. These efforts are a possible first step to introduce PAD on a nationwide level but continuity seems to be crucial.

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THE IMPACT OF TELEVISION PUBLIC SERVICE ANNOUNCEMENTS ON THE RATE OF BYSTANDER CPR

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ABSTRACT

Objective. To determine whether televised public service announcements (PSAs) demonstrating the fundamentals of CPR were effective in increasing the rate of layperson bystander-initiated CPR. **Methods.** Two 30-second PSAs were shown 597 times from September 8, 1996, through April 12, 1997. In each, CPR was given to one member of an older couple by the other in the home. The authors measured rates of bystander CPR in communities that were exposed to the PSA and in communities that were not exposed in two time periods, a before-airing period, January 1, 1993, through September 7, 1996, and a during-airing period, September 8, 1996, through April 12, 1997. A case was defined as a patient with a nontraumatic cardiac arrest that occurred before arrival of EMS personnel, and for whom CPR was initiated by EMS personnel or lay bystanders. **Results.** There were 1,786 cardiac arrests in the "before" period and 289 in the "during" period. The rate of bystander CPR increased from 43% to 55% ($p < 0.05$) in the intervention community and remained the same in the comparison community (33%). **Conclusion.** Airing of the PSA was accompanied by an increase in the rate of bystander CPR, though the increase may be attributable to a secular trend. **Key words:** CPR; cardiac arrest; public education; television; public service announcement; bystander CPR.

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Rapid initiation of layperson bystander CPR enhances a cardiac arrest victim's chances of survival.¹ In combination with several other important factors, such as a witnessed collapse and a short interval between collapse and defibrillation, bystander CPR improves survival rates by as much as 50% compared with resuscitation performed by emergency personnel only.²

Despite the fact that 75% of cardiac arrests occur at home,³ bystander CPR rates in the home remain significantly lower than cardiac arrests in public places.

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Persons aged 50 years and more are at higher risk of both experiencing a cardiac arrest and witnessing one. However, attempts to train this population have been largely unsuccessful.^{4,5} Several nontraditional teaching campaigns have been tried but have not been able to increase citizen CPR usage in the home.^{5,6}

In an attempt to encourage the use of citizen CPR, the American Heart Association has called for new programs to reach older adults.⁷ It is known that television is a main source of CPR information for older persons,⁸ and it may be a promising and innovative means to reach this target audience. Public service announcements (PSAs) have been successful in disseminating information about public health concerns such as smoking and asbestos hazards, cardiovascular disease, and HIV/AIDS awareness.⁹⁻¹³

Our goal was to assess the influence of a television PSA demonstrating the fundamentals of CPR on the incidence of bystander-initiated CPR. With the aid of a local television station, we undertook a seven-month campaign of televised PSAs directed toward older adults to test the hypothesis that the PSA campaign would lead to higher rates of bystander CPR for cardiac arrest.

METHODS

Study Design

This study measured the rates of bystander-initiated CPR in communities that viewed the PSAs (intervention communities) and compared them with the rates in communities that did not view the PSAs (comparison communities). We reviewed medical incident reports provided by emergency medical services (EMS) and fire departments from January 1, 1993, to April 12, 1997. From the reports, the following variables were extracted: the county in which the incident occurred, the date and location of the incident, the age and sex of the patient, whether bystander CPR was initiated, whether the cardiac arrest was witnessed, whether it was due to trauma, and whether it occurred before or after EMS arrival. We analyzed the data in two periods: a before-PSA period (January 1, 1993, to September 7, 1996) and a during-PSA period (September 8, 1996, to April 12, 1997).

The PSA

We approached local television stations to request their assistance in the production and broadcast of PSAs demonstrating the fundamentals of CPR. One station, KING-TV, an NBC affiliate in Seattle, Wash-

TABLE 1. Baseline Characteristics of Cardiac Arrest Patients in the Intervention and Comparison Communities

	Intervention	Comparison
Number	1,099	976
Male gender	788 (72%)	651 (67%)
Average age	65 years	65 years
Witnessed arrests (excluding unknowns)	452 (41%)	475 (48%)
Arrests at home	872 (79%)	832 (85%)
Age over 50 years	917 (83%)	801 (82%)

ington, agreed. The sponsoring agency, a private foundation, paid \$25,000 for the cost of production. The station agreed to air the PSAs at no cost. The station's donated airing charges averaged \$376 per PSA spot, for a total of \$217,815.

Two 30-second PSAs were produced. Each featured an older couple, one white and the other African American, with the husband experiencing a witnessed cardiac arrest at home and the wife calling 911 and initiating CPR. The two texts were similar (Appendix). Narrated by a local television news anchor, the PSAs gave concise, easily understandable information. The essentials of CPR were condensed into the message "call, blow, and pump." The PSAs concluded with the phone number 1-888-CPR-KING for viewers who desired more information about obtaining CPR training. The PSAs were aired 579 times from September 8, 1996, to April 12, 1997. Although airing times fluctuated from month to month, half of the PSAs were aired between the hours of 8:00 AM and 11:30 PM, the hours of highest viewing.

Population and Setting

The intervention communities, all in western Washington within broadcast range of KING-TV, included Snohomish County, population 551,000, Kitsap County, population 230,000, and Whatcom County, population 156,000. The comparison communities, located in eastern Washington, were Spokane County, population 410,000, and Yakima County, population 209,000. They were outside broadcast range of the PSAs, and had no exposure to KING-TV via cable or satellite.

The intervention and comparison communities were chosen as a convenience sample according to their size and status as areas with only one or two providers of EMS service. Very small communities were not considered in the study. We excluded the city of Seattle and King County from our analysis because of high background rates of bystander CPR (over 50%) and our assumption that the PSA would be unable to increase already high rates. Large-scale and ongoing citizen CPR training began in Seattle and King County in 1971, and Seattle and King County residents have been exposed to much media attention on the importance of early intervention in cardiac arrest.^{4,5}

Case Definition

A case was defined as a patient whose cardiac arrest occurred before arrival of EMS personnel, and who had CPR initiated by EMS or a bystander. We defined the term "bystander" to mean layperson, or non-EMS personnel. The definition of "bystander" included first-responder personnel, such as police. We included cardiac arrests due to overdose, drowning, SIDS, respiratory causes, and other medical causes. Trauma was excluded, i.e., motor vehicle and other accidents, assaults, burns, electrocutions, and traumatic suicides, because initiation of CPR is not necessarily the first priority for these events. Also excluded were cardiac arrests in a medical or dental clinic, nursing home, or other medical site and dead-on-arrival patients for whom no CPR was performed.

Human Subjects

This study was approved by the University of Washington Human Subjects Review Committee.

Data Analysis

We tested for differences in the bystander CPR rates before and during the PSA campaign using chi square statistics. Statistical significance was defined as $p < 0.05$.

RESULTS

From January 1, 1993, to April 12, 1997, 2,075 cases were identified. There were 1,786 cardiac arrests in the "before" period and 289 in the "during" period. There were 1,099 cardiac arrests in the intervention communities and 976 in the comparison communities. Table 1 shows the characteristics of the intervention and comparison communities.

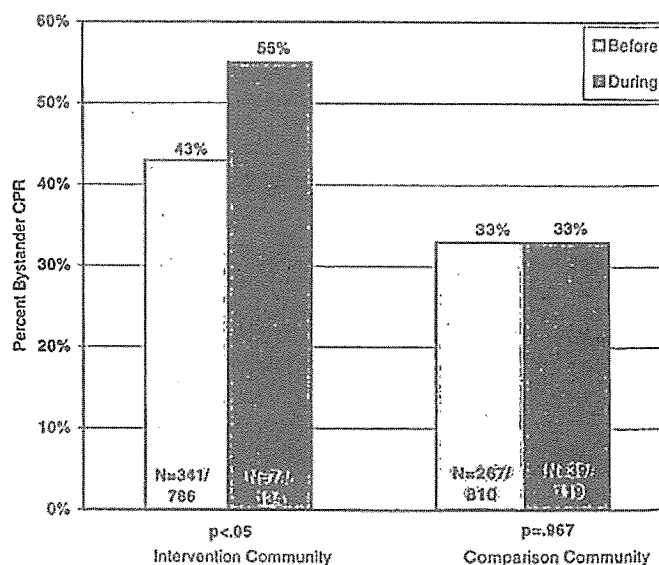


FIGURE 1. Bystander CPR rates before and during public service announcement campaign.

Figure 1 shows the rates of bystander CPR before and during the PSA broadcasts. In the intervention community, there was a significant increase from 43% to 55%. The rate remained at 33% in the comparison community. The rate of 43% includes the entire "before" period, from January 1993 through August 1996. In order to detect secular trends, we looked at the rates of bystander CPR in the intervention community by year in the "before" period. The rate was 35% in 1993, 46% in 1994, 44% in 1995, 51% from January through August 1996, and 55% in the "during" period, September 1996 through March 1997.

DISCUSSION

The intervention community's increase in the rate of bystander CPR in the "during" period may be attributable to the PSA, or may simply reflect a secular trend toward an increase in bystander CPR. We cannot discount a secular trend, since the three and a half years in the "before" period demonstrated an increasing rate of bystander CPR. The comparison community did not demonstrate any secular trend.

Even if a secular trend was responsible for the increase in the rate, we believe there were secondary benefits to the campaign. Awareness of the three basic steps of CPR increased in the intervention community. A random survey was conducted among residents of the intervention community and a comparison community to evaluate effectiveness of the campaign.¹⁴ Results of the survey show that more people in the intervention community reported knowledge of the basic steps of CPR than in the comparison community. Viewers of the PSAs unanimously liked them. KING-TV informed us that the PSA campaign generated the most positive response of any public service campaign it had ever produced (personal communication, Karla Halbakken, Aug 15, 1997).

The results of this study suggest that PSAs may be effective in promoting bystander CPR in the home among older adults. A television PSA demonstrating the essentials of CPR may reinforce the training people have received in the past, or it may give someone previously unexposed to CPR training the chance to mentally prepare for a cardiac arrest.

It should be noted that the rates of bystander CPR in the intervention community are high compared with those in most other locales.¹⁵⁻¹⁷ It is conceivable that the effect of a PSA campaign may be more pronounced in a community with a lower baseline rate of CPR.

LIMITATIONS AND FUTURE QUESTIONS

First, mortality rates were not considered in the analysis of cardiac arrest cases. We could not determine whether the elevated rates of bystander CPR resulted in higher survival rates during the airing of the PSAs. Second, the PSAs may have resulted in inappropriate

or inefficient CPR. It was beyond the scope of this study to examine whether the PSAs increased the frequency of inappropriate CPR or to measure the quality of CPR given during an event.

Another potential limitation would be that EMS personnel might become more diligent in documenting bystander CPR in the "during" period, resulting in a Hawthorne effect, with more complete data reporting than in the before period. To address this, we examined the amount of missing information for the two periods. We found that the box for "bystander CPR" was blank in approximately 10% of the cases for each period, and concluded that no such effect had taken place.

Finally, the study is limited by the fact that "after" PSA data were not collected. A "before, during, and after" design would provide stronger evidence about the effectiveness of the campaign. We did not collect these data simply due to lack of resources; we recommend such a design for future studies. Another innovative teaching method is to utilize the Internet. We are currently planning to evaluate a web site that has been constructed to teach CPR on the Internet. The web site is learnpr.org.

CONCLUSIONS

We observed that a broadcast of PSAs was accompanied by an increase in bystander CPR rates, and we believe the data are suggestive of an effect of the PSA on bystander CPR rates. We cannot, however, discount the possibility of a secular trend. The airing of a televised PSA was an innovative attempt to increase bystander CPR. We urge other communities to investigate the possibility of implementing such a campaign.

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