

## A survey of resuscitation training in Canadian undergraduate medical programs

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**Objectives:** To establish a national profile of undergraduate training in resuscitation at Canadian medical schools, to compare the resuscitation training programs of the schools and to determine the cost of teaching seven resuscitation courses.

**Design:** Mail survey in 1989 and follow-up telephone interviews in 1991 to update and verify the information.

**Subjects:** The undergraduate deans of the 16 Canadian medical schools.

**Intervention:** The mail survey asked five questions: (a) Is completion of a standard first aid or cardiopulmonary resuscitation (CPR) course a requirement for admission to medical school? (b) Are these courses and those in basic and advanced cardiac, trauma and neurologic life support for children and adults provided to undergraduate students? (c) During which undergraduate year are these courses offered? (d) Is their successful completion required for graduation? and (e) Who funds the training courses?

**Results:** The medical schools placed emphasis on the seven courses differently. More than half the schools required the completion of courses before admission or taught some courses but did not require the completion of the courses for graduation. On average, fewer than three of the seven courses were taught, and the completion of fewer than two was required for graduation. About half of the courses were funded by the universities. The annual projected maximum cost of teaching the seven courses was \$1790 per medical student.

**Conclusion:** The seven resuscitation courses have not been fully implemented at the undergraduate level in Canadian medical schools.

**Objectifs :** Établir un tableau national de la formation de premier cycle en réanimation dans les facultés de médecine du Canada, comparer les programmes de formation en réanimation des facultés de médecine et déterminer le coût de l'enseignement de sept cours de réanimation.

**Conception :** Envoi par la poste de sondages en 1989 et entrevues téléphoniques de suivi en 1991 pour mettre à jour et vérifier l'information.

**Sujets :** Les doyens de premier cycle des 16 facultés de médecine du Canada.

**Intervention :** Le sondage postal posait cinq questions : (a) La réussite d'un cours standard de premiers soins ou de réanimation cardio-respiratoire est-elle une exigence d'admission à la faculté de médecine? (b) Les étudiants de premier cycle peuvent-ils suivre ces cours, les cours d'introduction et les cours avancés en réanimation cardiaque d'urgence, en traumatologie et en assistance neurologique pour enfants et adultes? (c) En quelle année du premier cycle ces cours sont-ils offerts? (d) Faut-il réussir à ces cours pour obtenir son diplôme? (e) Qui finance les cours de formation?

**Résultats :** Les facultés de médecine accordent une importance variable aux sept cours.

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Plus de la moitié des facultés exigent de les avoir suivis avant l'admission ou elles donnent certains cours mais n'exigent pas la réussite pour obtenir le diplôme. En moyenne, moins de trois des sept cours étaient donnés, et la réussite d'au moins un cours était exigée pour l'obtention du diplôme. Environ la moitié des cours étaient financés par les universités. Le coût annuel maximum prévu pour l'enseignement des sept cours était de 1 790 \$ par étudiant en médecine.

**Conclusion :** Les sept cours de réanimation ne sont pas tous donnés au premier cycle dans les facultés de médecine du Canada.

**R**esuscitation "is the act of restoring life or consciousness of one apparently dead."<sup>1</sup> Crude life-saving attempts were performed in Egypt during prosperous times under the pharaohs.<sup>2</sup> Efforts to perfect and provide more sophisticated life-saving skills continue today. Since atherosclerotic heart disease is the overall leading cause of death and trauma is the leading cause of death among those aged 1 to 44 years<sup>3</sup> it is crucial that such efforts be maintained. Although the ultimate solution to these problems is prevention physicians must nevertheless be proficient in providing resuscitation within the first 10 minutes in cardiac emergencies and within the first "golden" hour in trauma cases.<sup>4,5</sup> This awareness has placed a growing demand on physicians for expertise in resuscitation,<sup>6</sup> and new training programs have been developed to assist them in a variety of emergencies.

Some US undergraduate medical schools offer a specialized 4-year curriculum that emphasizes resuscitation training.<sup>7</sup> In other schools prepackaged modular courses in resuscitation are used, including courses in first aid, cardiopulmonary resuscitation (CPR), basic trauma life support (BTLS) and advanced cardiac, trauma, pediatric and neurologic life support (ACLS, ATLS, PALS and ANLS).<sup>5,8-13</sup> Students who meet the goals of the written and practical examinations are given a certificate of good standing.

This survey was performed to answer the question "To what extent are Canadian medical graduates trained in the art of resuscitation?" Its objectives were to establish a national profile of resuscitation training in the 16 Canadian undergraduate medical schools, to compare the resuscitation training programs of the schools and to determine the cost of teaching the seven resuscitation courses mentioned.

For the purpose of the survey a first aid course refers to any 8-hour course introducing the student to the essential concepts of airway, breathing and circulation as well as to wound care and the control of hemorrhage. One such course is sponsored by St. John Ambulance.<sup>8</sup>

Basic life support (commonly known as CPR) and ACLS courses provide experience in basic and advanced methods of cardiac stabilization. They are 8 and 24 hours long respectively and are sponsored

by the American Heart Association<sup>9</sup> and the Canadian Heart Foundation.<sup>10</sup>

The PALS course is essentially the same as the ACLS course but focuses on children and infants. It is a 24-hour course sponsored by the American Heart Association and the American Academy of Pediatrics.<sup>12</sup>

On successful completion of the BTLS and ATLS courses the student will be able to use the basic and advanced life support skills essential in resuscitating the traumatized patient. Each course is approximately 24 hours long and is sponsored by the American College of Emergency Physicians<sup>11</sup> and the American College of Surgeons Committee on Trauma.<sup>5</sup>

The ANLS course provides the student with information and advanced clinical skills necessary for treating injuries to the central nervous system. This 24-hour course is not sponsored by an agency; it was written Dr. John W. Crosby and associates<sup>13</sup> and is available from Dr. Crosby.

## Methods

In 1989 we sent a questionnaire to the undergraduate deans of the 16 Canadian medical schools; all replied. They were asked the following questions: (a) Is completion of a first aid or CPR course a requirement for admission to medical school? (b) Are these courses and those in basic and advanced cardiac, trauma and neurologic life support for children and adults provided to undergraduate students? (c) During which undergraduate year are these courses offered? (d) Is their successful completion required for graduation? and (e) Who funds the courses?

Although beyond the scope of this survey it would have been ideal to review each school's entire 4-year curriculum. Instead we decided to review the availability of the seven resuscitation courses to establish a baseline for future studies. In 1991 the responses were updated and clarified through additional correspondence and by telephone. We telephoned the deans and verified that the information given was correct.

The cost of each course was provided by its sponsoring association. The total cost per course was obtained by multiplying the course cost by the

number of students graduating in one year. The total resuscitation training cost was the sum of the total costs per course.

## Results

The resuscitation courses required for admission, those taught during undergraduate training and the ones necessary for graduation are given in Table 1. Only first aid and CPR courses are required for admission by six of the medical schools. Although the ACLS course was being taught in most of the schools, the ATLS, PALS and ANLS courses were seldom taught or required for graduation.

The schools placed emphasis on the seven courses differently. More than half the schools required the completion of some courses before admission or taught courses during undergraduate training

but did not require students to have successfully completed the courses to graduate. McMaster University does not ask students to take any of the seven courses.

On average, fewer than three of the seven courses were taught, and completion of fewer than two was required to graduate (Table 1). About half the courses were funded by the universities (Table 2). The annual projected maximum cost of the courses per medical student was \$1790 (Table 3). The total projected resuscitation training cost for 1989 (when 1737 medical students graduated) was \$3 109 230.

## Discussion

The amount and type of resuscitation training provided was inconsistent throughout the medical

Table 1: Profile of undergraduate training in resuscitation in 1991 by medical school

School	Course*							Total
	FA	CPR	BTLS	ACLS	ATLS	PALS	ANLS	
British Columbia	A/T1	A/T1	-	T4	-	-	-	2A/3T
Calgary	a	a	-	T3	T3†	T3†	-	3T
Alberta	A	T1-2/G	-	T4/G	-	T4/G	-	1A/3T/3G
Saskatchewan	T1/G	T1-4/G	-	T4/G	-	-	-	3T/3G
Manitoba	-	T1	-	T4	T4	-	-	3T
Western Ontario	A/G	T1/G	-	T4/G	-	-	-	1A/2T/3G
McMaster	-	-	-	-	-	-	-	-
Toronto	A	A	T†	-	-	-	-	2A/1T
Queen's	-	T1-2	T2†	T3	-	-	-	3T
Ottawa	-	T1,4	-	T4	-	-	-	2T
McGill	T3/G	T3/G	-	T3/G	T4	-	-	4T/3G
Montreal	A/G	A/T1,3/G	-	-	-	-	-	2A/1T/2G
Sherbrooke	-	T3	-	T4	-	-	-	2T
Laval	-	T3/G	-	-	T3/G	-	-	2T/2G
Dalhousie	A/G	T1/G	-	T4/G	-	-	-	1A/2T/3G
Memorial	-	‡	-	T3	-	-	-	1T
Total	6A/3T/5G	3A/12T/7G	2T	12T/5G	4T/1G	2T/1G	-	

\*FA = first aid, CPR = cardiopulmonary resuscitation, BTLS = basic trauma life support, ACLS = advanced cardiac life support, ATLS = advanced trauma life support, PALS = pediatric advanced life support and ANLS = advanced neurologic life support. A = required for admission, T1-4 = taught in year(s) 1-4, a = recommended for admission and G = required for graduation.  
†Course outline modified.  
‡Student's responsibility to take CPR before ACLS.

Table 2: Source of funding of resuscitation courses taught during undergraduate training

Source	Course					
	FA (n = 3)	CPR (n = 12)	BTLS (n = 2)	ACLS (n = 12)	ATLS (n = 4)	PALS (n = 2)
Personal	1	2	0	0	1	0
School	0	4	2	6	0	0
School and student (shared)	1	5	0	5	2	2
Unknown	1	1	0	1	1	0

schools. We believe that ideally the completion of first aid and CPR courses should be a prerequisite for admission. To minimize psychomotor skill decay CPR recertification should be required annually in preparation for ACLS training (as is the case at the University of Saskatchewan).<sup>15,16</sup> If the ACLS, ATLS and PALS courses were required for graduation physicians would be better prepared for both urban and rural practice. The ongoing review of new courses, such as the ANLS course, is necessary.

Funding is essential if these courses are deemed prerequisites for graduation. Additional funding could be provided by students, universities, the government, the private sector and nonprofit health organizations.

Because curriculum time and funding are limited consideration should be given to providing a comprehensive resuscitation curriculum rather than seven individual courses. Such a curriculum has been described,<sup>17</sup> and another one is recommended by the American College of Emergency Physicians.<sup>18</sup> A similar one could be developed by the Canadian Association of Emergency Physicians. A conjoint committee with experts in medicine, emergency medicine, pediatrics, surgery and anesthesia could assist the association. To include the objectives of all seven courses would provide comprehensive training while avoiding repetition — for example, cervical-spine immobilization is covered in the BTLS, ATLS and ANLS courses. If all 16 medical schools were to adopt this curriculum the resuscitation training of medical students across Canada would be consistent; moreover, less funding and curriculum time would be needed. Such a program has already been planned by the University of Calgary (Gregory Powell: personal communication, 1991).

Treatment of patients with acute cardiovascular or trauma problems by trained personnel would reduce rates of illness and death, especially in rural

areas.<sup>4,5</sup> Cardiac resuscitation training has been successfully provided for medical students. Unfortunately the same cannot be said about trauma courses; BTLS training was offered in only two and ATLS training in only four of the schools. Unlike CPR and ACLS these courses are relatively new. It is hoped that they will soon become part of the curricula of Canadian medical schools and that the availability of recertification courses will encourage the graduating physician to participate in periodic retraining.

Given the time and financial constraints at the undergraduate level it may be appropriate to include the more advanced courses, such as PALS and ANLS, in the newly expanded 2-year internship.

This study had several limitations. First, other courses were not included in the survey — for example, neonatal advanced life support. Second, our questionnaire may not have elicited data regarding additional resuscitation training provided as part of the core curriculum. A baseline has been established, but an in-depth curriculum review would better answer our needs.

Since we collected these data several medical schools have embarked on an extensive curriculum review. Therefore, the most recent changes in resuscitation training are not presented.

## Conclusions

The seven resuscitation courses studied have not been fully implemented: on average, fewer than three of the seven courses were taught in the medical schools, and fewer than two had to be successfully completed before graduation.

Physicians continue to encounter acute cardiovascular and traumatic events despite preventive efforts. The greatest reduction in the number of complications or deaths resulting from these events occurs because of effective therapy within the first few minutes or hour. From the results of our survey medical undergraduates are not being prepared to provide this therapy. Further studies should include a comprehensive review of resuscitation training in undergraduate and postgraduate curricula.

To improve the situation deans must support recommendations from ongoing curriculum review and allocate funds to a specific resuscitation program. It would then be feasible to stipulate resuscitation training as a prerequisite for graduation. By improving medical student training emergency health care would be improved.

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Table 3: Projected maximum costs of resuscitation courses

Course	Cost per course,* \$	Total cost per course,† \$
FA	50	86 850
CPR	40	69 480
BTLS	150	260 550
ACLS	250	434 250
ATLS	550	955 350
PALS	375‡	651 375
ANLS	375§	651 375
Total	1790	3 109 230

\*Cost in Nova Scotia, unless otherwise indicated.

†Based on number of medical students graduating in Canada in 1989 (n = 1737).<sup>14</sup>

‡Cost in Kingston, Ont.

§New course; cost will vary.

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## Conferences

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**Aug. 25-31, 1991:** International Surgical Week  
Stockholm

Scientific secretary, 155 Hauptstrasse 63, PO Box 411,  
CH 4153, Reinach BL1, Switzerland

**Aug. 26-29, 1991:** 7th International Conference on  
Pharmacoeconomics (sponsored by the International  
Society for Pharmacoeconomics)

European World Trade and Convention Center, Basel,  
Switzerland

Dr. Stanley A. Edlavitch, conference chair, International  
Society for Pharmacoeconomics, University of  
Minnesota College of Pharmacy, HSUF 7-158, 308  
Harvard St. SE, Minneapolis, MN 55455;  
(612) 624-4426 or 624-5931, fax (612) 624-2974

**Aug. 31-Sept. 5, 1991:** World Congress on  
Microcirculation

Louisville, Ky.

P. Harris, Department of Physiology, Health Sciences  
Center, A-114 University of Louisville, KY 40292;  
(502) 588-5373

**Sept. 1-5, 1991:** World Congress for the Prevention of  
Alcoholism and Drug Dependency

Kuala Lumpur, Malaysia

Thomas R. Neslund, 12501 Old Columbia Pike, Silver  
Spring, MD 20904

**Sept. 1-6, 1991:** 6th World Congress in Ultrasound  
(sponsored by the World Federation for Ultrasound in  
Medicine and Biology)

Copenhagen

Congress Secretariat, Spadille Congress Service,  
Sommervej 3, DK-3100 Hornbaek, Denmark

**Sept. 1-6, 1991:** World Congress of the International  
Society of Cardiovascular Surgery

Amsterdam

Ms. Terry Rojas, Meetings and Conventions, 13 Elm St.,  
Manchester, MA 01944; (508) 526-8330

**Sept. 1-7, 1991:** 1st World Congress of Cellular and  
Molecular Biology

Palais des Congrès, Paris and Versailles

Mrs. Leila Orbecchi, director, CERT, 63, ave. Parmentier,  
75 011 Paris, France; telephone 011-33-1-48-07-07-  
00, fax 011-33-1-48-07-22-11

**Sept. 2-5, 1991:** 5th Breast Cancer Cooperative Group  
Conference of the European Organization for Research  
and Treatment of Cancer

Leuven, Belgium

European Organization for Research and Treatment of  
Cancer, 125, boul. de Waterloo, 1000 Brussels, Belgium

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