

*A Survey Study of Resuscitation Skills Retention Amongst Health Providers in
Newfoundland and Labrador*

Final Report of Study Findings

A Study Conducted By:

**Professional Development & Conferencing Services (PDCS)
Faculty of Medicine, Memorial University**

July 2011



Table of Contents

| | |
|-----------------------------------------------------------------|-----|
| Acknowledgements..... | iii |
| List of Tables and Figures..... | iv |
| Executive Summary..... | vi |
| 1.0 Introduction..... | 1 |
| 1.1 Study Objectives | 1 |
| 1.2 Background..... | 1 |
| 2.0 Study Methodology | 6 |
| 2.1 Literature Review..... | 7 |
| 2.2 Focus Groups | 7 |
| 2.3 Online Survey-Questionnaire | 8 |
| 3.0 Study Findings – Focus Groups..... | 10 |
| 3.1 Deterioration in Resuscitation Skills and Competencies..... | 11 |
| 3.2 Resuscitation Skills Training/Updates | 12 |
| 3.2.1 Frequency of Updates..... | 12 |
| 3.2.2 Preferred Update Methods | 13 |
| 3.2.3 Barriers to Participation..... | 14 |
| 3.3 Factors Influencing Confidence and Ability | 16 |
| 4.0 Study Findings – Online Survey-Questionnaire | 19 |
| 4.1 Survey Respondents | 19 |
| 4.1.1 Overall Respondent Demographic Characteristics | 19 |
| 4.1.2 Current Resuscitation Certification/Experience | 22 |
| 4.1.3 Regional Demographic Characteristics | 27 |
| 4.2 Resuscitation Skills Training/Updates..... | 29 |
| 4.2.1 Frequency of Updates..... | 29 |
| 4.2.2 Preferred Update Methods | 30 |
| 4.2.3 Barriers to Participation..... | 33 |
| 4.3 Factors Influencing Confidence and Ability | 34 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| | | |
|-------|--------------------------------------------------------------|----|
| 4.3.1 | Self-Efficacy to Perform Resuscitation..... | 34 |
| 4.3.2 | Respondents’ Confidence to Perform Resuscitation | 35 |
| 4.3.3 | Respondents’ Ability to Perform Resuscitation | 36 |
| 4.4 | Deterioration in Resuscitation Skills and Competencies | 39 |
| 4.5 | General Feedback from all Respondents..... | 44 |
| 5.0 | Summary of Study Findings..... | 48 |
| 6.0 | Conclusions..... | 52 |
| 7.0 | References | 54 |

Appendix A:

Focus Group Questions

Appendix B:

Online Survey - Questionnaire – *Survey of Resuscitation Skills Retention*

Acknowledgements

This study is the result of the collaborative efforts of numerous individuals and organizations. We would like to acknowledge their support and assistance for this study.

- Funding for this study was provided by the Medical Research Foundation, Faculty of Medicine, Memorial University.
- This study, including focus group and survey question design, implementation, and data collection and analysis, was conducted by Professional Development & Conferencing Services (PDCS), Faculty of Medicine:
 - Dr. Vernon Curran, Director, Academic Research and Development
 - Ms. Lisa Fleet, Manager, Research Programs
 - Ms. Emily Eaton, Research Assistant
 - Ms. Melanie Greene, Research Assistant (until Feb. 2011)
- Study implementation was guided by an interprofessional advisory group reflective of health managers and health providers from across the regional health authorities (RHAs) in Newfoundland and Labrador:
 - Dr. Vernon Curran, Memorial University
 - Ms. Lisa Fleet, Memorial University
 - Ms. Melanie Greene, Memorial University (until Feb. 2011)
 - Ms. Jacki Ballard, Eastern Health
 - Dr. Dave Morgan, Memorial University/Eastern Health
 - Ms. Susan White, Eastern Health
 - Ms. Sandra Evans, Central Health
 - Ms. Jeannette Christopher, Western Health
 - Ms. Lorraine Mitchell, Labrador-Grenfell Health
- Full ethics approval for this study was received with the support of the Human Investigation Committee (HIC), Faculty of Medicine, Memorial University, as well as to the respective ethics committees of the four RHAs.
- Distribution of the focus group questions and URL for the online survey-questionnaire would not have been possible without the assistance of the four RHAs, as well as the following health professional associations:
 - Newfoundland and Labrador Medical Association
 - Association of Registered Nurses of Newfoundland and Labrador
 - College of Licensed Practice Nurses of Newfoundland and Labrador
 - Newfoundland and Labrador Association of Occupational Therapists
 - Newfoundland and Labrador Association of Respiratory Therapists

List of Tables and Figures

Tables

| | | |
|----------|-----------------------------------------------------------------------------------------------------------------------------------|----|
| Table 1 | Survey Distribution..... | 9 |
| Table 2 | Respondents’ Professions..... | 19 |
| Table 3 | Respondents’ Departments/Clinical Areas..... | 21 |
| Table 4 | Respondents’ Current Resuscitation Certification..... | 22 |
| Table 5 | Respondents’ Current Resuscitation Certification (By Profession)..... | 24 |
| Table 6 | Mean # of Times Respondents Have Taken Each Course..... | 25 |
| Table 7 | Mean # of Times Respondents Have Participated in a ‘Real’ Resuscitation Code In the Past 12 Months..... | 26 |
| Table 8 | Mean # of Times Respondents Have Participated in a ‘Real’ Resuscitation Code In the Past 12 Months (By Size of Community)..... | 27 |
| Table 9 | Respondents’ Professions (By Region)..... | 27 |
| Table 10 | Respondents’ Departments/Clinical Areas (By Region)..... | 28 |
| Table 11 | Respondents’ Current Resuscitation Certification (By Region)..... | 29 |
| Table 12 | Respondents’ Preferred Update Methods..... | 30 |
| Table 13 | Preferred Update Methods (By Profession)..... | 31 |
| Table 14 | Respondents’ Barriers to Participation in Updates/Refreshers..... | 33 |
| Table 15 | Respondents’ Self-reported Degree of Confidence in their Abilities to Perform..... | 34 |
| Table 16 | Respondents’ Self-reported Confidence to Perform Resuscitation..... | 36 |
| Table 17 | Respondents’ Self-reported Ability to Perform Resuscitation..... | 36 |
| Table 18 | Respondents’ Self-reported Ability to Perform Resuscitation (By Region)..... | 37 |
| Table 19 | Respondents’ Self-reported Ability to Perform Resuscitation (By Profession)..... | 38 |
| Table 20 | Respondents’ Self-Reported Ability to Perform Resuscitation (By Size of Community)- ACLS Certification..... | 38 |
| Table 21 | Respondents’ Self-Reported Ability to Perform Resuscitation 39 (By Size of Community)- PALS Certification..... | 39 |

| | | |
|----------|--------------------------------------------------------------------------------------------------------------------------------|----|
| Table 22 | Respondents’ Self-Reported Ability to Perform Resuscitation (By Size of Community)- NRP Certification | 39 |
| Table 23 | Respondents’ Concerns Regarding Deterioration of Ability to Perform Resuscitation | 40 |
| Table 24 | Respondents’ Concerns Regarding Deterioration of Ability to Perform Resuscitation (By Profession) - BLS Certification | 40 |

Figures

| | | |
|----------|----------------------------------------|----|
| Figure 1 | Region of Practice/Work (Overall)..... | 20 |
| Figure 2 | Size of Community of Practice..... | 21 |

Executive Summary

The purpose of this report is to summarize the findings of a research study conducted between July 2010 and June 2011. The objectives of this study were threefold:

1. To examine the perceptions and attitudes of certified resuscitation providers towards the retention of resuscitation skills and regular skills updating.
2. To examine resuscitation providers' self-efficacy beliefs towards resuscitation skills.
3. To explore resuscitation provider's perceptions of methods and modalities for enhancing resuscitation skills retention.

This study was conducted by Professional Development & Conferencing Services (PDCS), Faculty of Medicine, Memorial University (Dr. Vernon Curran, Principal Investigator). It was supported by a Research Development Award from the Medical Research Foundation, Faculty of Medicine, Memorial University.

Study implementation was guided by an interprofessional advisory group reflective of health managers and health providers from across RHAs in Newfoundland and Labrador. Advisory group members were as follows:

- Dr. Vernon Curran, PhD – Director of Academic Research and Development, Professor of Medical Education, Faculty of Medicine, Memorial University
- Ms. Lisa Fleet, MA, Dip.Ad.Ed, BEd - Manager, Research Programs, Professional Development & Conferencing Services, Faculty of Medicine, Memorial University
- Ms. Melanie Greene, MA – Research Assistant, Professional Development & Conferencing Services, Faculty of Medicine, Memorial University (until Feb. 2011)
- Ms. Jacki Ballard, BA - Manager, Learning and Development, Eastern Health
- Dr. Dave Morgan, MD, CCFP-EM - Assistant Professor, Program Director, Emergency Medicine Residency Program, Discipline of Family Medicine, Memorial University/Eastern Health
- Ms. Susan White, RN, BN – Clinical Nurse Educator, Division of Newborn Medicine, Eastern Health
- Ms. Sandra Evans, RN, BVocEd, MEd - Director, Professional Development & Continuing Education, Central Health
- Ms. Jeannette Christopher, RN, BEd, MEd – Regional Director (retired June 2011), Organizational Development, Western Health

- Ms. Lorraine Mitchell, RN, BN, MN – Regional Director, Employee Development, Training & Health, Labrador-Grenfell Health

Prior to commencement of the study, application for ethics review and approval was made to the Human Investigation Committee (HIC), Faculty of Medicine, Memorial University, as well as to the respective ethics committees of the four RHAs. Full study approval was received from HIC, Central Health, Western Health, and Labrador-Grenfell Health. Eastern Health reviewed the study protocol and determined full ethics approval was not required as the study was not being conducted onsite in one of its facilities. However, its ethics committee was informed of the study and will be informed of the findings as per their request.

A variety of methodologies were used to gather information as part of this study. A mixed-methods, explanatory study design (Springer, 2010) combining the strengths of quantitative and qualitative research was followed and included: (1) a literature review; (2) focus groups; and (3) online survey-questionnaire. Twenty-eight (N=28) health professionals from across the four regional health authorities (RHAs) participated in the focus group. The online survey-questionnaire was completed by N=909 respondents.

Various health professional groups were represented in the focus groups and survey and included:

- Registered nurses
- Nurse Practitioners
- Licensed Practical Nurses
- Family Physicians
- Specialists
- Paramedics
- Occupational Therapists
- Respiratory Therapists
- Physiotherapists

As well, various departments/clinical areas were also represented, ranging from emergency, family practice, acute and ambulatory care, long-term care, critical care, surgery, medicine, and community health.

Current Resuscitation Certification/Experience

Both focus group and survey respondents possess extensive resuscitation certification in a variety of areas. Focus group respondents reported being certified in BLS, ACLS, NRP, PALS, TNCC, CTAS, ATLS, and ITLS. The majority of survey respondents reported being certified in BLS (79.8%). This was followed by ACLS (22.1%), NRP (10.7%), and PALS (7.4%).

| Survey Respondents' Current Resuscitation Certification | N* | % of Total Respondents |
|----------------------------------------------------------------|-----------|-------------------------------|
| BLS | 725 | 79.8% |
| ACLS | 201 | 22.1% |
| NRP | 97 | 10.7% |
| PALS | 67 | 7.4% |
| TNCC | 66 | 7.3% |
| Canadian Triage and Acuity Scale (CTAS) | 52 | 5.7% |
| ATLS | 18 | 2.0% |
| ITLS | 18 | 2.0% |
| Advanced Life Support in Obstetrics (ALSO) | 13 | 1.4% |
| Acute Care of At-risk Newborns (ACORN) | 6 | 0.7% |

The majority of those certified in most areas were nurses (RNs and NPs), with the exception of ATLS, in which the majority certified were physicians (77.8%) and ITLS, in which the majority certified were paramedics (55.6%).

Interestingly, while some respondents have extensive course experience, they are lacking in 'real' experience. Respondents certified in BLS reported having participated in a real resuscitation code a mean of 1.44 times in the past twelve months (as opposed to participating in the course a mean of 12.00 times). By contrast, respondents certified in NRP have more 'real' experience, reporting participating in codes a mean of 4.76 times (as opposed to participating in the course a mean of 3.80 times).

Resuscitation Skills Training/Updates

Frequency of Updates

Focus group participants reported that the frequency of refreshers should be dependent upon the length of time between required renewals. There was a general consensus that updates would be ideal if availed of at least every few months. Several respondents specified six months as appropriate. Two respondents felt that the renewal period for ACLS in particular (3 years) was a long time to go without updates.

By contrast, survey respondents reported wanting to participate in updates (i.e. refresher courses) every year or every two years, depending on the certification area. The exception to this was if new guidelines were implemented. In this situation, respondents wanted more frequent updates in their certification area.

Preferred Update Methods

Focus group participants identified several methods by which they would like to be able to update or refresh their competencies. Preferred methods highlighted included:

- Mock codes
- E-learning
- Frequent review of equipment and materials

Survey respondents also identified mock codes as being important. Their ranking of preferred learning methods (i.e. using the scale 1=most preferred to 13=least preferred) indicated preferences for methods which allowed them to practice their skills in a hands-on format, such as:

- Practice with an instructor (mean score 3.59)
- Practice with other health professionals as a team (mean score 3.72)
- Mock codes (mean score 5.04)
- Self-practice with a manikin (mean score 5.74).

One-Way ANOVA analyses were conducted to determine if respondents' professions, regions, or size of community had a significant effect on their preferred update methods at the $p < .05$ probability level. The results indicate that respondents' professions had a significant effect on their preferences for various methods. For instance, physician and paramedics reported a greater preference for mock codes than allied health. Allied health reported a greater preference for videoconferencing than other professions. The results also indicate that a larger proportion of respondents in the Central region reported a preference for e-learning ($p = .014$); a

larger proportion of respondents in the Eastern region reported a preference for self-instructional videos ($p=.044$). Size of community had no significant effect on preferred update methods.

Barriers to Participation

Focus group and survey respondents identified similar barriers to participation in resuscitation training and updates. These barriers include:

- Staff shortages
- Timing of courses and updates
- Availability of courses/updates and/or instructors
- Financial issues (i.e. cost of travel to training; cost to bring instructor to a rural community for training; impact of training on fee-for-service physicians who have to close their practices to attend training, etc.)

Factors Influencing Confidence and Ability

Both focus group and survey participants highlighted how lack of practice and aspects of team performance could influence their confidence in their ability to perform resuscitation. Aspects of team performance cited as influential by focus group respondents included:

- Discrepancies in skill levels amongst team members
- Lack of communication amongst the team
- Team leaders who are not always up-to-date on their skills.

Survey respondents were asked to rate their level of self-efficacy (an individual's confidence in his/her ability to affect a given behavior) in performing a resuscitation code in a variety of specific situation, using the scale 0=cannot at all do to 100=highly certain can do.

Respondents reported their highest self-efficacy:

- After they have recently practiced (mean 82.79).
- After participating in an update (mean 79.95).
- After an effective debriefing session from a recent resuscitation code (mean 75.69).

Respondents reported their lowest self-efficacy:

- If team members do not work well together (mean 55.26).
- When there is no clear leader of the resuscitation code (mean 52.74).

- If members of the resuscitation team are not communicating well (mean 51.74).
- If I cannot understand other members of the resuscitation team (mean 49.24).
- If I am not familiar with new guidelines (mean 46.93).
- When I feel my skills have deteriorated (mean 46.54).

Survey respondents were also asked to rate their confidence to perform resuscitation in a competent manner in the areas in which they were currently certified. This rating was based on a Likert scale of 1=not at all confident to 5=extremely confident. Respondents reported being moderately to very confident in all resuscitation certification areas, with the highest confidence being reported in:

- BLS (mean score 3.96)
- ACLS (mean score 3.83)
- ITLS (mean score 3.83)

The lowest confidence was reported for:

- PALS (mean score 3.33)
- ALSO (mean score 3.30)
- ACORN (3.00)

Survey respondents were also asked to rate their ability to perform resuscitation in a competent manner in the areas in which they are currently certified. This rating was based on a Likert scale of 1=not at all able to 5=extremely able. The results show that that respondents report being moderately to very able in most of the resuscitation certification areas. Respondents report being very to extremely able in their ability to perform BLS (mean score 4.10) and ACLS (mean score 4.03). One-Way ANOVA analyses were conducted to determine if respondents' regions, professions, and size of community had a significant effect on their self-reported abilities to perform resuscitations at the $p < .05$ probability level and the results show that both region of practice and profession had a significant effect on respondents' self-reported ability to perform BLS.

Pearson chi square analyses was conducted to determine if there was a significant difference between respondents self-reported ability to perform resuscitation and the size of the community in which they practice. The results show that significant differences were reported at the $p < .05$ probability level between ability to perform and size of community for those who are ACLS, PALS, and NRP certified. A greater proportion of respondents in urban communities appear to report greater ability than those who practice in rural communities.

Deterioration in Resuscitation Skills and Competencies

Survey respondents were asked to rate their concerns regarding the deterioration of their ability to perform resuscitation in the areas in which they are currently certified. This rating was based on a Likert scale of 1=very low concern to 5=very high concern. Respondents reported moderate to high concern regarding deterioration in their ability to perform PALS (mean score 3.29) and TNCC (mean score 3.02). They reported low to moderate concern in most other resuscitation areas. A Pearson chi square analysis revealed a significant difference between self-reported concerns of deterioration to perform BLS and profession ($p=.000$). A greater proportion of nurses reported low concern while LPNs and allied health reported moderate concern.

Focus group and survey respondents highlighted several factors which influence deterioration in resuscitation skills and competencies. Inadequate opportunities for real or mock practice was highlighted by numerous respondents. Lack of access to courses and/or training materials, as well as frequent changes to guidelines, was also cited.

Conclusions

- Greater access to and opportunity for participation in practice/hands-on training opportunities was consistently highlighted by focus group and survey respondents. Such opportunities include mock experiences, mock codes, and opportunities for practice with an instructor. This is especially important for those who do not work in departments which experience a high frequency of resuscitation codes, such as emergency, critical care, etc.
- Overall, the preferred update methods reported by focus group and survey respondents included:
 - Mock codes
 - Practice with an instructor
 - Practice with other health professionals as a team
 - Self-practice with a manikin
 - E-learning
 - Frequent review of equipment and materials

Respondents' professions and regions had a significant effect on their preferred update methods. Some examples:

- Physicians, paramedics, and respiratory therapists reported a preference for mock codes.
 - Allied health reported a preference for videoconferencing, audioconferencing, and self-instructional videos.
 - Respondents in Central Health reported a preference for e-learning.
 - Respondents in Eastern Health reported a preference for self-instructional videos.
- Respondents in rural communities reported less ‘real’ resuscitation code experience than those in urban communities. As well, respondents in rural communities reported lower ability to perform resuscitation in specific certifications areas, such as ACLS, PALS, and NRP.
 - Both focus group and survey participants reported how aspects of team performance influence their confidence in their ability to perform resuscitation. Aspects of team performance cited as influential by focus group respondents included: discrepancies in skill levels amongst team members; lack of communication amongst the team; and team leaders who are not always up-to-date on their skills. Survey respondents also reported low self-efficacy (an individual’s confidence in his/her ability to affect a given behavior) to perform resuscitation when there is no clear leader of the team and when the team is not communicating well. It is recommended that to improve team performance during a resuscitation code, health professionals must be provided with opportunities to practice and be assessed as a team and to develop competencies in interprofessional teamwork.
 - Respondents highlighted the importance of appropriate equipment and resources being provided to all health professionals who wish to utilize them for training and/or refresher courses. Focus group respondents highlighted the need for training on ‘realistic’ equipment, which is especially important if you do not have a lot a ‘real’ code experience. Some respondents reported a preference for self-directed learning/refresher opportunities if only they could access the resources. Provision of learning materials/guidelines in print or online formats, allowing health professionals to borrow a manikin for self-practice, are all methods by which health professionals could update their skills and refresh their knowledge if made available to them.
 - Respondents consistently highlighted changes in guidelines and lack of training related to these changes, as a reason why their confidence and ability deteriorates. They highlighted the importance of the provision of training sessions/updates as new guidelines are released in their respective certification areas.

1.0 Introduction

1.1 Study Objectives

The purpose of this report is to summarize the findings of a research study conducted between July 2010 and June 2011. The objectives of this study were threefold:

1. To examine the perceptions and attitudes of certified resuscitation providers towards the retention of resuscitation skills and regular skills updating.
2. To examine resuscitation providers' self-efficacy beliefs towards resuscitation skills.
3. To explore resuscitation provider's perceptions of methods and modalities for enhancing resuscitation skills retention.

This study was conducted by Professional Development & Conferencing Services (PDCS), Faculty of Medicine, Memorial University (Dr. Vernon Curran, Principal Investigator). It was supported by a Research Development Award from the Medical Research Foundation, Faculty of Medicine, Memorial University.

1.2 Background

In terms of the level and extent of staff training and development that occurs within hospitals and across the health system, continuing education for health providers in the area of resuscitation and life support skills is significant. It is estimated that over 10,000 health providers across a variety of professions (e.g., medicine, nursing, respiratory therapy, paramedicine) and across the four regional health authorities (RHAs) in Newfoundland and Labrador are trained and/or certified in a variety of resuscitation and life support skill areas. These areas would include basic life support (BLS), advanced cardiac life support (ACLS), advanced trauma life support (ATLS), pediatric advanced life support (PALS), and neonatal resuscitation program (NRP), among others.

Although most of these health providers can successfully learn to perform resuscitation and life support, research on the retention of resuscitation skills has shown that deterioration in skill level occurs across a wide variety of professions (e.g., physicians, nurses, emergency medical technicians) and across a number of resuscitation skill areas (Broomfield, 1996; Cooper & Libby, 1997; Fossel, Kiskaddon, & Sternbach, 1983; Hamilton, 2005; Moser & Coleman, 1992; Niles et

al., 2009; O'Steen, Kee, & Minick, 1996; Smith, Gilcreast, & Pierce, 2008). There appears to be no relationship between skill deterioration and advanced educational background, years of experience, responsibility for patient care, self-perceived level of competence, motivation, nor the potential for use of skills. Hospital staff who participate in resuscitation events on a regular basis have been shown to not retain their knowledge or skills to any greater degree than those who participate less frequently or never (Boudin, 1995; Curry & Gass, 1987). Studies have reported skills deterioration within a minimum of 2 weeks of initial training with progressive deterioration until participants reach pre-training levels at 1 and 2 years after initial training (Moser & Coleman, 1992). The review of multiple evaluation studies conducted within 6 months of training demonstrates that resuscitation skills retention significantly declines during this time (Dunn, Niday, Watter, McGrath, & Alcock, 1992). Studies of ACLS training effects have also shown that physicians and nurses' knowledge of ACLS guidelines deteriorates to near pretraining levels within 6 months after training (Schwid, Rooke, Ross, & Sivarajan, 1999).

A number of studies focusing on resuscitation skills training have evaluated the effect of various teaching methods and modalities on skills retention (Bjorshol, Lindner, Soreide, Moen, & Sunde, 2009; Christensen et al., 1998; Cronin, Cheang, Hlynka, Adair, & Roberts, 2001; Hamilton, 2005; Hoadley, 2009; Kaye & Mancini, 1986; Niles et al., 2009; Settgest, Nguyen, Devries, Krebs, & Duane, 2006; Smith, Gilcreast, & Pierce, 2008; Wayne et al., 2005; Wayne et al., 2006). The methods compared have included 4-hour vs. 8-hour courses, modular self-teaching versus traditional lecture approaches, videotape with independent practice, low and high fidelity simulations, use of portable manikins with video instruction, computer-based training, and computerized simulator systems. The findings from these studies have demonstrated that both health professionals and the lay public are able to learn CPR equally well with a variety of teaching methods, but none maintain skills retention over an extended period of time.

Video self-instruction has been shown to improve competence in resuscitation (Hamilton, 2005). For instance, Braslow et al. (1997) discuss the use of a video to teach CPR. Performance was recorded and assessed using a 14-item checklist and skill meter/recording manikin directly following training. Results were then compared with those of participants of instructor-led training. Both video self-instruction (VSI) groups performed CPR more competently after training; 80% were rated as competent compared with 45% of the instructor-led groups. Retention tested at 60 days after training also showed a higher percentage of correct ventilations and compressions in the VSI group. Another study found that medical students could be trained using VSI to similar competence to those traditionally trained in a 4-hour instructor-led AHA heartsaver course (Todd et al., 1998). The experimental group used a

modestly priced resuscitation manikin and the same 34-minute self-instruction video, without any instructor involvement.

A quasi-experimental study of student nurses was carried out, which found that arranging four self-instruction training sessions, where subjects were allowed to practice for as long as they wanted with a skillmeter manikin to provide feedback, significantly improved CPR performance (Davies & Gould, 2000). Nurses could carry out CPR training on the ward, thus preventing the staffing problems caused by releasing staff from the ward for training (Davies & Gould, 2000). Although it would not replace formal CPR training, the availability of an appropriate CPR manikin would allow staff to practice their skills more regularly. Self-instruction has been suggested as an effective, financially economic way of refreshing or learning the skills of CPR, leaving instructors more time to focus on evaluating the skills (Starr, 1998).

A number of studies have been performed using simulation to improve resuscitation performance by nurses (Flisher, 1992; Grannemann & Conn, 1996; Rivera & Gabriel, 1995; Wadas, 1999). It has been reported that training with cardiac arrest simulation (CAS) reduces staff anxiety, improves teamwork and improves knowledge of equipment and cardiac arrest treatments (Flisher, 1992). It has also been suggested that simulation training in resuscitation helps participants to improve their knowledge in a relatively realistic arena and allows them to familiarize themselves with the equipment and procedures (Hendrichse, Ellis, & Morris, 2001). One study found that a specialized manikin, which gives auditory feedback of the rescuers performance during CPR, improved skills (Wik, Thowsen, & Steen, 2001). Performance improved immediately when the voice-activation manikin (VAM) was enabled. The retention of CPR skills was tested following training with a VAM and found that even when baseline CPR skills were poor, they improved after 20 minutes of practice on the VAM (Wik, Myklebust, Auestad, & Steen, 2002).

A limited number of studies on the use of computers and the Internet in the delivery of CPR, BLS and/or ALS have been reported in the literature (Moule, Albarran, Bessant, Brownfield, & Pollock, 2008; Peterson, 2006; Romero, Ventura, Gibaja, Hervas, & Romero, 2006; Schwid et al., 1999). A randomized controlled trial was carried out to compare the cardiac arrest management of 45 anaesthetists following preparation by either computer-based ALS simulation program or textbook study (Schwid et al., 1999). Participants who prepared by using the computer program performed significantly better in the cardiac arrest simulation (CAS) test. Results suggest that the computer program was an effective, economical learning tool that enhances retention of knowledge and is more likely to be used than textbooks (Schwid et al., 1999). A pilot non-randomized study comparing e-learning and classroom delivery of BLS with automated external defibrillator (AED) use among mental health care professionals (including

nurses, clinical psychologists, and medical staff) found that e-learners performed slightly better in most of the observed skills (Moule et al., 2008). The e-learning group also out-performed the classroom group in a comparison of pre- and post-test knowledge scores, skill performance results, and response time, but these differences were not statistically significant. Overall group performance did not differ, however, indicating that e-learning and classroom learning can prepare learners comparatively well in resuscitation knowledge and skills.

Investigators have also sought to identify means for improving resuscitation skills retention over time. Research findings definitively support more frequent review than annual recertification (Fabius, Grissom, & Fuentes, 1994; Yakel, 1989). Regular practice and training has been identified as one effective strategy to reduce anxiety and increase comfort levels when performing BLS (Farah, Stiner, Zohar, Zveibil, & Eisenman, 2007; Settgest et al., 2006). Such refresher training methods or “booster” strategies have typically involved the provision of hands-on practice at some point after an initial training session. However, the optimal interval to facilitate “boosters” and the effectiveness of different teaching methods for facilitating boosters has not been determined nor examined in a systematic and comparative manner.

Interestingly, while many teaching methods used in resuscitation and life support courses aim to increase perceived self-efficacy, little attention has been directed to this area in training (Turner, Dierselhuis, Draaisma, & ten Cate, 2006; Turner, van de Leemput, Draaisma, Oosterveld, & ten Cate, 2008). Self-efficacy is a cognitive process which has been described as an individual’s confidence in their ability to affect a given behavior. It has been suggested that the likelihood that any skill will be performed successfully depends on an individual’s belief that he or she can successfully perform that skill. It has been suggested that self-efficacy is also believed to affect knowledge gain and the performance of skills related to resuscitation proficiency (Maibach, Schieber, & Carroll, 1996). Resuscitation events are anxiety-provoking, and if sufficiently intense, it is believed that anxiety may reduce self-efficacy (Tofil, White, Manzella, McGill, & Zinkan, 2009).

A recent study by Youngquist et al. (2008) examined the effects of pediatric airway management training methods on paramedic self-efficacy and skill performance. An initial sample of N=2,520 paramedics were trained in pediatric bag-mask ventilation (BMV) and endotracheal intubation (ETI). A convenience sample of N=245 paramedics presented for voluntary retraining and were assigned to control (no retraining), videotape presentation, self-directed learning, or instructor-facilitated lecture and demonstration retraining. Self-efficacy was measured prior to and following initial training and retraining. BMV and ETI skills were also tested following retraining. The study findings demonstrated that self-efficacy ratings were not predictive of skill performance, as self-efficacy was maintained even when skill performance

declined. However, the findings also showed that training increases self-efficacy, especially among paramedics from low-call volume areas (Youngquist et al., 2008).

In an earlier study, it was demonstrated that nurses who had post-qualification training showed more confidence as well as greater knowledge in their resuscitation skills (O'Donnell, 1990). Another study examined the relationship between confidence, experience, perceptions of skill importance, and resuscitation skills in preregistration house officers (Marteau, Wynne, Kaye, & Evans, 1990). Resuscitation skills were assessed using a performance checklist, experience was measured by the number of cardiac arrests attended in the previous six months, and confidence and perceived importance of skills were assessed by a survey. The authors found that the preregistration house officers tended to have erroneous confidence because of their attending cardiac arrests. They reported overconfidence in their skills and this was positively related to the number of cardiac arrests they attended. However, their skills did not relate to their level of confidence.

There is a lack of peer-reviewed literature which has sought to examine in a systematic manner health providers' perceptions of resuscitation and life support skills retention, and preferred methods and modalities for updating and maintaining resuscitation and life support skills over time. Furthermore, the relationship of the health provider's geographic location and area of clinical work has not been investigated in a systematic manner with perceptions and preferences for skills updating. The study findings have important policy and program implications for the perceived utility of refresher training in skills retention and the use of various teaching and learning modalities in the assessment and training of resuscitation skills in rural and remote areas.

2.0 Study Methodology

Study implementation was guided by an interprofessional advisory group reflective of health managers and health providers from across RHAs in Newfoundland and Labrador. Advisory group members were as follows:

- Dr. Vernon Curran, PhD – Director of Academic Research and Development, Professor of Medical Education, Faculty of Medicine, Memorial University
- Ms. Lisa Fleet, MA, Dip.Ad.Ed, BEd - Manager, Research Programs, Professional Development & Conferencing Services, Faculty of Medicine, Memorial University
- Ms. Melanie Greene, MA – Research Assistant, Professional Development & Conferencing Services, Faculty of Medicine, Memorial University (until Feb. 2011)
- Ms. Jacki Ballard, BA - Manager, Learning and Development, Eastern Health
- Dr. Dave Morgan, MD, CCFP-EM - Assistant Professor, Program Director, Emergency Medicine Residency Program, Discipline of Family Medicine, Memorial University/Eastern Health
- Ms. Susan White, RN, BN – Clinical Nurse Educator, Division of Newborn Medicine, Eastern Health
- Ms. Sandra Evans, RN, BVocEd, MEd - Director, Professional Development & Continuing Education, Central Health
- Ms. Jeannette Christopher, RN, BEd, MEd – Regional Director (retired June 2011), Organizational Development, Western Health
- Ms. Lorraine Mitchell, RN, BN, MN – Regional Director, Employee Development, Training & Health, Labrador-Grenfell Health

Prior to commencement of the study, application for ethics review and approval was made to the Human Investigation Committee (HIC), Faculty of Medicine, Memorial University, as well as to the respective ethics committees of the four RHAs. Full study approval was received from HIC, Central Health, Western Health, and Labrador-Grenfell Health. Eastern Health reviewed the study protocol and determined that full ethics approval was not required as the study was not being conducted onsite in one of its facilities. However, its ethics committee was informed of the study and will be informed of the findings as per their request.

A variety of methodologies were used to gather information as part of this study. A mixed-methods, explanatory study design (Springer, 2010) combining the strengths of quantitative and qualitative research was followed and included: (1) a literature review; (2) focus groups; and (3) online survey-questionnaire.

2.1 Literature Review

A search of the peer-reviewed literature was conducted using PubMed to identify specific studies which focus on health professionals' attitudes towards, and experiences in, maintaining resuscitation skills and their associated self-efficacy beliefs. The literature search was limited to studies and reports published in the English language during the past ten years (2000-2010). The following terms were used and combined in order to refine the search results:

- Resuscitation [MeSH]¹
- Cardiopulmonary resuscitation [MeSH]
- Advanced Cardiac Life Support [MeSH]
- Physicians [MeSH]
- Health Educators [MeSH]
- Nurses [MeSH]
- Self Efficacy [MeSH]
- Basic Life Support
- CPR
- PALS
- NRP
- Health Professionals
- Skills
- Beliefs
- Attitudes
- Confidence
- Competence
- Focus groups
- Surveys

2.2 Focus Groups

The request for focus group participation was distributed electronically by advisory group members in each of the four RHAs using both Microsoft Outlook and internal intranets, such as Meditech. Health managers across the RHAs were also asked to post the request in their respective departments. Interested participants were asked to complete an 'Expression of Interest', which detailed information such as health profession, region, current resuscitation

¹ Medical subject headings (MeSH) used to index articles in Pubmed.

training, and contact information, and to contact Ms. Lisa Fleet (Manager, Research Programs, PDCS) indicating their interest.

Focus groups were scheduled over a two-week period between November 1 and 9th, 2010. Each group was one-hour in duration and scheduled for 7:30-8:30pm (island time). Interested participants were contacted by Ms. Lisa Fleet or Ms. Melanie Greene (Research Assistant, PDCS), informed of the date and time of the focus group, provided with a consent form to review and complete, and the focus group questions which they could review in advance of the session. A copy of the focus group questions are presented in Appendix A.

Four focus groups were conducted (one with health providers in each RHA), with a total of N=28 participants. An honorarium of \$50 was provided to each participant. The focus groups were conducted by audio-teleconference, tape-recorded and transcribed with permission of the respondents. NVivo (v.8) was used in coding the data and responses were analyzed using the constant comparative method. Common themes that emerged from this analysis were organized into specific categories. Findings from these focus groups were used to identify topics for inclusion in the online survey-questionnaire.

2.3 Online Survey-Questionnaire

A survey-questionnaire was designed, using a combination of closed and open-ended questions, to collect information on:

- Current resuscitation certification
- Resuscitation skills updates methods (preferences and barriers)
- Self-efficacy to perform resuscitation
- Resuscitation confidence and ability
- Deterioration of resuscitation abilities
- Demographic characteristics of respondents (i.e. gender, profession, years experience, region, practice setting, department/clinical area, size of practice community)

Between March and April 2011, the survey-questionnaire was posted online via SurveyMonkey.com. A copy of the survey is available in Appendix B. The URL for the online survey-questionnaire was distributed electronically to all health providers across the four RHAs by a variety of sources (see Table 1):

Table 1
Survey Distribution

| RHA/Association | Method of URL Distribution |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eastern Health | <ul style="list-style-type: none"> • Via Outlook (E-mail) and Meditech. |
| Central Health | <ul style="list-style-type: none"> • Via Outlook (E-mail) and Meditech (those without e-mail access instructed to go to Intranet site for the link). |
| Western Health | <ul style="list-style-type: none"> • Via Outlook (E-mail) • Posted on regional learning management system. • Posted on Intranet. |
| Labrador-Grenfell Health | <ul style="list-style-type: none"> • Via Outlook (E-mail) and Intranet. |
| Newfoundland and Labrador Medical Association | <ul style="list-style-type: none"> • Posted link to survey on main page of website |
| Association of Registered Nurses of Newfoundland and Labrador | <ul style="list-style-type: none"> • E-mails provided to PDCS (from those nurses who consent to be part of research). Survey link distributed by e-mail by PDCS. |
| College of Licensed Practice Nurses of Newfoundland and Labrador | <ul style="list-style-type: none"> • Distributed via e-mail to its membership. |
| Newfoundland and Labrador Association of Occupational Therapists | <ul style="list-style-type: none"> • Distributed via e-mail to its membership. |
| Newfoundland and Labrador Association of Respiratory Therapists | <ul style="list-style-type: none"> • Distributed via e-mail to its membership. |

A second and third distribution was conducted by all of the above methods to increase the response rate. Survey responses were downloaded from SurveyMonkey.com as a MS Excel file. The data was then transferred into the Statistical Package for the Social Sciences (PASW Statistics 18.0). Frequency, cross-tab, and pearson chi square analyses was conducted with quantitative data; qualitative data was reviewed and summarized into common themes.

3.0 Study Findings – Focus Groups

There was a total of N=28 participants across the four RHAs. Participants' professions, resuscitation training, years' experience in respective resuscitation areas, and the clinical areas in which they practice are detailed below.

Eastern Health:

- 7 participants - 4 registered nurses (RNs); 1 licensed practical nurse (LPN); 1 physiotherapist; 1 medical flight specialist.
- Resuscitation training – BLS, NRP, ACLS, PALS.
- All with 10 years experience or more in BLS (range from 10-27 years).
- Clinical areas – neurology, critical care, emergency, surgery, public health, community health, acute care, long-term care.

Central Health:

- 10 participants - 5 RNs; 2 paramedics; 1 LPN; 1 therapeutic recreation; 1 occupational therapy.
- Resuscitation training – BLS, ACLS, PALS, TNCC (trauma nursing core course), CTAS (Canadian Triage Acuity Score).
- Training in resuscitation ranged from 7 to 27 years.
- Clinical areas – ICU, health protection, professional development, long-term care, infection control, primary care, therapeutic recreation, occupational therapy.

Western Health:

- 6 participants - 4 RNs; 1 nurse practitioner (NP); 1 family physician.
- Resuscitation training – BLS, NRP, PALS, ACLS, ATLS, TNCC, ITLS (international trauma life support).
- Training in resuscitation ranged from 1 year to 30 years.
- Clinical areas – emergency, family practice, rural clinic with no physician, women's health, newborn, ICU, long-term care, orthopedics, public health, health promotion, primary care.

Labrador-Grenfell Health:

- 5 participants- 3 RNs; 2 paramedics.
- Resuscitation training – BLS, NRP, ACLS.
- Majority (4) with at least 22 years trained in resuscitation area (1 with 15 years).
- Clinical areas – emergency, various clinical areas, OR, infection control, orthopedics.

3.1 Deterioration in Resuscitation Skills and Competencies

Those focus group participants who are instructors in various resuscitation areas reported no real concerns regarding their competencies, as teaching courses consistently provides them with opportunities for updating their skills. However, other participants reported having insufficient opportunity to practice their resuscitation skills in their current work environments and expressed concerns over whether they would be able to adequately perform resuscitation when a situation called for it. Participants also highlighted the fact that some health professionals report feeling confident in their ability, yet during the course renewal process, it becomes clear that their knowledge and skills are inadequate.

I have been certified for about ten years and I have never had the opportunity to practice my skills so I'm always constantly concerned about deterioration and whether or not I'll be able to do it when you know, put in that situation.

If you learn ACLS and you learned the rhythms and you go for six months and you haven't had the opportunity to be present in a code or to see those rhythms, you're going to forget it.

They certainly feel coming in, that they don't need to be doing it but when they get there it's easy to see that they are uncomfortable with some of the practices and certainly the knowledge base.

Participants acknowledged the link between the lack of frequent renewals and the deterioration of resuscitation skills and suggested that this is of particular concern given the provinces' aging population. While refreshers and renewals increase your confidence temporarily, this confidence begins to diminish over time.

...the courses boost your confidence but I would say that between courses your confidence certainly dwindles a little bit

Other concerns reported by focus group respondents included frequent changes in guidelines and the lack of 'realistic' equipment which many utilize for training.

...you don't get time to get used to the guidelines before they are changed again so you don't get proficient in the skill when the guidelines are current and then a new lot is added on to you, so it can become complex and confusing to people.

...with all the new changes that are going on in CPR, it does take a while for a lot of staff to say okay, this is what I have to do.

We don't use realistic enough equipment in order for the ones who do the skills to get a feel so that when they're actually in a code they have a feel for how it's actually supposed to happen.

...they don't give them a true feel of what it's like to do CPR on a real person. You can't tilt the head, you can't open the mouth, and it's just a, in my opinion, a poor learning tool.

3.2 Resuscitation Skills Training/Updates

3.2.1 Frequency of Updates

Focus group participants were asked how frequently they would like to be able to update or refresh their competencies. Respondents indicated that the frequency of refreshers should be dependent upon the length of time between required renewals. There was a general consensus that updates would be ideal if availed of at least every few months. Several respondents specified six months as appropriate. Two respondents felt that the renewal period for ACLS in particular (3 years) was a long time to go without updates.

3 years is a long time for ACLS, especially when you are dealing with drugs.

It was also suggested that more frequent updates, such as every three months, be encouraged for those who do not get the opportunity to practice their skills routinely.

Well, I think personally for me, it would be for me every three months. Because, like I say, where I work in long-term care, like, you don't get to use it. So I mean, it's like most everything, if you don't use it, you kind of lose it. Right?

In addition to updating skills, frequent updates were also seen as being important for boosting confidence in performing resuscitation. One participant highlighted a historical culture in which staff were not renewing their resuscitation training. This has now changed with institutional expectations that staff renew their training and has resulted in an increase in confidence amongst staff.

3.2.2 Preferred Update Methods

Focus group participants were asked to identify methods they currently use to update or refresh their resuscitation competencies. Methods highlighted included: mock codes; observation of resuscitation codes; simulations; teaching; and self-learning opportunities. One participant described how his/her region implemented mock codes in pediatrics in the past year. Another participant described how his/her workplace incorporated practical experience through observation of emergency situations for staff that would not typically get this exposure.

...if something is going on, even just a car accident, we will often give the nurses up on the floor the chance to come down and help. A lot of times we need their help but a lot of times we give them the chance to come down just to see what's, what's expected and what you do in these type of emergencies that normally they wouldn't experience by working on the floor.

Practice with simulators at the Health Sciences Centre in St. John's was highlighted by another participant. A number of participants mentioned teaching as a means by which they keep up-to-date on their resuscitation competencies.

...being an instructor have about 4 courses a year, so actually every 3 months I am going through the program and in between that I actually view a CD and keep myself up-to-date.

I teach and I review the material and try to keep up on it as I'm teaching, and again as a refresher for me.

Self-directed learning initiatives were also reported by several participants. Methods of self-learning that were mentioned included reading resources and manuals, review of equipment and materials, and seeking out non-credit practical courses at conferences.

I think overall we all tend to self-learn because we're constantly reading and refreshing ourselves on new changes, new protocol, new standards.

Participants were also asked to describe ways in which they would like to be able to update or refresh their competencies. Preferred methods highlighted included: mock codes; e-learning; and frequent review of equipment and materials. Overwhelmingly, participants indicated the importance of mock codes for achieving frequent and practical experience in resuscitation. It

was suggested that these opportunities be made available and accessible to all health professionals in the region, both onsite at the health care facility and those in the community.

I think that mock codes should be conducted almost on a regular basis. Almost like, you know, same thing as a fire drill, it should be done once every couple of months at least to keep you refreshed. And then you can sit back and talk about how where you went wrong, or what you did wrong.

I think that is something worth exploring having a mock code team travel the region and put off a planned mock code in the outlying facilities because that would be of great benefit to the staff working in those areas because I am sure they don't get a lot of hands on with actual emergencies and this would help boost their confidence level.

E-learning was also suggested as an effective means of updating/refreshing skills.

I know you can get those online modules, I don't know if you can get them with the CPR but before when I did another type of training you had to go through the competency testing and you go through the questions and answers and you get a score and that could be something that could be useful in between.

Even something online like a 20 minute refresher module something like that might be useful and it could be different ones like one could have to do with infant, one could be child, one could adult and there could 5 or 6 different modules...

The importance of becoming familiar with and reviewing equipment was also acknowledged.

I think every now and then, even the review of the new equipment and go over the drugs and stuff, just to refresh everybody's memories.

3.2.3 Barriers to Participation

Focus group participants were asked to identify the barriers which might prevent them from participating in resuscitation skills updates if offered. The barriers identified can be categorized as mainly financial (impacted by geographical remoteness), institutional, availability of instructors and/or courses, and the anxiety which can be associated with resuscitation training.

Significant financial barriers identified by participants included: the costs associated with offering programs at various times throughout the year instead of on an annual basis (i.e.

paying instructors, paying registration fees, flying instructors in if a rural community, etc.); the cost associated with travel to major centres for health professionals who work in rural communities; the high costs of realistic training equipment; and the existing fee-for-service system in place for many physicians.

...it's very expensive to get out of here to attend a workshop or an education seminar that maybe hosted in St. John's.

...if you are talking travelling to the rural sites then you are looking at the expense of travelling and possibly having to stay overnight so there are some barriers there.

In addition to the financial costs of bringing an instructor in to a rural community for training, there is also a lack of available instructors to provide this training even if funding were available.

...it would be great if we actually had all instructors on site. That would be ideal for the different courses because right now, for a lot of them, we're depending on instructors to come from different parts throughout the region.

It was suggested that a reason for the poor turnout in resuscitation updates by physicians is lack of compensation. Fee-for-service physicians lose compensation if they need to close their practice and may not have someone available to cover them.

I think more physicians would do more of these courses more often if there was some type of compensation because [they] are leaving practice.

A major institutional barrier highlighted by focus group participants was staff shortages in their facility.

I think one of the barriers would be staff shortages because you can be booked for it and then last minute oh you can't go because we do not have coverage for you and that kind of stuff and I hear it all the time, so it is availability of staff in order to allow you to go. I think actually our institutions that we work for should be more accountable and I think if there is something there should be no barriers like you were saying but I think that is one of the problems.

Finally, focus group participants highlighted the fact that many people are often reluctant to participate in updates, regardless of the opportunities made available to them. The group

speculated that intimidation or anxiety is one factor which influences the decision to participate/not participate.

You do have people that just don't want to do it anyway and they'll shy away from it.

I think that is a big barrier that, especially with ACLS, that people stress out over it, and because of it, if they don't have to do it, they don't do it.

I think you lose self-confidence if somebody is there critiquing you in a mock situation and then you get in a real situation, you get the anxiety of that patient in front of you plus you have the added anxiety of losing your self-confidence.

3.3 Factors Influencing Confidence and Ability

According to focus group respondents, one of the overwhelming factors which influence confidence and ability to perform resuscitation are feelings of apprehension, anxiety, and frustration.

There is always a feeling of anxiety when you hear that you are about to participate in a real emergency not knowing what exactly you will be faced with until you are actually involved in the scenario. I would say it is safe to say most people do have some apprehension.

Some of the factors which influence participants' levels of anxiety and subsequent performance include time of day that the code occurs, the skill level and experience of co-workers and how this might impact on team performance, and a lack of standardization of equipment and layout of the setting.

I think for us here too, how you're feeling prior to a resuscitation could actually depend on what time of day or night it is. Daytime we could possibly pull on ten people, if we need to run a code. Nighttime you might only have three people. So, obviously a night time code is a lot more stressful as opposed to a day time code.

I think that the staff you are on with during a resuscitation has a significant impact on how you feel. When I look around and I know I have my more experienced staff on with me as opposed to junior staff who may not have any experience behind their NRP training, it does make a difference.

The environment is very important there, I mean in general I have the least amount of anxiety when I am actually in my ER room, in my ER Department..... you feel a little more anxious about being prepared and what not, then as you move to acute care, not as good a feeling as the ER Department and then as you move to long-term care not as good a feeling again, just because these types of experiences happen more in ER you are more prepared you know where your things are..

Focus group participants also reported feelings of frustration and or even second-guessing of their skills and performance.

Makes it frustrating when you know you don't have a positive outcome, and you know things weren't done right.

You kind of wonder, you know, did I do this right, or did I do that right, or even as a group, did we do this, or didn't we do this.

Focus group participants reported that various aspects of team performance were also significant in influencing their performance. Aspects of team performance reported as influential included: discrepancies in skill levels amongst team members; lack of communication amongst the team; and team leaders who are not always up-to-date on their skills. The importance of designating a team leader was emphasized by several participants.

I think communication in the code team, who's running the code, is a big factor.

...and you know, you know they are directing it wrong, and people are looking at each other wondering if they should intervene or what to say, or whatever. And it kind of just all falls apart from there because you don't have good direction.

I have been to codes in the ER where it is just total massive confusion...where it is a teaching hospital there is so many different residents and students and that sort of thing around that things get really crowded ...and I think it is really important to have a good leader in a code situation and I think that helps things go a long better.

One of the factors which influences confidence and ability in future resuscitation codes is debriefing, which was emphasized by several participants as essential, especially after an unsuccessful code.

I mean I would like to even see a 5 minute debriefing after the code while the team are still there to say what went wrong or what went right or whatever because getting

everyone back to a debriefing down the road might not happen. It would be nice to deal with issues of how you ran the code immediately.

4.0 Study Findings – Online Survey-Questionnaire

4.1 Survey Respondents

The online survey-questionnaire was completed by N=909 individuals. Respondents' self-reported professions were combined for the purpose of data analysis as follows:

- Nurse – Registered Nurse and Nurse Practitioner
- Allied Health – Occupational Therapist, Physiotherapist, Social Worker, Speech Language Pathologist
- Allied Health (Other) - Physiotherapy Assistant, Recreation Specialist, Personal Care Attendant, etc.
- Physician - Family Physician and Specialist
- Paramedic – Primary Care, Advanced Care, Medical Flight Specialist, Emergency Medical Responder

4.1.1 Overall Respondent Demographic Characteristics

Health Professions

Table 2 shows that 53.4% of respondents (N=481) were nurses, specifically registered nurses (N=463) and nurse practitioners (N=18). Nineteen percent (19.0%) were licensed practical nurses (LPNs).

Table 2
Respondents' Professions

| Respondents' Professions | N | % of Total Respondents |
|---------------------------------|-----|------------------------|
| Nurse (RN & NP) | 481 | 53.4% |
| LPN | 171 | 19.0% |
| Allied Health (OT, PT, SW, SLP) | 70 | 7.8% |
| Allied Health (Other) | 53 | 5.9% |
| Physician | 35 | 3.9% |
| Non-Health** | 31 | 3.4% |
| Paramedic | 26 | 2.9% |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Professions | N | % of Total Respondents |
|------------------------------------------------|-------------|------------------------|
| RT | 26 | 2.9% |
| Nurse Manager/Consultant/Training/Education | 8 | 0.9% |
| TOTAL | 901* | 100% |

*Eight (N=8) respondents did not answer this question.

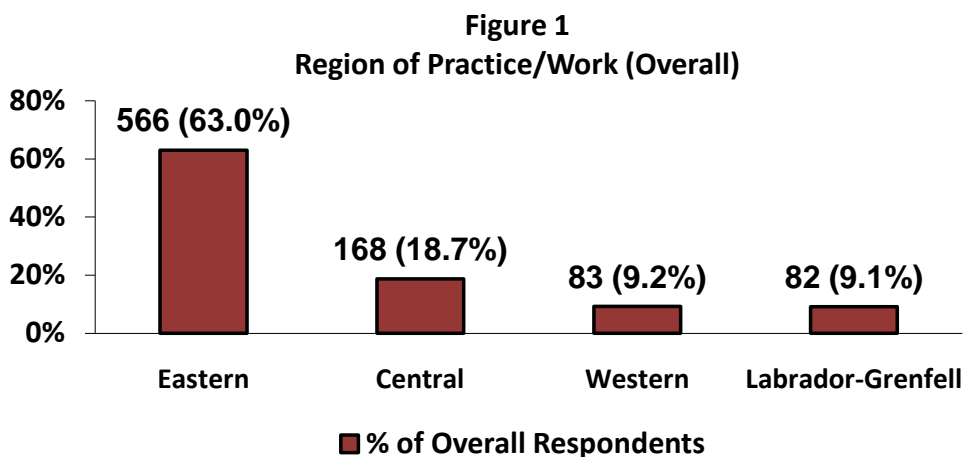
**Clerical, administrative, research staff, etc.

Gender/Years Experience

Eighty-eight percent (88.1%) of respondents were female; 11.9% were male. Mean years of experience as a health professional was 17.5 years.

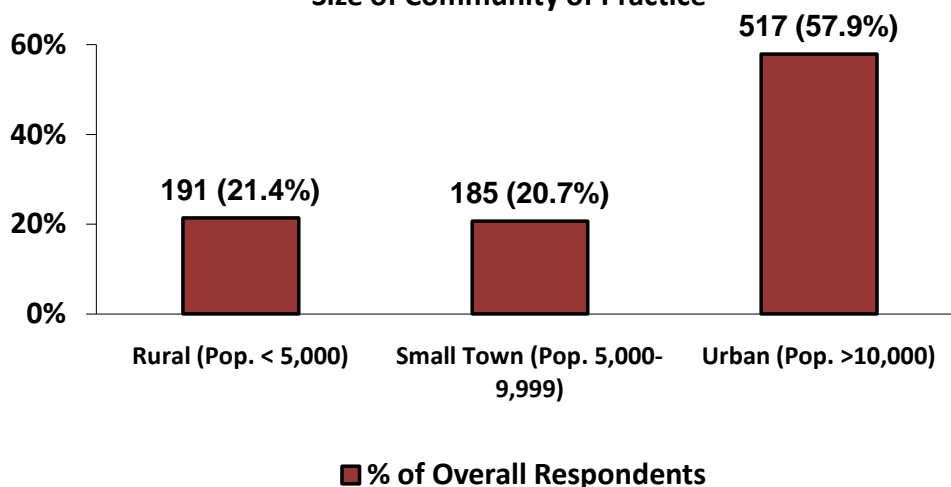
Region of Practice/Size of Community

Figure 1 shows the region of practice/work for all survey respondents, the majority of whom reported practicing in the Eastern Health region (63.0%). Figure 2 shows that the majority of survey respondents (57.9%) practice in urban communities (population greater than 10,000). Twenty-one percent (21.4%) practice in rural communities (population less than 5,000).



*N=10 respondents did not indicate their region of practice.

Figure 2
Size of Community of Practice



*N=16 respondents did not indicate their size of community.

Departments/Clinical Areas of Practice

Respondents were asked to indicate the departments/clinical areas in which they practice (and could indicate more than one area if they practice in several). The results are shown in Table 3. Twenty-eight percent (28.4%) report practicing in ‘other’ areas than those listed on the survey, including acute and ambulatory care, mental health, diagnostic imaging, etc. Twenty-five percent (25.7%) report practicing in long-term care. Twenty-two percent (22.6%) report practicing in the community.

Table 3
Respondents’ Departments/Clinical Areas

| Respondents’ Departments/ Clinical Areas | N* | % of Total Respondents |
|-------------------------------------------------------|-----|------------------------|
| Other** | 258 | 28.4% |
| Long-term Care | 234 | 25.7% |
| Community | 205 | 22.6% |
| Emergency (incl. paramedicine & medical transport) | 196 | 21.6% |
| Medicine | 172 | 18.9% |
| Intensive Care (including CCU & NICU) | 125 | 13.8% |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Departments/ Clinical Areas | N* | % of Total Respondents |
|---------------------------------------------|-----|------------------------|
| Surgery | 119 | 13.1% |
| Pediatrics | 100 | 11.0% |
| Obstetrics | 66 | 7.3% |
| OR/Recovery | 49 | 5.4% |
| Family Practice | 26 | 2.9% |

*Respondents could indicate more than one department/clinical area.

**Other areas included: acute care, ambulatory care, mental health, diagnostic imaging, research, infection control, education, cancer care, etc.

4.1.2 Current Resuscitation Certification/Experience

Almost eighty percent of survey respondents (79.8%) reported current resuscitation certification in BLS. Twenty-two percent (22.1%) reported certification in ACLS. Respondents' current resuscitation certifications are shown in Table 4. Also shown are the number of instructors in each of the certification areas (out of those who responded as being certified).

Table 4
Respondents' Current Resuscitation Certification

| Respondents' Current Resuscitation Certification | N* | % of Total Respondents | # of Instructors (out of N) |
|-----------------------------------------------------|-----|---------------------------|--------------------------------|
| BLS | 725 | 79.8% | 88 |
| ACLS | 201 | 22.1% | 18 |
| NRP | 97 | 10.7% | 17 |
| PALS | 67 | 7.4% | 12 |
| TNCC | 66 | 7.3% | 6 |
| Canadian Triage and Acuity Scale (CTAS) | 52 | 5.7% | 7 |
| ATLS | 18 | 2.0% | 1 |
| ITLS | 18 | 2.0% | 4 |
| Advanced Life Support in | 13 | 1.4% | 2 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Current Resuscitation Certification | N* | % of Total Respondents | # of Instructors (out of N) |
|---------------------------------------------------------|-----------|-------------------------------|------------------------------------|
| Obstetrics (ALSO) | | | |
| Acute Care of At-risk Newborns (ACORN) | 6 | 0.7% | 2 |

**Respondents could indicate more than resuscitation area. # of instructors indicated in brackets.*

**Table 5
Respondents' Current Resuscitation Certification (By Profession)**

| Respondents' Professions | BLS | ACLS | NRP | PALS | TNCC | CTAS | ATLS | ITLS | ALSO | ACORN |
|---------------------------------------------------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Nurse (RN & NP) | 425 (58.8%) | 130 (64.7%) | 62 (63.9%) | 32 (47.8%) | 64 (97.0%) | 49 (94.2%) | 3 (16.7%) | 6 (33.3%) | 8 (61.5%) | 3 (50.0%) |
| LPN | 133 (18.4%) | 18 (9.0%) | 3 (3.1%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 0 (0.0%) |
| Allied Health (OT, PT, SW, SLP) | 50 (6.9%) | 4 (2.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Allied Health (Other) | 37 (5.1%) | 5 (2.5%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Physician | 19 (2.6%) | 18 (9.0%) | 9 (9.3%) | 13 (19.4%) | 0 (0.0%) | 0 (0.0%) | 14 (77.8%) | 0 (0.0%) | 3 (23.1%) | 0 (0.0%) |
| Non-Health** | 8 (1.1%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 0 (0.0%) |
| Paramedic | 22 (3.0%) | 10 (5.0%) | 8 (8.2%) | 7 (10.4%) | 2 (3.0%) | 2 (3.8%) | 1 (5.6%) | 10 (55.6%) | 2 (15.4%) | 0 (0.0%) |
| RT | 21 (2.9%) | 14 (7.0%) | 15 (15.5%) | 14 (20.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (50.0%) |
| Nurse Manager/ Consultant/ Training/ Education | 8 (1.1%) | 2 (1.0%) | 0 (0.0%) | 1 (1.5%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Total | 723* | 201 | 97 | 67 | 66 | 52 | 18 | 18 | 13 | 6 |

*N=2 respondents did not indicate their professions.

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

Respondents certified in various resuscitation areas reported a wide range of experience with regards to taking courses and participating in ‘real’ resuscitation codes. The data in Table 6 shows that on average, respondents report taking the BLS course 12.00 times, ACLS 4.07 times, and NRP 3.80 times. However, a wide range of times was also reported. By contrast, experience with ALSO and ACORN is limited.

Table 6
Mean # of Times Respondents Have Taken Each Course

| Respondents’ Current Resuscitation Certification | N | Mean # of Times | SD | Range* |
|---------------------------------------------------------|----------|------------------------|-----------|---------------|
| BLS | 722 | 12.00 | 8.043 | 59 |
| ACLS | 246 | 4.07 | 4.315 | 35 |
| NRP | 140 | 3.80 | 4.609 | 30 |
| PALS | 103 | 1.66 | 1.556 | 10 |
| TNCC | 95 | 1.85 | 1.591 | 7 |
| CTAS | 76 | 1.28 | 2.145 | 15 |
| ATLS | 49 | 1.43 | 2.972 | 20 |
| ITLS | 42 | 1.14 | 1.995 | 10 |
| ALSO | 38 | .55 | .828 | 4 |
| ACORN | 29 | .21 | .412 | 1 |

**Difference between the largest and smallest values reported.*

Interestingly, while some respondents have extensive course experience, they are lacking in ‘real’ experience. Respondents certified in BLS reported having participated in a real resuscitation code a mean of 1.44 times in the past twelve months (as opposed to participating in the course for a mean of 12.00 times). By contrast, respondents certified in NRP have more ‘real’ experience, reporting participating in codes a mean of 4.76 times. Also interesting is the range of experience and the results show that this is often dependent on respondents’ departments of practice. For instance, the results for CTAS in Table 7 show a range of 500. In this case, one respondent reported no experience while another reported participating in a real code 500 times (therefore a range of 500). The latter had extensive experience in Emergency.

Studies highlighted in Section 1.2 have shown that resuscitation knowledge and skills significantly decline within 6 months of training and there appears to be no relationship between skill deterioration and years of experience and responsibility for patient care. This suggests that those

with greater ‘real’ experience still do not always retain their knowledge or skills to any greater degree that those who participate less frequently or never (Boudin, 1995; Curry & Gass, 1987).

Table 7
Mean # of Times Respondents Have Participated in a ‘Real’ Resuscitation Code in the Past 12 Months

| Respondents’ Current Resuscitation Certification | N | Mean # of Times | SD | Range* |
|---------------------------------------------------------|----------|------------------------|-----------|---------------|
| BLS | 612 | 1.44 | 3.426 | 30 |
| ACLS | 241 | 3.90 | 7.584 | 80 |
| NRP | 130 | 4.76 | 25.059 | 250 |
| PALS | 107 | .72 | 1.795 | 15 |
| TNCC | 99 | 1.85 | 6.036 | 52 |
| Canadian Triage and Acuity Scale | 79 | 12.87 | 59.959 | 500 |
| ATLS | 82 | 1.30 | 4.385 | 30 |
| ITLS | 74 | 1.51 | 4.944 | 30 |
| Advanced Life Support in Obstetrics (ALSO) | 74 | .12 | .640 | 5 |
| Acute Care of At-risk Newborns (ACORN) | 69 | .48 | 2.553 | 20 |

**Difference between the largest and smallest values reported.*

Pearson chi square analyses were conducted to determine if there was a significant difference between respondents’ participation in a ‘real’ resuscitation code and the size of the community in which they practice. The results in Table 8 show that significant differences were reported at the $p < .05$ probability level between ‘real’ resuscitation code experience and size of community for those who are BLS and ACLS certified. A greater proportion of respondents in small towns and urban communities reported more ‘real’ experience in BLS and ACLS than those who practice in rural communities.

Table 8

Mean # of Times Respondents Have Participated in a ‘Real’ Resuscitation Code in the Past 12 Months (By Size of Community)

| Current Certification Area | Size of Community | N | Mean # of Times | Pearson Chi Square | |
|----------------------------|-------------------|-----|-----------------|--------------------|-------|
| | | | | df | Sig. |
| BLS | Rural | 128 | 1.08 | 28 | .010* |
| | Small Town | 128 | 1.77 | | |
| | Urban | 351 | 1.47 | | |
| ACLS | Rural | 44 | 2.25 | 30 | .000* |
| | Small Town | 55 | 3.98 | | |
| | Urban | 140 | 4.41 | | |

**Significant at $p < .05$ probability level.*

4.1.3 Regional Demographic Characteristics

Respondents’ professions, departments/clinical areas, and current certification areas, are presented in Tables 9-11 by regional health authority.

Table 9

Respondents’ Professions (By Region)

| Respondents’ Professions | Eastern | Central | Western | Labrador | Total |
|---------------------------------|-------------|------------|------------|-----------|-------|
| Nurse (RN & NP) | 328 (68.3%) | 68 (14.2%) | 37 (7.7%) | 47 (9.8%) | 480* |
| LPN | 71 (42.5%) | 43 (25.7%) | 40 (24.0%) | 12 (7.2%) | 167** |
| Allied Health (OT, PT, SW, SLP) | 49 (70.0%) | 13 (18.6%) | 3 (4.3%) | 5 (7.1%) | 70 |
| Allied Health (Other) | 37 (69.8%) | 11 (20.8%) | 1 (1.9%) | 4 (7.5%) | 53 |
| Physician | 28 (80.0%) | 4 (11.4%) | 0 (0.0%) | 3 (8.6%) | 35 |
| Non-Health** | 16 (51.6%) | 13 (41.9%) | 0 (0.0%) | 2 (6.5%) | 31 |
| Paramedic | 16 (61.5%) | 6 (23.1%) | 0 (0.0%) | 4 (15.4%) | 26 |
| RT | 13 (50.0%) | 8 (30.8%) | 2 (7.7%) | 3 (11.5%) | 26 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Professions | Eastern | Central | Western | Labrador | Total |
|----------------------------------------------------|----------|----------|----------|----------|-------|
| Nurse Manager/Consultant/ Training/Education | 8 (100%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 8 |

*N=1 respondent did not indicate his/her region.

**N=4 respondents did not indicate their regions.

Table 10
Respondents' Departments/Clinical Areas (By Region)

| Respondents' Departments/ Clinical Areas | Eastern | Central | Western | Labrador | Total |
|----------------------------------------------------------|-------------|------------|------------|------------|--------|
| Other** | 173 (67.1%) | 47 (18.2%) | 17 (6.6%) | 21 (8.1%) | 258 |
| Long-term Care | 100 (42.7%) | 63 (26.9%) | 43 (18.4%) | 24 (10.3%) | 234* |
| Community | 126 (61.5%) | 42 (20.5%) | 9 (4.4%) | 28 (13.7%) | 205 |
| Emergency (incl. paramedicine & medical transport) | 93 (47.4%) | 49 (25.0%) | 22 (11.2%) | 31 (15.8%) | 196** |
| Medicine | 84 (48.8%) | 36 (20.9%) | 33 (19.2%) | 16 (9.3%) | 172*** |
| ICU, CCU & NICU | 78 (62.4%) | 21 (16.8%) | 12 (9.6%) | 14 (11.2%) | 125 |
| Surgery | 59 (49.6%) | 28 (23.5%) | 17 (14.3%) | 14 (11.8%) | 119** |
| Pediatrics | 59 (59.0%) | 13 (13.0%) | 12 (12.0%) | 16 (16.0%) | 100 |
| Obstetrics | 30 (45.5%) | 15 (22.7%) | 3 (4.5%) | 18 (27.3%) | 66 |
| OR/Recovery | 30 (61.2%) | 10 (20.4%) | 3 (6.1%) | 6 (12.2%) | 49 |
| Family Practice | 8 (30.8%) | 8 (30.8%) | 3 (11.5%) | 7 (26.9%) | 26 |

*N=4 respondents did not indicate their regions.

**N=1 respondent did not indicate his/her region.

***N=3 respondents did not indicate their regions.

Table 11

Respondents' Current Resuscitation Certification (By Region)

| Respondents' Current Resuscitation Certification | Eastern | Central | Western | Labrador | Total |
|---------------------------------------------------------|----------------|----------------|----------------|-----------------|--------------|
| BLS | 448 (61.8%) | 136 (18.8%) | 70 (9.7%) | 67 (9.2%) | 725* |
| ACLS | 108 (53.7%) | 37 (18.4%) | 27 (13.4%) | 28 (13.9%) | 201** |
| NRP | 53 (54.6%) | 14 (14.4%) | 4 (4.1%) | 25 (25.8%) | 97** |
| PALS | 39 (58.2%) | 13 (19.4%) | 10 (14.9%) | 5 (7.5%) | 67 |
| TNCC | 20 (30.3%) | 12 (18.2%) | 17 (25.8%) | 17 (25.8%) | 66 |
| Canadian Triage and Acuity Scale (CTAS) | 24 (46.2%) | 9 (17.3%) | 13 (25.0%) | 6 (11.5%) | 52 |
| ATLS | 13 (72.2%) | 2 (11.1%) | 1 (5.6%) | 2 (11.1%) | 18 |
| ITLS | 15 (83.3%) | 0 (0.0%) | 1 (5.6%) | 2 (11.1%) | 18 |
| Advanced Life Support in Obstetrics (ALSO) | 6 (46.2%) | 4 (30.8%) | 0 (0.0%) | 3 (23.1%) | 13 |
| Acute Care of At-risk Newborns (ACORN) | 5 (83.3%) | 0 (0.0%) | 0 (0.0%) | 1 (16.7%) | 6 |

*N=4 respondents did not indicate their regions.

**N=1 respondent did not indicate his/her region.

4.2 Resuscitation Skills Training/Updates

4.2.1 Frequency of Updates

Overall, a larger proportion of respondents who were certified in BLS, ACLS, PALS, NRP, and CTAS reported wanting to participate in updates (i.e. refresher courses) on an annual basis:

- BLS - 76.3%
- ACLS - 49.3%
- PALS - 44.4%
- NRP - 45.5%
- CTAS - 47.4%

The majority of respondents certified in ATLS, ALSO, ACORN, TNCC, ITLS, and CTAS reported wanting to participate in updates (i.e. refresher courses) every 2-3 years or as new guidelines are implemented:

- ATLS - 58.1%
- ALSO- 59.3%
- ACORN - 60.0%
- TNCC - 55.2%
- ITLS - 50.0%
- CTAS - 47.4%

4.2.2 Preferred Update Methods

Respondents were asked to rank their preferred learning methods for updating/refreshing their resuscitation skills in between renewal periods. Their preferences are shown in Table 12, in order of highest preference, i.e. using the scale 1=most preferred to 13=least preferred. Overall, respondents reported preferences for methods which allowed them to practice their skills in a hands-on format, such as practice with an instructor (mean score 3.59), practice with other health professionals as a team (mean score 3.72), mock codes (mean score 5.04), and self-practice with a manikin (mean score 5.74).

Table 12
Respondents' Preferred Update Methods

| Respondents' Preferred Update Methods | N | Mean Ranking | SD |
|------------------------------------------------------------|----------|---------------------|-----------|
| Practice with an instructor | 555 | 3.59 | 2.939 |
| Practice with other health professionals (i.e. as a team) | 580 | 3.72 | 2.691 |
| Mock codes | 557 | 5.04 | 4.225 |
| Self-practice with a manikin | 527 | 5.74 | 3.354 |
| Observation of resuscitation codes | 539 | 6.58 | 3.143 |
| Self-instructional videos | 510 | 6.59 | 3.162 |
| Self-learning (i.e. reviewing guidelines, textbooks, etc.) | 553 | 6.71 | 3.207 |
| Conference presentations, sessions with peers | 565 | 7.04 | 3.417 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Preferred Update Methods | N | Mean Ranking | SD |
|---------------------------------------|-----|--------------|-------|
| E-learning | 516 | 7.13 | 3.805 |
| Debriefing sessions | 544 | 7.24 | 3.361 |
| Videoconferencing | 492 | 8.37 | 3.241 |
| Audioconferencing | 521 | 9.71 | 3.092 |

One-Way ANOVA analyses were conducted to determine if respondents' professions, regions, or size of community of practice had a significant effect on their preferred update methods at the $p < .05$ probability level. The results in Table 13 show that respondents' professions had a significant effect on their preferences for various methods such as mock codes ($p = .000$), videoconferencing ($p = .005$), audioconferencing ($p = .003$), and self-instructional videos ($p = .044$). For instance, physician and paramedics reported a greater preference for mock codes than allied health. Allied health reported a greater preference for videoconferencing than other professions. The results also show that a larger proportion of respondents in the Central region reported a preference for e-learning ($p = .014$); a larger proportion of respondents in the Eastern region reported a preference for self-instructional videos ($p = .044$). Size of community had no significant effect on preferred update methods.

Table 13
Preferred Update Methods (By Profession)

| Preferred Update Methods | Profession | N | Mean Ranking | ANOVA | | |
|--------------------------|------------------------------------|-----|--------------|-------|-------|------|
| | | | | df | F | Sig. |
| Mock Codes | Nurse (RN & NP) | 333 | 4.86 | 8 | 6.340 | .000 |
| | LPN | 92 | 5.67 | | | |
| | Allied Health (OT, PT, SW, SLP) | 36 | 8.69 | | | |
| | Physician | 21 | 2.48 | | | |
| | Paramedic | 19 | 2.89 | | | |
| | RT | 16 | 3.25 | | | |
| Videoconferencing | Nurse (RN & NP) | 300 | 8.69 | 8 | 2.792 | .005 |
| | LPN | 80 | 7.94 | | | |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Preferred Update Methods | Profession | N | Mean Ranking | ANOVA | | |
|-----------------------------|------------------------------------|-----|--------------|-------|-------|------|
| | | | | df | F | Sig. |
| | Allied Health (OT, PT, SW, SLP) | 32 | 6.22 | | | |
| | Physician | 16 | 8.50 | | | |
| | Paramedic | 16 | 8.00 | | | |
| | RT | 17 | 9.29 | | | |
| Audioconferencing | Nurse (RN & NP) | 322 | 9.95 | 8 | 2.932 | .003 |
| | LPN | 81 | 8.98 | | | |
| | Allied Health (OT, PT, SW, SLP) | 32 | 8.22 | | | |
| | Physician | 19 | 9.42 | | | |
| | Paramedic | 14 | 9.29 | | | |
| | RT | 20 | 11.10 | | | |
| Self-instructional Videos | Nurse (RN & NP) | 311 | 6.47 | 8 | 2.577 | .009 |
| | LPN | 81 | 7.30 | | | |
| | Allied Health (OT, PT, SW, SLP) | 36 | 5.61 | | | |
| | Physician | 15 | 6.47 | | | |
| | Paramedic | 14 | 7.36 | | | |
| | RT | 18 | 7.11 | | | |
| Practice with an instructor | Nurse (RN & NP) | 327 | 3.72 | 8 | 3.623 | .000 |
| | LPN | 93 | 3.11 | | | |
| | Allied Health (OT, PT, SW, SLP) | 41 | 2.61 | | | |
| | Physician | 19 | 5.21 | | | |
| | Paramedic | 15 | 5.93 | | | |
| | RT | 19 | 4.21 | | | |
| Observation of | Nurse (RN & NP) | 326 | 6.51 | 8 | 2.044 | .040 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Preferred Update Methods | Profession | N | Mean Ranking | ANOVA | | |
|--------------------------|---------------------------------|-----|--------------|-------|-------|------|
| | | | | df | F | Sig. |
| Resuscitation Codes | LPN | 83 | 6.08 | 8 | 5.279 | .000 |
| | Allied Health (OT, PT, SW, SLP) | 37 | 7.84 | | | |
| | Physician | 19 | 6.32 | | | |
| | Paramedic | 18 | 7.33 | | | |
| | RT | 19 | 6.00 | | | |
| Debriefing Sessions | Nurse (RN & NP) | 333 | 6.90 | 8 | 5.279 | .000 |
| | LPN | 83 | 7.63 | | | |
| | Allied Health (OT, PT, SW, SLP) | 36 | 9.44 | | | |
| | Physician | 19 | 7.05 | | | |
| | Paramedic | 19 | 8.05 | | | |
| | RT | 19 | 5.11 | | | |

4.2.3 Barriers to Participation

Respondents were asked to indicate their barriers to participation in resuscitation skills training and/or updates/refreshers. The findings in Table 14 show that the majority of respondents reported staff shortages (43.1%), timing of courses/updates (40.3%), and availability of courses/updates (33.1%) as major barriers.

Table 14
Respondents' Barriers to Participation in Updates/Refreshers

| Respondents' Barriers to Participation | N* | % of Total Respondents |
|----------------------------------------|-----|------------------------|
| Staffing shortages in my unit/hospital | 392 | 43.1% |
| Timing of courses and/or updates | 366 | 40.3% |
| Availability of courses and/or updates | 301 | 33.1% |
| Availability of instructors | 151 | 16.6% |

| Respondents' Barriers to Participation | N* | % of Total Respondents |
|-------------------------------------------------------------|-----------|-------------------------------|
| Lack of remuneration/compensation for my participation | 148 | 16.3% |
| Personal commitments | 144 | 15.8% |
| Lack of institutional support | 136 | 15.0% |
| Travel | 127 | 14.0% |
| Geographical remoteness – access to courses at larger sites | 97 | 10.7% |
| Lack of access to a computer/Internet | 38 | 4.2% |

**Respondents could indicate more than one barrier if applicable.*

4.3 Factors Influencing Confidence and Ability

4.3.1 Self-Efficacy to Perform Resuscitation

Self-efficacy is a cognitive process which has been described as an individual's confidence in his/her ability to affect a given behaviour. Respondents were asked to rate their degree of confidence in performing a resuscitation code across a variety of situations, using a scale of 0=cannot at all do to 100=highly certain can do.

The results in Table 15 summarize respondents' confidence in their ability to perform resuscitation across these situations. Respondents report their highest confidence after they have recently practiced (mean 82.79) and after participating in an update (mean 79.95). By contrast, respondents report their lowest confidence in their abilities when they are not familiar with new guidelines (mean 46.93) or when they feel their skills have deteriorated (mean 46.54).

Table 15
Respondents Self-reported Degree of Confidence in their Abilities to Perform

| Situation | N | Mean | SD |
|------------------------------------------------------------------------|----------|-------------|-----------|
| After I have recently practiced | 653 | 82.79 | 18.232 |
| After I have participated in an update | 650 | 79.95 | 19.234 |
| After an effective debriefing session from a recent resuscitation code | 647 | 75.69 | 20.537 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Situation | N | Mean | SD |
|-------------------------------------------------------------------------------------------|-----|-------|--------|
| When I am unfamiliar with other members of the resuscitation team | 650 | 68.75 | 21.025 |
| When I am feeling tired | 652 | 65.80 | 21.944 |
| When I am performing a resuscitation in an unfamiliar setting | 654 | 64.56 | 22.576 |
| When I am feeling anxious | 662 | 63.52 | 23.282 |
| When new guidelines have recently been introduced | 650 | 61.17 | 21.143 |
| If I have not participated in a resuscitation code recently | 654 | 61.06 | 23.368 |
| If another team members skills are lacking | 666 | 60.96 | 23.350 |
| During a code that is not going well | 650 | 60.69 | 22.610 |
| If I am nervous about my participation in a resuscitation code | 648 | 58.61 | 22.685 |
| When roles of resuscitation team members are unclear | 668 | 58.55 | 25.000 |
| When I am feeling apprehensive | 651 | 58.19 | 22.466 |
| If I am concerned about the competency level of the team leader and/or other team members | 652 | 57.21 | 21.980 |
| If the location is overcrowded | 652 | 57.01 | 22.802 |
| When other team members are disrespectful | 651 | 56.02 | 24.444 |
| If team members do not work well together | 654 | 55.26 | 21.352 |
| When there is no clear leader of the resuscitation code | 657 | 52.74 | 25.335 |
| If members of the resuscitation team are not communicating well | 648 | 51.74 | 21.401 |
| If I cannot understand other members of the resuscitation team | 659 | 49.24 | 23.937 |
| If I am not familiar with new guidelines | 652 | 46.93 | 24.771 |
| When I feel my skills have deteriorated | 651 | 46.54 | 22.053 |

4.3.2 Respondents' Confidence to Perform Resuscitation

Respondents were asked to rate their confidence to perform resuscitation in a competent manner in the areas in which they are currently certified. This rating was based on a likert scale of 1=not at all confident to 5=extremely confident. The results in Table 16 show that respondents report being

moderately to very confident in all resuscitation certification areas, with the highest confidence being reported in BLS (mean score 3.96), ACLS (mean score 3.83), and ITLS (mean score 3.83).

Table 16
Respondents' Self-Reported Confidence to Perform Resuscitation

| Respondents' Current Resuscitation Certification | N | Mean | SD |
|---------------------------------------------------------|----------|-------------|-----------|
| BLS | 626 | 3.96 | .917 |
| ACLS | 191 | 3.83 | .993 |
| ITLS | 23 | 3.83 | 1.370 |
| CTAS | 47 | 3.79 | 1.141 |
| ATLS | 19 | 3.74 | 1.447 |
| NRP | 94 | 3.61 | 1.100 |
| TNCC | 64 | 3.59 | 1.080 |
| PALS | 69 | 3.33 | 1.038 |
| ALSO | 20 | 3.30 | 1.380 |
| ACORN | 13 | 3.00 | 1.354 |

4.3.3 Respondents' Ability to Perform Resuscitation

Respondents were asked to rate their ability to perform resuscitation in a competent manner in the areas in which they are currently certified. This rating was based on a likert scale of 1=not at all able to 5=extremely able. The results in Table 17 show that respondents report being moderately to very able in most of the resuscitation certification areas. Respondents report being very to extremely able in their ability to perform BLS (mean score 4.10) and ACLS (mean score 4.03).

Table 17
Respondents' Self-Reported Ability to Perform Resuscitation

| Respondents' Current Resuscitation Certification | N | Mean | SD |
|---------------------------------------------------------|----------|-------------|-----------|
| BLS | 619 | 4.10 | .828 |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Respondents' Current Resuscitation Certification | N | Mean | SD |
|---------------------------------------------------------|----------|-------------|-----------|
| ACLS | 190 | 4.03 | .902 |
| CTAS | 47 | 3.70 | 1.121 |
| TNCC | 66 | 3.64 | 1.104 |
| ITLS | 27 | 3.63 | 1.497 |
| NRP | 100 | 3.62 | 1.080 |
| ATLS | 25 | 3.52 | 1.295 |
| PALS | 71 | 3.38 | 1.074 |
| ALSO | 24 | 3.08 | 1.349 |
| ACORN | 17 | 2.53 | 1.281 |

One-Way ANOVA analyses were conducted to determine if respondents' regions, professions, and size of community had a significant effect on their self-reported abilities to perform resuscitations at the $p < .05$ probability level. The results in Tables 18 and 19 show that region of practice and profession had a significant effect on respondents' self-reported ability to perform BLS.

Table 18
Respondents' Self-Reported Ability to Perform Resuscitation (By Region)

| Current Resuscitation Certification | Region | N | Mean | ANOVA | | |
|--------------------------------------------|---------------|----------|-------------|--------------|----------|-------------|
| | | | | df | F | Sig. |
| BLS | Eastern | 387 | 4.03 | 3 | 2.923 | .033 |
| | Central | 114 | 4.27 | | | |
| | Western | 56 | 4.21 | | | |
| | Labrador | 58 | 4.07 | | | |

Table 19
Respondents' Self-Reported Ability to Perform Resuscitation (By Profession)

| Current Resuscitation Certification | Profession | N | Mean | ANOVA | | |
|-------------------------------------|---------------------------------|-----|------|-------|--------|------|
| | | | | df | F | Sig. |
| BLS | Nurse (RN & NP) | 380 | 4.18 | 8 | 10.175 | .000 |
| | LPN | 101 | 3.91 | | | |
| | Allied Health (OT, PT, SW, SLP) | 44 | 3.43 | | | |
| | Physician | 16 | 4.00 | | | |
| | Paramedic | 19 | 4.60 | | | |
| | RT | 20 | 4.60 | | | |

Pearson chi square analyses was conducted to determine if there was a significant difference between respondents self-reported ability to perform resuscitation and the size of the community in which they practice. The results in Tables 20, 21, 22 show that significant differences were reported at the $p < .05$ probability level between ability to perform and size of community for those who are ACLS, PALS, and NRP certified. A greater proportion of respondents in urban communities appear to report greater ability than those who practice in rural communities.

Table 20
Respondents' Self-Reported Ability to Perform Resuscitation (By Size of Community)
ACLS Certification

| Level of Ability | Rural | Small Town | Urban |
|------------------|--------------------------------------|------------|------------|
| Not at all able | 0 (0.0%) | 2 (4.1%) | 0 (0.0%) |
| Somewhat able | 1 (2.5%) | 2 (4.1%) | 7 (7.1%) |
| Moderately able | 13 (32.5%) | 9 (18.4%) | 10 (10.1%) |
| Very able | 14 (35.0%) | 22 (44.9%) | 44 (44.4%) |
| Extremely able | 12 (30.0%) | 14 (28.6%) | 38 (38.4%) |
| Chi Square | $\chi^2 = 17.305$ df = 8 sig. = .027 | | |

Table 21
Respondents' Self-Reported Ability to Perform Resuscitation (By Size of Community)
PALS Certification

| Level of Ability | Rural | Small Town | Urban |
|------------------|--------------------------------------|------------|------------|
| Not at all able | 0 (0.0%) | 2 (8.7%) | 0 (0.0%) |
| Somewhat able | 5 (55.6%) | 3 (13.0%) | 8 (20.5%) |
| Moderately able | 1 (11.1%) | 9 (39.1%) | 6 (15.4%) |
| Very able | 2 (22.2%) | 6 (26.1%) | 19 (48.7%) |
| Extremely able | 1 (11.1%) | 3 (13.0%) | 6 (15.4%) |
| Chi Square | $\chi^2 = 16.482$ df = 8 sig. = .036 | | |

Table 22
Respondents' Self-Reported Ability to Perform Resuscitation (By Size of Community)
NRP Certification

| Level of Ability | Rural | Small Town | Urban |
|------------------|--------------------------------------|------------|------------|
| Not at all able | 0 (0.0%) | 3 (9.4%) | 1 (2.0%) |
| Somewhat able | 6 (35.3%) | 2 (6.3%) | 5 (10.0%) |
| Moderately able | 3 (17.6%) | 6 (18.8%) | 12 (24.0%) |
| Very able | 8 (47.1%) | 14 (43.8%) | 18 (36.0%) |
| Extremely able | 0 (0.0%) | 7 (21.9%) | 14 (28.0%) |
| Chi Square | $\chi^2 = 16.933$ df = 8 sig. = .031 | | |

4.4 Deterioration in Resuscitation Skills and Competencies

Respondents were asked to rate their concerns regarding the deterioration of their ability to perform resuscitation in the areas in which they are currently certified. This rating was based on a likert scale of 1=very low concern to 5=very high concern. The results in Table 23 show that respondents report moderate to high concern regarding deterioration in their ability to perform

PALS (mean score 3.29) and TNCC (mean score 3.02). Respondents reported low to moderate concern in most other resuscitation areas.

Table 23
Respondents' Concerns Regarding Deterioration of Ability to Perform Resuscitation

| Respondents' Current Resuscitation Certification | N | Mean | SD |
|---------------------------------------------------------|----------|-------------|-----------|
| PALS | 66 | 3.29 | 1.200 |
| TNCC | 60 | 3.02 | 1.172 |
| ACORN | 11 | 2.91 | 1.300 |
| NRP | 89 | 2.89 | 1.283 |
| ALSO | 18 | 2.83 | 1.249 |
| ACLS | 186 | 2.76 | 1.175 |
| BLS | 612 | 2.43 | .973 |
| ATLS | 22 | 2.27 | 1.162 |
| CTAS | 46 | 2.35 | 1.197 |
| ITLS | 22 | 1.95 | 1.090 |

A Pearson chi square analysis revealed a significant difference between self-reported concerns of deterioration to perform BLS and profession ($p=.000$) (Table 24). A greater proportion of nurses reported low concern while LPNs and allied health reported moderate concern.

Table 24
Respondents' Concerns Regarding Deterioration of Ability to Perform Resuscitation (By Profession) - BLS Certification

| Level of Concern | Nurse (RN & NP) | LPN | Allied Health (OT, PT, SW, SLP) | Physician | Paramedic | RT |
|-------------------------|----------------------------|------------|----------------------------------------|------------------|------------------|-----------|
| Very low concern | 73 (19.4%) | 5 (5.3%) | 2 (4.4%) | 3 (17.6%) | 9 (47.4%) | 9 (45.0%) |
| Low concern | 164 (43.5%) | 27 (28.4%) | 11 (24.4%) | 5 (29.4%) | 5 (26.3%) | 6 (30.0%) |
| Moderate | 101 (26.8%) | 47 (49.5%) | 25 (55.6%) | 6 (35.3%) | 4 (21.1%) | 4 (20.0%) |

A Survey Study of Resuscitation Skills Retention Amongst Health Providers in Newfoundland and Labrador

| Level of Concern | Nurse (RN & NP) | LPN | Allied Health (OT, PT, SW, SLP) | Physician | Paramedic | RT |
|-------------------|---------------------------------------------------|------------|---------------------------------|-----------|-----------|----------|
| High concern | 30 (8.0%) | 11 (11.6%) | 5 (11.1%) | 2 (11.8%) | 1 (5.3%) | 1 (5.0%) |
| Very high concern | 9 (2.4%) | 5 (5.3%) | 2 (4.4%) | 1 (5.9%) | 0 (0.0%) | 0 (0.0%) |
| Chi Square | x ² = 85.349 df = 32 sig. = .000 | | | | | |

Survey respondents were also provided with the opportunity to respond to an open-ended question indicating the main reasons why they felt resuscitation skills and competencies deteriorate. Feedback was received from N=356 respondents. Approximately N=269 respondents reported that a lack of practice and experience with either ‘real’ or mock codes leads to deterioration in knowledge and skills. The department or clinical area you work in often influences the amount of ‘real’ or practice time of respondents as well. Some of their comments are as follows:

- *Being certified in BLS is a condition of my employment, but the chances of having to use these skills in my clinical area are very slim.*
- *Difficult to feel more confident with resuscitation skills when opportunities for practice and discussion, whether real or simulated are infrequent.*
- *I feel that the old adage of "if you don't use it you lose it" certainly applies to these skills. I have taken the courses but have not had a real chance to use them and I am frightened that when the time comes that I have to use them in an emergency, I am not going to be able to do so.*
- *I guess if there are no cases where we need to use our skills in real life than this is a good thing however, it might very well contribute to deterioration of our skills this is why I feel training and retraining is very important.*
- *Depending on area of work, the skills are not used on a regular basis therefore you are not able to keep competency up.*
- *If you don't have opportunity to use these skills they WILL deteriorate.*
- *Lack of confidence, lack of opportunity to perform in "real situations with real clients". A public forum is much different than a hospital setting.*
- *I think the lack of experience in having cardiac arrests. You tend to forget or lack confidence in doing codes. In small places such as the one I work in a cardiac arrest doesn't come as a daily occurrence. Therefore you do your recertification every year but may not experience a code for years. Therefore there is a certain lack of confidence in this area for staff that hasn't done many.*

- *It is not something I have had to use and I am thankful for that. The only thing is when you don't use something you don't easily remember it.*
- *Lack of experience due to long periods between refreshers and lack of mock codes, especially working in areas where the number of actual codes is low. This creates anxiety and apprehension when you do find yourself involved in a code.*
- *Do not perform codes often enough to feel confident about my skills. Feel less confident as time gets farther away from the refresher.*
- *Due to lack of practice i.e. mock codes.*
- *It depends on where you work... When I was working in a city hospital in a city of over a million people I found that I used my ACLS and BLS skills much more often mainly due to the amount of traumas we had through our ER. Also I worked on a cardiac unit in which patients were post angioplasty, post bypass, post transplant, post cardiac surgery, and were often very critical so we had to maintain our skills because a lot of code situations happened there. Since moving back I find that I am a bit more nervous about code situations for many reasons such as new staff who don't know me or my skill set, the set up of the ER, the policies/protocols of the department, and the general population that the hospital serves. I am up to date in my BLS and ACLS but it's just time between recertification and using those skills that make me feel a bit rusty, but I keep myself up to date by reading at home to ensure I am not rusty if that time comes in the ER.*
- *In my profession we routinely do not participate in a code, unless we are the first person to discover the pt, for example if it happened off of the nursing unit. Therefore, refresher courses are the only time we get any practice. Therefore, I think maybe more frequent refreshers would be beneficial.*
- *In order to maintain..you need reinforcement by either real or simulated situations. In the operating room at present we are not having many cardiac arrests therefore we are not utilizing our knowledge that we obtained during ACLS training. When I was on the floors and in the critical care units I was exposed to arrests routinely therefore had better confidence in my knowledge.*

Forty-eight (N=48) respondents highlighted the influence a lapse in certification could have on deterioration of knowledge and skills:

- *Length of time since recertification class (almost one year for me - I do recertification next week).*
- *Failure to attend refresher courses.*
- *For ACLS, there is not a lot of encouragement to complete and difficult to get time to do so with current staffing levels.*

- *I feel it is because a person fails to complete refresher courses which I believe is needed to keep your skills efficient and up to date.*
- *It is left to staff to self-initiate their participation in the course and some do not find it to be a priority, even though it is supposed to be required.*
- *From a lack of knowledge - not having done a refresher course in more than a 12 month span.*
- *Lapse in recertification.*
- *For those who for whatever reason are unable to keep their expertise up.*
- *As in all emergency preparation -- equipment - site - people -- all aspects must be ready to go in a split second at all times. Just as it is no good to stock the emergency cart during a code -- it is no good to wonder what my role is during a code. Skills stay fresh when you are forced to renew -- and like everything -- some people will only renew if forced to by being observed by others.*
- *Because persons are not interested in upgrading their skills. Sometimes these sessions tend to be repetitive and boring.*

Several respondents (N=21) reported that lack of access to courses or courses not been offered frequently enough explains the deterioration of their resuscitation skills:

- *I perform ACLS protocols often however I have never been trained in this. The reason I am not trained is due to lack of available courses at my site. This also appears to be a problem for maintaining recertification.*
- *Lack of availability of updates at some facilities. Also, there is a need to have reminders of expiry dates- no longer receive a card so have to keep track of that yourself. With this becoming a job requirement for many positions in EH now, I would expect there may be waiting lists to get in for recertification in the future. May require more instructors to provide this education. I feel it is imperative to be provided with the book and CD prior to the session, and to have the instructor/practical session. No webinar please!*
- *Lack of accessible courses here...ACLS takes a few days and is only offered a few times a year...it is very expensive to run and I consider myself fortunate to be able to get in to the local course every 3 years or so.*
- *Number of times I have participated in course/recertification overall. Prior to the last few years it wasn't so readily available so I have only been keeping up recertification yearly in recent years.*
- *I feel that the lack of being able to re-cert myself in the courses effects it mostly. Unavailability in coverage and courses are the # 1 factors.*
- *Due to geography - large geographical area small staff, there is no equipment available only in the larger centers.*

Other reasons highlighted by N=18 respondents included changes in guidelines in between recertification periods and a lack of access to training or course materials. Respondents' comments are as follows:

- *Frequent changes in guidelines*
- *Confusion over new guidelines.*
- *Lack of education due to new updates and practice.*
- *Learning materials for ACLS/BLS are BORROWED and must be returned after the training. It would be very beneficial if participants had the option to purchase or keep the books!!*
- *No manual to refer to as needed. (These are kept in the professional development office and used for participants of recertification).*
- *No online reading materials or access to reading materials to keep skills fresh.*

4.5 General Feedback from all Respondents

Respondents were provided with the opportunity to provide general comments after completing the survey. Comments were received from N=104 survey respondents. Many respondents (N=43) gave recommendations to improve the recertification process and how it can be improved. A summary of these comments are as follows:

- *Computer programs at work and at home would greatly help. These could test the health care provider with different scenarios.*
- *Lack of access to some e.g. ATLS, ACORN and PALS is a barrier. Providing courses locally is ideal as you get to practice with members of your own "team".*
- *I believe that courses like this should not be relegated to only areas of ICU/CCU/PICU, etc. ALL nurses need some form of education on these skills (although it wouldn't be feasible to update/refresh them as much as those working in high-risk areas). If a nurse shows interest in furthering his/her education re advanced life support, his/her health authority should do their best to accommodate that request.*
- *I like the train the trainer method of keeping up skills. I believe that each facility that offers an ER dept should have a trainer dedicated to that site for frequent upgrades in the format of mock events, group review sessions, and organizing learning sessions for the staff responsible to keep up on skills. Rural areas would only need to send the trainer to these recertification sessions in a central location and then in turn the trainer keeps the other staff up to date. I teach CPR in our rural area and all staff are kept updated. The same could be done for other courses.*
- *I really feel that we need to increase our "practices" and simulations in order for everyone to gain confidence and competency.*

- *I think health care providers in general should have the basic life skills. The need to have someone respond is crucial. All depts should play a role in being able to participate if the need arises. My dept does not see many patients so to be able to help a fellow worker is important. This adds to our community around us.*
- *I would like to see a more combined first aid and CPR course offered. In a facility setting there are many people specialized so there is always someone to go to for help. Once we leave work, we do not suddenly stop being a nurse. It is a lifestyle not just a job. I use a lot of nursing skills in the community for family, neighbors and friends. As my partner is also trained in fire emergency responses, we often stop at road side accidents. On scene first aid is not mandatory so it is not offered in our work site. It is very expensive to take privately. I believe anyone interested should be able to take basic first aid and CPR at a reasonable cost i.e. \$20, not \$100 per person.*
- *Instructors should be given the ability to register potential staff on recertification courses as staff development currently does this and it appears that these core courses are not given the importance that they should be.*
- *Keeping abreast of the newest techniques is most important.*
- *Lots of time & money go into making sure staff is current in these skills, but the follow up with more mock codes may create more comfort & confidence when real situation arises. Annual reminders process to staff working in health care desperately needs to be improved to make sure health care providers are current.*
- *Maybe instructors could take 10 - 15 mins. when a unit is not busy to review guidelines.*
- *More simulation equipment in hospital setting and availability to practice skills would be very beneficial for health care professionals in keeping up their resuscitation skills.*
- *As you go up the ladder of advanced practice the care to detail and competency go up as well. At the lower end of the spectrum you will get complacent individuals who are only working for their pay check. These individuals' skills tend to be poor.*
- *Having had the experience of performing CPR in a community setting I feel that "the basic principles" stick with you, even if it has been a while since recertification. In a real life situation which is influenced by extraneous factors and high levels of adrenaline, you may err on the exact counts/ratios but you remember the ABC's!*
- *Holding off recertification until new guidelines are to be taught as do not wish to use my time unwisely.*
- *I feel there is still a lot of work that needs to be done with the Resuscitation "TEAM". I believe many lives could be saved with a "rapid response team approach" or the like. As well as a more keen insight/ better prophylactic care in the in hospital setting may prevent the need to resuscitate at all.*
- *I go to the library to review code algorithms to keep updated.*
- *I have always been given the opportunity to adhere to the guidelines for BLS in a timely manner.*

Twenty-four (N=24) survey respondents highlighted the importance of renewing certifications and the period of time in between certifications:

- *I believe it should be mandatory to complete all resuscitation courses within specific time frames, if not employers will not provide staff with an opportunity to do so.*
- *I do not think renewal should be any longer than one year. On other side doing renewal every 6 months would require either more trained instructors or else make instructor a permanent position. Most of the time I see people with attitude that they do not need renewal because they work in areas where codes are common place. Changing attitudes is never easy.*
- *I feel all staff should have to keep up skills. You never know when BLS will be required. Just because most of the residents on the units are DNRs, it doesn't mean that a staff member or visitor will not need your expertise. I feel all staff should have to be certified.*
- *I feel competencies with resuscitation will improve with mandatory annual recertification. Eastern Health will need to support its staff to ensure all staff can be recertified annually i.e. train qualified instructors; allow time/physical environments for course instruction and practice.*
- *I would like to see more accessibility to education sessions for all frontline staff without having to worry about missing scheduled sessions due to staffing shortage.*
- *I'd like to continue with some kind of yearly refresher which includes an update; may not be necessary to have to meet face to face but nice to have a 'mannequin' to practice along with the webinar, teleconference, etc.*
- *I think that no matter how long you have been a health care provider you can benefit from annual recertification and occasional practice sessions.*
- *As an Instructor I see that the skill level of participants decreases over time. For the most part those who update yearly are more confident and are better able to perform in the classroom setting.*

Work situations were mentioned by N=27 respondents as playing a role in why they either do or do not keep up their certification or use their resuscitation skills:

- *I am a member of the cardiac arrest and trauma team. My certification in ACLS is expired do to inability to get time off work. However I feel my continuous participation in resuscitation should be adequate to maintain my certification. As a member of a resuscitation team I feel my skills are maintained and if not other team members would let me know. We are all committed to quality care and assist each other with maintaining and improving our skills.*
- *I am a registered nurse with many years of experience in critical care. However, now that I am in nurse management I am not expected to be directly involved in resuscitation thus not expected to keep up this skill. I believe it should be my choice to re-certify and the cost covered by my employer.*

- *I feel somewhat limited in what skills I can access. I worked in a hospital setting until three months ago and I was an active member of the code team. However, I was not allowed to take the ACLS course as my manager felt it would not be beneficial to my practice on my unit. I disagreed. I had been previously certified in ACLS when I worked in New Brunswick, but when it came time to renew I was denied the opportunity. I tried taking the rhythm interpretation course a couple of times, but each time it was cancelled due to lack of participation. I recently gave up trying. I feel that these courses should be offered to anyone who is willing to take the time to do the course. It could be fully funded in areas that need it and subsidized in areas where it is important but not "required".*
- *I have completed ACLS 4 times but this year my manager refused educational leave and I was unable to recertify because I could not get into the program without my managers support. It would be great to have better options for recertification programs.*
- *Front line staff education has suffered due to staff educators being used for workshops open to outside participants. In previous years workshops were planned to accommodate shift work and were held frequently and on pt units making it easier plan relief staff and include night and evening shifts.*

Ten (N=10) respondents mentioned a lack of real life situation with resuscitations:

- *I have never had to use this skill. I'm very much a "hands on" learner and require this type of practice to keep the skill. Watching it performed on video or online helps me understand but in no way gives me the confidence I would need to perform this skill competently.*
- *I have not had a lot of experience with codes. I have been an observer more than a participant up to this point. I remember feeling very anxious when participating in a code in the ER dept and luckily for me there were people there with lots of experience who knew what to do. However I do keep up my CPR on a yearly basis and feel that I will know what to do in an emergency situation should the need arise.*
- *I have only had to use life saving measures twice in my 27 years but it is reassuring to have the knowledge, knowing that one may be called upon at any time to administer CPR. Luckily when I did there was an experienced team involved in the process. I would like to have more frequent practices and mock real life situations to more realistically evaluate my response.*
- *As an instructor in a small hospital, real life situations are not in excess. Practiced real life skills pull it all together. When the opportunity is not there, skill deteriorates. Confidence comes with repeated usage. Seasoned RNs always tend to do better than those new to the career. Experience is a plus!*

5.0 Summary of Study Findings

A mixed-methods, explanatory study design combining the strengths of quantitative and qualitative research was used to gather information for this study and included: (1) a literature review; (2) focus groups; and (3) online survey-questionnaire. Study implementation was guided by an interprofessional advisory group reflective of health managers and health providers from across RHAs in Newfoundland and Labrador. Focus groups were conducted with N=28 health professionals across the four RHAs. The online survey-questionnaire was completed by N=909 individuals. Various health professional groups were represented in the focus groups and survey and included:

- Registered nurses
- Nurse Practitioners
- Licensed Practical Nurses
- Family Physicians
- Specialists
- Paramedics
- Occupational Therapists
- Respiratory Therapists
- Physiotherapists

As well, various departments/clinical areas were also represented, ranging from emergency, family practice, acute and ambulatory care, long-term care, critical care, surgery, medicine, and community health.

Current Resuscitation Certification/Experience

Focus group respondents reported being certified in BLS, ACLS, NRP, PALS, TNCC, CTAS, ATLS, and ITLS. The majority of survey respondents reported being certified in BLS (79.8%). This was followed by ACLS (22.1%), NRP (10.7%), and PALS (7.4%). The majority of those certified in most areas were nurses (RNs and NPs), with the exception of ATLS, in which the majority certified were physicians (77.8%) and ITLS, in which the majority certified were paramedics (55.6%).

Interestingly, while some respondents have extensive course experience, they are lacking in 'real' experience. Respondents certified in BLS reported having participated in a real resuscitation code a mean of 1.44 times in the past twelve months (as opposed to participating in the course a mean

of 12.00 times). By contrast, respondents certified in NRP have more ‘real’ experience, reporting participation in codes a mean of 4.76 times (as opposed to participating in the course a mean of 3.80 times). Studies highlighted in Section 1.2 have shown that resuscitation knowledge and skills significantly decline within 6 months of training and there appears to be no relationship between skill deterioration and years of experience and responsibility for patient care. This suggests that those with greater ‘real’ experience do not always retain their knowledge or skills to any greater degree than those who participate less frequently or never (Boudin, 1995; Curry & Gass, 1987) and that updates may be necessary between renewal periods.

Resuscitation Skills Training/Updates

Frequency of Updates

Focus group respondents indicated that the frequency of refreshers should be dependent upon the length of time between required renewals. There was a general consensus that updates would be ideal if available at least every few months. Several respondents specified six months as appropriate. Two respondents felt that the renewal period for ACLS in particular (3 years) was a long time to go without updates.

By contrast, survey respondents reported wanting to participate in updates (i.e. refresher courses) every year or every two years, depending on the certification area. The exception to this was if new guidelines were implemented. In this situation, respondents wanted more frequent updates in their respective certification areas.

Preferred Update Methods

Focus group participants identified several methods by which they would like to be able to update or refresh their competencies. Preferred methods highlighted included:

- Mock codes
- E-learning
- Frequent review of equipment and materials

Mock codes were also highlighted as an important method by survey respondents. Their ranking of preferred learning methods (i.e. using the scale 1=most preferred to 13=least preferred so rating closest to 1 indicates the most preferred) shows that they also reported preferences for methods which allowed them to practice their skills in a hands-on format, such as practice with an instructor (mean score 3.59), practice with other health professionals as a team (mean score 3.72), mock codes (mean score 5.04), and self-practice with a manikin (mean score 5.74).

One-Way ANOVA analyses were conducted to determine if respondents' professions, regions, or size of community had a significant effect on their preferred update methods at the $p < .05$ probability level. The results show that respondents' professions had a significant effect on their preferences for various methods such as mock codes ($p = .000$), videoconferencing ($p = .005$), audioconferencing ($p = .003$), and self-instructional videos ($p = .044$). The results also show that a greater proportion of respondents in the Central region reported a preference for e-learning ($p = .014$); a greater proportion of respondents in the Eastern region reported a preference for self-instructional videos ($p = .044$). Size of community had no significant effect on preferred update methods.

Barriers to Participation

Focus group and survey respondents identified similar barriers to participation in resuscitation training and updates. These barriers include:

- Staff shortages
- Timing of courses and updates
- Availability of courses/updates and/or instructors
- Financial issues (i.e. cost of travel to training; cost to bring instructor to a rural community for training; impact of training on fee-for-service physicians who have to close their practices to attend training, etc.)

Factors Influencing Confidence and Ability

Both focus group and survey participants highlight how aspects of team performance could influence their confidence in their ability to perform resuscitation. Aspects of team performance cited as influential by focus group respondents included: discrepancies in skill levels amongst team members; lack of communication amongst the team; and team leaders (usually physicians) who are not always up-to-date on their skills. The importance of designating a team leader was emphasized by several participants. Survey respondents also reported low confidence in their ability to perform resuscitation when there is no clear leader of the team and when the team is not communicating well. According to focus group respondents, one of the overwhelming factors which influence confidence and ability to perform resuscitation are feelings of apprehension, anxiety, and frustration. Survey respondents reported feelings of apprehension as influencing their performance as well.

Survey respondents were also asked to rate their confidence to perform resuscitation in a competent manner in the areas in which they were currently certified. This rating was based on a likert scale of 1=not at all confident to 5=extremely confident. Respondents report being

moderately to very confident in all resuscitation certification areas, with the highest confidence being reported in BLS (mean score 3.96), ACLS (mean score 3.83), and ITLS (mean score 3.83); the lowest confidence being report for PALS (mean score 3.33), ALSO (mean score 3.30) and ACORN (3.00).

Survey respondents were also asked to rate their ability to perform resuscitation in a competent manner in the areas in which they are currently certified. This rating was based on a likert scale of 1=not at all able to 5=extremely able. The results show that that respondents report being moderately to very able in most of the resuscitation certification areas. Respondents report being very to extremely able in their ability to perform (mean score 4.10) and ACLS (mean score 4.03). One-Way NOVA analyses were conducted to determine if respondents' regions, professions, and size of community had a significant effect on their self-reported abilities to perform resuscitations at the $p < .05$ probability level and the results show that both region of practice and profession had a significant effect on respondents' self-reported ability to perform BLS.

Pearson chi square analyses was conducted to determine if there was a significant difference between respondents self-reported ability to perform resuscitation and the size of the community in which they practice. The results show that significant differences were reported at the $p < .05$ probability level between ability to perform and size of community for those who are ACLS, PALS, and NRP certified. A greater proportion of respondents in urban communities appear to report greater ability than those who practice in rural communities.

Deterioration in Resuscitation Skills and Competencies

Survey respondents were asked to rate their concerns regarding the deterioration of their ability to perform resuscitation in the areas in which they are currently certified. This rating was based on a likert scale of 1=very low concern to 5=very high concern. Respondents reported moderate to high concern regarding deterioration in their ability to perform PALS (mean score 3.29) and TNCC (mean score 3.02). They reported low to moderate concern in most other resuscitation areas. A Pearson chi square analysis revealed a significant difference between self-reported concerns of deterioration to perform BLS and profession ($p = .000$). A greater proportion of nurses reported low concern while LPNs and allied health reported moderate concern.

Focus group and survey respondents highlighted several factors which influence deterioration in resuscitation skills and competencies. Inadequate opportunities for real or mock practice was highlighted by numerous respondents. Lack of access to courses and/or training materials, as well as frequent changes to guidelines, was also cited.

6.0 Conclusions

- Greater access to and opportunity for participation in practice/hands-on training opportunities was consistently highlighted by focus group and survey respondents. Such opportunities include mock experiences, mock codes, and opportunities for practice with an instructor. This is especially important for those who do not work in departments which experience a high frequency of resuscitation codes, such as emergency, critical care, etc.
- Overall, the preferred update methods reported by focus group and survey respondents included:
 - Mock codes
 - Practice with an instructor
 - Practice with other health professionals as a team
 - Self-practice with a manikin
 - E-learning
 - Frequent review of equipment and materials

Respondents' professions and regions had a significant effect on their preferred update methods. Some examples:

- Physicians, paramedics, and respiratory therapists reported a preference for mock codes.
- Allied health reported a preference for videoconferencing, audioconferencing, and self-instructional videos.
- Respondents in Central Health reported a preference for e-learning.
- Respondents in Eastern Health reported a preference for self-instructional videos.
- Respondents in rural communities reported less 'real' resuscitation code experience than those in urban communities. As well, respondents in rural communities reported lower ability to perform resuscitation in specific certifications areas, such as ACLS, PALS, and NRP.
- Both focus group and survey participants reported how aspects of team performance influence their confidence in their ability to perform resuscitation. Aspects of team performance cited as influential by focus group respondents included: discrepancies in skill levels amongst team members; lack of communication amongst the team; and team leaders who are not always up-to-date on their skills. Survey respondents also reported low self-efficacy (an individual's confidence in his/her ability to affect a given behavior) to perform resuscitation when there is

no clear leader of the team and when the team is not communicating well. It is recommended that to improve team performance during a resuscitation code, health professionals must be provided with opportunities to practice and be assessed as a team and to develop competencies in interprofessional teamwork.

- Respondents highlighted the importance of appropriate equipment and resources being provided to all health professionals who wish to utilize them for training and/or refresher courses. Focus group respondents highlighted the need for training on ‘realistic’ equipment, which is especially important if you do not have a lot a ‘real’ code experience. Some respondents reported a preference for self-directed learning/refresher opportunities if only they could access the resources. Provision of learning materials/guidelines in print or online formats, allowing health professionals to borrow a manikin for self-practice, are all methods by which health professionals could update their skills and refresh their knowledge if made available to them.
- Respondents consistently highlighted changes in guidelines and lack of training related to these changes, as a reason why their confidence and ability deteriorates. They highlighted the importance of the provision of training sessions/updates as new guidelines are released in their respective certification areas.

7.0 References

- Bjorshol, C.A., Lindner, T.W., Soreide, E., Moen, L., & Sunde, K. (2009). Hospital employees improve basic life support skills and confidence with a personal resuscitation manikin and a 24-min video instruction. *Resuscitation, 80*(8), 898-902.
- Boudin, K.M. (1995). Strategies for maintaining ACLS skills in hospitals. *Respiratory Care, 40*(5), 550-64.
- Braslow, A., Brennan, R.T., Newman, N.M., Bircher, N.G., Batcheller, A.M., & Kaye, W. (1997). CPR training without an instructor: development and evaluation of a video self-instructional system for effective performance of cardiopulmonary resuscitation. *Resuscitation, 34*(3), 207-220.
- Broomfield, R. (1996). A quasi-experimental research to investigate the retention of basic cardiopulmonary resuscitation skills and knowledge by qualified nurses following a course in professional development. *Journal of Advanced Nursing, 23*(5), 1016-23.
- Christensen, J., Parrish, K., Barabe, S., Noseworthy, R., Williams, T., Geddes, R., & Chalmers, A. (1998). A comparison of multimedia and standard advanced cardiac life support learning. *Academic Emergency Medicine, 59*(7), 702-8.
- Cooper, S., & Libby, J. (1997). A review of educational issues in resuscitation training. *Journal of Clinical Nursing, 6*(1), 5-10.
- Cronin, C., Cheang, S., Hlynka, D., Adair, E., & Roberts .S. (2001). Videoconferencing can be used to assess neonatal resuscitation skills. *Medical Education, 35*(11), 1013-23.
- Curry, L, & Gass, D. (1987). Effects of training in cardiopulmonary resuscitation on competence and patient outcome. *Canadian Medical Association, 137*, 491-496.

Davies, N., & Gould, D. (2000). Updating cardiopulmonary resuscitation skills: a study to examine the efficacy of self-instruction on nurse's competence. *Journal of Clinical Nursing, 9*, 400-410.

Dunn, S., Niday, P., Watters, N.E., McGrath, P., & Alcock, D. (1992). The provision and evaluation of a neonatal resuscitation program. *Journal of Continuing Education in Nursing, 23*(3), 118-26.

Fabius, D.B., Grissom, E.L., & Fuentes, A. (1994). Recertification in cardiopulmonary resuscitation: A comparison of two teaching methods. *Journal for Nurses in Staff Development, 10*(5), 262-8.

Farah, R., Stiner, E., Zohar, Z., Zveibil, F., & Eisenman, A. (2007). Cardiopulmonary resuscitation surprise drills for assessing, improving and maintaining cardiopulmonary resuscitation skills of hospital personnel. *European Journal of Emergency Medicine, 14*(6), 332-6.

Flisher D. (1992). Improving nurse's resuscitation skills. *Nursing Standard, 6*(50), 32-35.

Fossel, M., Kiskaddon, R.T., & Sternbach, G.L. (1983). Retention of cardiopulmonary resuscitation skills by medical students. *Journal of Medical Education, 58*(7), 568-75.

Grannemann, S., & Conn, V.S. (1996). An evaluation of the effectiveness of competency-based code blue education. *Journal for Nurses in Staff Development, 12*(6), 283-288.

Hamilton, R. (2005). Nurses' knowledge and skill retention following cardiopulmonary resuscitation training: A review of the literature. *Journal of Advanced Nursing, 51*(3), 288-97.

Hendrickse, A.D., Ellis, A.M., & Morris, R.W. (2001). Use of simulated technology in Australian defence force resuscitation. *Journal of the Royal Army Medical Corps, 147*(2), 173-178.

Hoadley, T.A. (2009). Learning advanced cardiac life support: A comparative study of the effects of low- and high-fidelity simulation. *Nursing Education Perspectives, 30*(2), 91-5.

Kaye, W., & Mancini, M. (1986). Retention of cardiopulmonary resuscitation skills by physicians, registered nurses, and the general public. *Critical Care Medicine, 14*(7), 620-622.

Maibach, E.W., Schieber, R.A., & Carroll, M.F. (1996). Self-efficacy in pediatric resuscitation: implications for education and performance. *Pediatrics, 97*(1), 94-9.

Marteau, T., Wynne, G., Kaye, W., & Evans, T. (1990). Resuscitation: experience without feedback increases confidence but not skill. *British Medical Journal, 300*(31), 849-850.

Moser, D.K., & Coleman, S. (1992). Recommendations for improving cardiopulmonary resuscitation skills retention. *Heart & Lung, 21*(4), 372-80.

Moule, P., Albarran, J.W., Bessant, E., Brownfield, C., & Pollock, J. (2008). A non-randomized comparison of e-learning and classroom delivery of basic life support with automated external defibrillator use: a pilot study. *International Journal of Nursing Practice, 14*: 427-434.

Niles, D., Sutton, R.M., Donoghue, A., Kalsi, M.S., Roberts, K., Boyle, L., Nishisaki, A., Arbogast, K.B., Helfaer, M., & Nadkarni, V. (2009). "Rolling refreshers": A novel approach to maintain CPR psychomotor skill competence. *Resuscitation, 80*(8), 909-12.

O'Donnell, C. (1990). A survey of opinion among trained nurses and junior medical staff on current practices in resuscitation. *Journal of Advanced Nursing, 15*, 1175-1180.

O'Steen, D.S., Kee, C.C., & Minick, M.P. (1996). The retention of advanced cardiac life support knowledge among registered nurses. *Journal for Nurses in Staff Development, 12*(2), 66-72.

Peterson, R. (2006). Teaching cardiopulmonary resuscitation via the web. *Critical Care Nursing, 26*, 55-59.

Rivera, T., & Gabriel, S. (1995). How effectively do you function in a cardiac arrest? A creative approach to code skills. *Journal of Continuing Education in Nursing, 26*(5), 226-229.

Romero, C., Ventura, S., Gibaja, E., Hervas, C., & Romero, C. (2006). Web-based adaptive training simulator system for cardiac life support. *Artificial Intelligence in Medicine, 38*, 67-78.

Schwid, H.A., Rooke, G.A., Ross, B.K., & Sivarajan, M. (1999). Use of a computerized advanced cardiac life support simulator improves retention of advanced cardiac life support guidelines better than a textbook review. *Critical Care Medicine, 27*(4), 821-4.

Settgast, A., Nguyen, J.T., Devries, A., Krebs, E., & Duane, P. (2006). An innovative approach to teaching resuscitation skills. *Medical Teacher, 28*(3), e90-93.

Smith, K.K., Gilcreast, D., & Pierce, K. (2008). Evaluation of staff's retention of ACLS and BLS skills. *Resuscitation, 78*(1), 59-65.

Springer K. (2010). Educational research: A contextual approach. Denver (CO): John Wiley & Sons.

Starr, L.M. (1998). An effective CPR home learning system: A program evaluation. *American Association of Occupational Health Nurses Journal, 46*(6), 289-295.

Todd, K.H., Braslow, A., Brennan, R.T., Lowery, D.W., Cox, R.J., Lipscomb, L.E., & Kellermann, A.L. (1998). Randomized, controlled trial of video self-instruction versus traditional CPR training. *Annals of Emergency Medicine, 31*(3), 364-9.

Tofil, N.M., White, M.L., Manzella, B., McGill, D., & Zinkan, L. (2009). Initiation of a pediatric mock code program at a children's hospital. *Medical Teacher, 31*, e241-e247.

Turner, N.M., Dierselhuis, M.P., Draaisma, J.M.T, ten Cate, O.Th.J. (2006). The effect of the Advanced Paediatric Life Support course on perceived self-efficacy and use of resuscitation skills. *Resuscitation, 73*(3), 430-436.

Turner, N.M., van de Leemput, A.J., Draaisma, J.M.T., Oosterveld, P., & ten Cate, O.Th.J. (2008). Validity of the visual analogue scale as an instrument to measure self-efficacy in resuscitation skills. *Medical Education*, 42, 503-511.

Wadas, T.M. (1999). Role rehearsal: a mock code program. *Dimensions in Critical Care Nursing*, 18(6), 36-39.

Wayne, D.B., Butter, J., Siddall, V.J., Fudala, M.J., Linqvist, L.A., Feinglass, J., Wade, L.D., & McGaghie, W.C. (2005). Simulation-based training of internal medicine residents in advanced cardiac life support protocols: A randomized trial. *Teaching and Learning in Medicine*, 17(3), 202-208.

Wayne, D.B., Butter, J., Siddall, V.J., Fudala, M.J., Wade, L.D., Feinglass, J., & McGaghie, W.C. (2006). Mastery learning of advanced cardiac life support skills by internal medicine residents using simulation technology and deliberate practice. *Journal of General Internal Medicine*, 21(3), 251-6.

Wik, L., Myklebust, H., Auestad, B.H., & Steen, P.A. (2002). Retention of basic life support skills 6 months after training with an automated voice advisory manikin system without instructor involvement. *Resuscitation*, 52(3), 273-279.

Wik, L., Thowsen, J., & Steen, P.A. (2001). An automated voice advisory manikin system for training in basic life support without an instructor. A novel approach to CPR training. *Resuscitation*, 50(2), 167-172.

Yakel, M.E. (1989). Retention of cardiopulmonary resuscitation skills among nursing personnel: What makes the difference? *Heart & Lung*, 18(5), 520-5.

Youngquist, S.T., Henderson, D.P., Gausche-Hill, M., Goodrich, .M., Poore, P.D., & Lewis, R.J. (2008). Paramedic self-efficacy and skill retention in pediatric airway management. *Academic Emergency Medicine*, 15(12), 1295-303.

Appendix A:
Focus Group Questions

Focus Group Questions

1. Are you concerned about deterioration in your resuscitation competencies (e.g., knowledge and skills) over time and/or in between renewal periods? If so, what are your concerns?
2. If you **are currently able** to update or refresh your resuscitation competencies between renewal periods, whether in a formal (e.g., mock codes) or informal manner (e.g., self-learning), how do you do so?
 - a. How frequently do you do so?
 - b. How could your access to and/or participation in such updates be supported and/or enhanced?
3. If you **would like to be able** to update or refresh your resuscitation competencies between renewal periods, how would you like to be able to do so (e.g. what learning methods/activities would you prefer?)
 - a. How frequently would you like to be able to update or refresh your competencies?
 - b. What are the barriers that might prevent you from participating in such updates if they were available?
4. In your opinion, what are the main reasons that deterioration in knowledge and skills in resuscitation occurs?

Think of a time you were performing a resuscitation that in retrospect you were not entirely pleased with (i.e. the way someone ran the code, your performance of skill, the team's performance, etc.) Take a moment and try to recall as many details as possible about this resuscitation:

5. How were you feeling prior to the resuscitation?
6. How did you feel afterwards?
7. What aspects of the resuscitation could have been better?
8. What knowledge and/or skill areas would you have liked to be more familiar with?
9. What factors and/or conditions may have negatively impeded and/or interfered with this resuscitation?

Appendix B:

Online Survey-Questionnaire – *Survey of Resuscitation Skills Retention*

Survey of Resuscitation Skills Retention

Introduction

The purpose of this survey is to examine the opinions and attitudes of health providers towards retention and updating of resuscitation skills. The survey is part of a study investigating health providers' perceptions of resuscitation skills retention. The project has been approved by the Human Investigations Committee (HIC), Faculty of Medicine, Memorial University of Newfoundland and is funded through the Medical Research Foundation (MRF), Faculty of Medicine, Memorial University of Newfoundland.

We thank you in advance for taking the time to complete this survey and would appreciate your response by **March 23, 2011**. Participation in this survey is voluntary. Your responses are anonymous and will only be used for research purposes. All data will be presented in an aggregate format with no identifying information included.

If you have any questions about the survey please contact:

Ms. Lisa Fleet
Manager, Research Programs
Professional Development & Conferencing Services
Faculty of Medicine, Memorial University
Telephone: 709-777-4293
E-mail: lfleet@mun.ca

*Please note that the information you provide will be housed on servers in the United States (as Survey Monkey is an American company). SurveyMonkey and all information collected is therefore subject to US laws.

Survey of Resuscitation Skills Retention

Random Draw for Completing Survey (Optional)

For those who complete the survey, in recognition of this demand on your time, we will be holding a random draw for a \$100 Chapters Gift Card (one gift card/regional health authority).

Your participation in this draw is voluntary; you may still complete the survey without participating. However, if you would like your name entered in this draw, please provide the requested information below and complete the survey. All personal information is for this purpose only. Your name, e-mail, and RHA will be separated from the survey data once submitted and will be kept confidential.

Name:

E-mail:

Regional Health Authority:

Survey of Resuscitation Skills Retention

Demographic Information

1. Gender:

Male

Female

2. Profession:

Registered Nurse

Licensed Practical Nurse

Nurse Practitioner

Primary Care Paramedic

Advanced Care Paramedic

Critical Care Paramedic

Family Physician/General Practitioner

Specialist

Respiratory Therapist

Occupational Therapist

Physiotherapist

Other (please specify):

3. Years of Experience as a Health Professional:

| |
|---|
| 5 |
| 6 |

4. Health Authority Region of Practice:

Eastern

Central

Western

Labrador-Grenfell

Survey of Resuscitation Skills Retention

5. Practice Setting (check all that apply):

- Hospital
- Community Health Centre
- Private Practice
- Other (please specify):

6. Department/Clinical Area (check all that apply):

- Emergency
- Surgery
- Intensive Care
- Medicine
- Long-term Care
- Family Practice
- OR/Recovery
- Obstetrics
- Pediatrics
- Community
- Other (please specify):

7. Size of community in which you currently practice:

- Rural (population <5,000)
- Small town (population 5,000-9,999)
- Urban (population >10,000)

Survey of Resuscitation Skills Retention

Current Resuscitation Certification

8. In which of the following resuscitation areas do you currently hold certification? (check all that apply)

- Basic Life Support (BLS)
- Advanced Cardiac Life Support (ACLS)
- Advanced Trauma Life Support (ATLS)
- Advanced Life Support in Obstetrics (ALSO)
- Acute Care of At-risk Newborns (ACORN)
- Pediatric Advanced Life Support (PALS)
- Neonatal Resuscitation Program (NRP)
- Trauma Nurse Core Course (TNCC)
- International Trauma Life Support (ITLS)
- Canadian Triage and Acuity Scale (CTAS)

9. Please answer questions 9a-9c for each of the resuscitation areas in which you reported currently holding certification in question 8 above.

a. Please estimate the number of times you have taken each course:

| | |
|-------|----------------------|
| BLS | <input type="text"/> |
| ACLS | <input type="text"/> |
| ATLS | <input type="text"/> |
| ALSO | <input type="text"/> |
| ACoRN | <input type="text"/> |
| PALS | <input type="text"/> |
| NRP | <input type="text"/> |
| TNCC | <input type="text"/> |
| ITLS | <input type="text"/> |
| CTAS | <input type="text"/> |

Survey of Resuscitation Skills Retention

b. Please estimate the number of times have you participated in a “real” resuscitation code in each area in the past 12 months:

| | |
|-------|----------------------|
| BLS | <input type="text"/> |
| ACLS | <input type="text"/> |
| ATLS | <input type="text"/> |
| ALSO | <input type="text"/> |
| ACoRN | <input type="text"/> |
| PALS | <input type="text"/> |
| NRP | <input type="text"/> |
| TNCC | <input type="text"/> |
| ITLS | <input type="text"/> |
| CTAS | <input type="text"/> |

c. Using the choices provided, please indicate how often you would like to participate in an update (e.g., refresher course) in each area:

| | Monthly | Every 3 months | Every 6 months | Annually | Other |
|-------|---------|----------------|----------------|----------|-------|
| BLS | ja | ja | ja | ja | ja |
| ACLS | ja | ja | ja | ja | ja |
| ATLS | ja | ja | ja | ja | ja |
| ALSO | ja | ja | ja | ja | ja |
| ACoRN | ja | ja | ja | ja | ja |
| PALS | ja | ja | ja | ja | ja |
| NRP | ja | ja | ja | ja | ja |
| TNCC | ja | ja | ja | ja | ja |
| ITLS | ja | ja | ja | ja | ja |
| CTAS | ja | ja | ja | ja | ja |

Other specified (please specify resuscitation area and frequency of update):

| | |
|--|---|
| | 5 |
| | 6 |

Survey of Resuscitation Skills Retention

10. Please indicate if you are an instructor in any of the following resuscitation areas (check all that apply):

- BLS
- ACLS
- ATLS
- ALSO
- ACoRN
- PALS
- NRP
- TNCC
- ITLS
- CTAS

Survey of Resuscitation Skills Retention

Resuscitation Skills Update Methods

11. Using the scale 1-13 (1=most preferred to 13=least preferred), please rank your preferred learning methods for updating/refreshing your resuscitation skills in between renewal periods (*only 1 preference for each option):

| | Most Preferred (1) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Least Preferred (13) |
|-----------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Mock codes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| E-learning | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Videoconferencing | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Audio-teleconferencing | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Self-instructional videos | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Self-practice with a manikin | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Practice with an instructor | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Practice with other health professionals (i.e. as a team) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Observation of resuscitation codes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Self-learning (e.g., reviewing guidelines, textbooks) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Debriefing sessions (e.g., post-resuscitation debrief) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Conference presentations, sessions with peers | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Other specified:

| | |
|--|---|
| | 5 |
| | 6 |

Survey of Resuscitation Skills Retention

12. Which of the following could be barriers to your participation in resuscitation skills training and/or updates/refreshers? (Check all that apply):

- Lack of access to a computer/Internet
- Staffing shortages in my unit/hospital
- Travel
- Lack of remuneration/compensation for my participation
- Availability of instructors
- Availability of courses and/or updates
- Timing of courses and/or updates
- Geographical remoteness – access to courses at larger sites
- Personal commitments (e.g., family responsibilities)
- Lack of institutional support
- Other (please specify):

| | |
|--|---|
| | 5 |
| | 6 |

Survey of Resuscitation Skills Retention

Self-Efficacy to Perform Resuscitation

Self-efficacy is a cognitive process which has been described as an individual's confidence in their ability to affect a given behaviour. A number of situations are described below that could influence one's performance during a resuscitation code. Please consider these situations in terms of the following scale:

| | | | | | | | | | | |
|---------------|----|----|----|----|-------------------|----|----|----|----|-----------------------|
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Cannot at all | | | | | Moderately can do | | | | | Highly certain can do |

Survey of Resuscitation Skills Retention

13. Using the scale above, please rate your degree of confidence in performing a resuscitation code in each of the following situations:

| | |
|-------------------------------------------------------------------------------------------|--------------------------------|
| When roles of resuscitation team members are unclear | <input type="text" value="6"/> |
| If another team members' skills are lacking | <input type="text" value="6"/> |
| When I am feeling anxious | <input type="text" value="6"/> |
| If I cannot understand other members of the resuscitation team | <input type="text" value="6"/> |
| When there is no clear leader of the resuscitation code | <input type="text" value="6"/> |
| If I am not familiar with new guidelines | <input type="text" value="6"/> |
| When other team members are disrespectful | <input type="text" value="6"/> |
| When I am feeling apprehensive | <input type="text" value="6"/> |
| If I am concerned about the competency level of the team leader and/or other team members | <input type="text" value="6"/> |
| When I am performing a resuscitation in an unfamiliar setting | <input type="text" value="6"/> |
| If team members do not work well together | <input type="text" value="6"/> |
| During a code that is not going well | <input type="text" value="6"/> |
| When new guidelines have recently been introduced | <input type="text" value="6"/> |
| If the location is overcrowded | <input type="text" value="6"/> |
| If members of the resuscitation team are not communicating well | <input type="text" value="6"/> |
| When I feel my skills have deteriorated | <input type="text" value="6"/> |
| If I am nervous about my participation in a resuscitation code | <input type="text" value="6"/> |
| After I have participated in an update | <input type="text" value="6"/> |
| When I am unfamiliar with other members of the resuscitation team | <input type="text" value="6"/> |
| After I have recently practiced | <input type="text" value="6"/> |
| When I am feeling tired | <input type="text" value="6"/> |
| If I have not participated in a resuscitation code recently | <input type="text" value="6"/> |
| After an effective debriefing session from a recent resuscitation code | <input type="text" value="6"/> |

Survey of Resuscitation Skills Retention

Resuscitation Confidence and Ability

14. Considering the resuscitation areas in which you currently hold certification, how would you rate your confidence to perform resuscitation in a competent manner for that/those area(s):

| | Not At All Confident | Slightly Confident | Moderately Confident | Very Confident | Extremely Confident | N/A |
|-------|----------------------|--------------------|----------------------|----------------|---------------------|-----|
| BLS | jn | jn | jn | jn | jn | jn |
| ACLS | jn | jn | jn | jn | jn | jn |
| ATLS | jn | jn | jn | jn | jn | jn |
| ALSO | jn | jn | jn | jn | jn | jn |
| ACoRN | jn | jn | jn | jn | jn | jn |
| PALS | jn | jn | jn | jn | jn | jn |
| NRP | jn | jn | jn | jn | jn | jn |
| TNCC | jn | jn | jn | jn | jn | jn |
| ITLS | jn | jn | jn | jn | jn | jn |
| CTAS | jn | jn | jn | jn | jn | jn |

15. Considering the resuscitation areas in which you currently hold certification, how would you rate your ability to perform resuscitation for that/those area(s)

| | Not At All Able | Somewhat Able | Moderately Able | Very Able | Extremely Able | N/A |
|-------|-----------------|---------------|-----------------|-----------|----------------|-----|
| BLS | jn | jn | jn | jn | jn | jn |
| ACLS | jn | jn | jn | jn | jn | jn |
| ATLS | jn | jn | jn | jn | jn | jn |
| ALSO | jn | jn | jn | jn | jn | jn |
| ACoRN | jn | jn | jn | jn | jn | jn |
| PALS | jn | jn | jn | jn | jn | jn |
| NRP | jn | jn | jn | jn | jn | jn |
| TNCC | jn | jn | jn | jn | jn | jn |
| ITLS | jn | jn | jn | jn | jn | jn |
| CTAS | jn | jn | jn | jn | jn | jn |

Survey of Resuscitation Skills Retention

Resuscitation Deterioration

16. Considering the resuscitation areas in which you currently hold certification, how concerned are you in the deterioration of your ability to perform resuscitation for that/those area(s):

| | Very Low Concern | Low Concern | Moderate Concern | High Concern | Very High Concern | N/A |
|-------|------------------|-------------|------------------|--------------|-------------------|-----|
| BLS | jn | jn | jn | jn | jn | jn |
| ACLS | jn | jn | jn | jn | jn | jn |
| ATLS | jn | jn | jn | jn | jn | jn |
| ALSO | jn | jn | jn | jn | jn | jn |
| ACoRN | jn | jn | jn | jn | jn | jn |
| PALS | jn | jn | jn | jn | jn | jn |
| NRP | jn | jn | jn | jn | jn | jn |
| TNCC | jn | jn | jn | jn | jn | jn |
| ITLS | jn | jn | jn | jn | jn | jn |
| CTAS | jn | jn | jn | jn | jn | jn |

17. In your opinion, what are the main reasons that resuscitation skills and competencies deteriorate?

5

6

Survey of Resuscitation Skills Retention

General Comments

18. General Comments:

