Public Expectations of Receiving Telephone Pre-Arrival Instructions from Emergency Medical Dispatchers at 3 Decades Post Origination at First Scripted Site

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Abstract

Introduction: Dispatcher-provided telephone pre-arrival instructions (PAIs) date back over 3 decades in the United States of America. In 1979, the Salt Lake City Fire Department began providing Medical Priority Dispatch System (MPDS™) protocol-driven PAIs for every MPDS chief complaint—including airway management, cardiopulmonary resuscitation (CPR), Heimlich maneuver, and childbirth situations. Therefore, with 3 decades of experience with scripted PAIs, Salt Lake City is a prime site for studying public expectations of receiving PAIs when calling 9-1-1. The authors hypothesized that the North American public has strong expectations of receiving telephone CPR and Heimlich maneuver PAIs and are likely to accept transfer to phone-advice professionals when dispatchers determine that their medical problem is non-emergent.

Objective: To assess public expectations of receiving telephone PAIs from 9-1-1 Emergency Medical Dispatchers (EMDs), 3 decades after introduction.

Methods: The survey involved a random selection of Salt Lake City residents in September 2007. The questionnaires and response cards (in English language) were mailed to a convenience sample of 2,000 respondents to complete. The survey responses were presented and the expectations of receiving PAIs assessed. Evaluation of the association between demographics and PAI expectations was performed, adjusting for PAI type. The difference between CPR and Heimlich maneuver PAI expectations was also assessed, along with willingness of caller transfer to a phone-advice professional when a medical problem is non-emergent.

Results: Two hundred and seventy (270) survey questionnaires were completed and returned (10.4%) showing overall, that 88.7% (95%CI: 83.3%, 92.8%) of citizen respondents expect PAIs from EMDs. The expectation of receiving PAIs was significantly associated with female callers (OR (95%CI): 3.05 (1.21, 7.65), p = 0.022). Citizens age 15 to 45 years were significantly less likely to accept transfer to a phone-advice nurse than other age groups combined (p = 0.033). Though not statistically significant, citizens age 60 to 75 years were 4 times more likely to expect to receive CPR PAIs from EMDs, twice more likely to expect to receive Heimlich maneuver PAIs or accept transfer to a phone advice nurse. Household income was not significantly associated with PAI expectations or transfer to a phone-advice nurse.

Conclusions: The public has high expectations of receiving life-saving PAIs from EMDs. Females have higher expectations of receiving CPR or Heimlich maneuver advice. In the future, with well constructed, scripted telephone instructions in EMD protocols, we expect similar public acceptance of a wider range of enhanced telephone-directed patient evaluations, advice, and care.

Keywords: Pre-Arrival Instructions Expectation, Emergency Medical Dispatch Protocol, Medical Priority Dispatch System, Emergency Medical Service, Emergency Medical Dispatcher, Cardiopulmonary Resuscitation, Heimlich Maneuver, Nurse Advice Transfer, Telephone Advice.

Introduction

The history of dispatcher-provided telephone pre-arrival instruction (PAIs) dates back over 3 decades in the United States. The first known recorded resuscitation-type phone instructions occurred in Phoenix, where an injured paramedic, assigned to the dispatch center, began providing occasional ad lib instructions for 9-1-1 calls in 1974.1

In 1979, the Salt Lake City Fire/Emergency Medical Services Alarm Office began providing Medical Priority Dispatch System (MPDS) protocol-driven instructions for every one of the MPDS chief complaints—including airway management, CPR, Heimlich maneuver, and childbirth situations.2

Cardiac arrest (CA) is one of the leading causes of mortality in North America and the overall survival rate for out-of-hospital CA falls below 5%.3 Increased survival has been associated with bystander cardiopulmonary resuscitation (CPR).4 Several community training methods have been used in the past to improve bystander CPR.5–25 Lately, lack of community interest and motivation pose a great challenge, although dispatch-assisted CPR PAIs have been shown to enhance bystander CPR rates.26 For many years, Emergency medical dispatchers (EMDs) have also assisted 9-1-1 callers through telephone PAIs to effectively perform the Heimlich maneuver procedure. This procedure, which involves abdominal thrusts was introduced in 1974 to save lives of choking victims.27

Public awareness and expectation of receiving telephone-directed help, virtually non-existent in the 1970s, began to grow in the 1980s, and got sporadic regional awareness whenever a dramatic “emergency dispatcher saves a life” story was covered in the news, radio, or television media.

In 1989, the Columbia Broadcasting System (CBS) primetime television show “RESCUE 911!” was broadcast to millions of Americans and Canadians, as well as to citizens of 45 other countries, highlighting the importance of the dispatch role of 9-1-1 service in every case portrayed in the 7-year series. It remained in re-runs until 2005.

By 1990, it is estimated that hundreds of centers in North America had some type of protocol and/or training to provide such
telephone help. Whether they actually did or not, and to what extent, remains unknown. The extent of the public’s expectations of receiving PAIs has only been the subject of one study to date, in the Rochester, New York area in 2000. Billittier et al. reported in their study that knowing how to “dial 9-1-1 or 9-11” numbers significantly predicted the lay public’s expectation of receiving PAIs and that the public expected to receive PAIs when they make such calls. They recorded an average expectation rate of receiving advice of 76% (95% CI: 73%, 80%) for all of the four following medical conditions: 88% (95% CI: 85%, 90%) for choking, 87% (95% CI: 84%, 90%) for not breathing, 89% (95% CI: 86%, 91%) for bleeding, and 88% (95% CI: 86%, 91%) for childbirth.

In several states in Australia, countrywide in the UK, and in a few Emergency Medical Systems (EMS) in North America, EMDs utilize special protocols to transfer the caller to EMS-approved healthcare entities, once it has been determined that a patient’s medical problem is not urgent and non-life threatening. This transfer is based on medically approved pre-set, low acuity codes. The call may be transferred to a phone-advice nurse or other professional non-emergency care source, such as Rape Crisis Centers or Mental Health Help Lines for further evaluation and care or, in some cases, return to the 9-1-1/EMS system for a mobile response. This method significantly optimizes the utilization of dispatch resources.

The authors hypothesized that the North American public today has strong expectations of receiving telephone CPR and Heimlich maneuver pre-arrival instructions when they call 9-1-1 and are also likely to accept transfer to phone-advice professionals when EMDs determine that their problem is not a medical emergency.

Methods
Salt Lake City, the birthplace of scripted PAIs, is a prime example for studying public expectations of receiving PAIs. The study was based on a mail-in survey conducted in September 2007. In collaboration with the Salt Lake City Fire Department, a citizen survey questionnaire, instruction sheet, and a postage-paid return response card (Figure 1) were constructed and printed in English. Using the 2007 Salt Lake City phone book, a participant selection was accomplished by selecting every 5th name on each 5th page of the book. These addresses were vetted against a zip code map from the phone book while comparing each with a digital internet source to identify actual resident areas within the city limits. All non-Salt Lake City addresses were excluded from the study sample. Survey questionnaires were then sent out via first class US mail in September 2007, to a convenience sample of 2,000 residents in Salt Lake City. There was no formal consenting process, but consent was assumed with the return of a completed survey response card. The respondents were requested to anonymously complete and mail back their responses in the pre-paid survey response envelopes.
Data Analysis

A web interface with a report generation component was created for data entry. Initial descriptive (frequencies and averages) statistics were generated upon the completion of data entry. Intercooled STATA for Windows® software (STATA Statistical Software: Release 9 ©2007, StataCorp, College Station, TX, USA) was used for detailed data analysis.

Odds ratio (OR) with 95% confidence intervals (CIs) and p-values were used to assess associations between study groups, at 0.05 significance level. The study responses were analyzed, while categorizing by the citizen’s gender, age, and type of PAI. The next analyses evaluated association between the citizen’s expectations of receiving PAsIs and their age, and gender. The association between gender, age, household income, and PAI expectation was also evaluated, while adjusting for the type of PAI. Finally, the difference between the level of the public’s PAI expectation to receive CPR and Heimlich maneuver instructions was assessed, as well as the level of acceptance of transfer to a nurse when their problem was non-emergent.

Results

Two-hundred and seven (10.4%) citizens participated in the survey. Based on this sample, Salt Lake City citizens expect to receive PAIs from EMDs to help them in the life-threatening emergencies of cardiac arrest and choking (Table 1), confirmed by an average expectation rate of 88.7% (95%CI: 83.3%, 92.8%). They were also willing to accept transfer to phone-advice professionals when EMDs determined that their medical problem was non-emergent (88.5% (95%CI: 82.8%, 92.8%)).

The level of public expectation of receiving PAIs from EMDs was significantly associated with female callers (Table 2). However, age was not significantly associated with the likelihood of expecting to receive PAIs from EMDs. Citizens age 15 to 45 years were the only group that was significantly less likely than all the other age groups combined to accept to be transferred to a phone-advice professional (p = 0.033) (Table 3). Though not statistically significant, citizens age 60 to 75 years were four times more likely to expect to receive PAIs from EMDs to help them perform CPR, and twice as likely to expect to receive PAIs from EMDs to either help them do the Heimlich maneuver or to accept transfer to phone-advice professionals for non-emergent situations. In addition, female citizens were three times more likely than males to expect to receive PAIs from EMDs to help them do CPR, and twice as likely to expect to receive PAIs from EMDs to help them do the Heimlich maneuver or to accept transfer to phone-advice professionals. All the differences found, however, were not statistically significant.

There was no significant difference in PAI expectation for CPR between citizens living in households with incomes higher than the overall median income ($41,864) than for those who earned less. However, citizens who had higher incomes than the overall median income had slightly higher odds of expecting PAIs for CPR. A similar pattern was observed in the citizens who accepted transfers to phone-advice professionals. On the other hand, although not a statistically significant difference, those living in households with income less than the overall income had a high expectation of receiving PAIs from EMDs to help them do the Heimlich maneuver.

There was no significant difference in the expectation of receiving CPR and Heimlich maneuver PAIs (91.2% each) (Table 4).

Table 1: Profile of citizen responses categorized by gender, age, and type of PAI.

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Pre-Arrival Instructions (PAIs)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) Continuous</td>
<td>192</td>
<td>Yes: n (%)</td>
<td>No: n (%)</td>
</tr>
<tr>
<td>15-45</td>
<td>56</td>
<td>170 (57.1±18.2)†</td>
<td>22 (56.6±18.3)†</td>
</tr>
<tr>
<td>45-60</td>
<td>55</td>
<td>50 (89.3)</td>
<td>6 (10.7)</td>
</tr>
<tr>
<td>60-75</td>
<td>43</td>
<td>47 (85.5)</td>
<td>8 (14.5)</td>
</tr>
<tr>
<td>&gt;75</td>
<td>38</td>
<td>41 (95.3)</td>
<td>2 (4.7)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>115 (55.8)</td>
<td>Yes</td>
<td>70 (61.0)</td>
</tr>
<tr>
<td>Male</td>
<td>91 (44.2)</td>
<td>No</td>
<td>25 (27.5)</td>
</tr>
</tbody>
</table>

*Two-sided Fisher’s Exact test p-value, unless otherwise stated. †n(mean ± standard deviation). §Two-sided Student t-test p-value for testing the difference in the mean age (with unequal variance) between the two levels of the citizen’s expectation to receive PAIs from EMDs. The PAIs exclude transfers to advice nurse for non-emergent cases. ‡Trend analysis p-value (Fisher’s Exact). Female citizens were three times more likely to expect to receive PAIs from EMDs than males (OR (95%CI): 3.05 (1.21, 7.65), p = 0.022).

Table 2: Association between public expectation of receiving PAIs from EMDs by age and gender.
### Discussion

After 3 decades of PAI availability locally and exposure nationally, over 91% of Salt Lake City citizens responding to this survey expect to receive this elevated level of telephone help. A significant public expectation obviously exists, therefore a public safety standard of care and practice is no longer disputable here.

This study has further examined several variations within the social parameters affecting a citizens’ degree of expectation of receiving PAs from EMDs. Such expectations differ significantly by gender, and slightly by age and median household income. Females had a significantly higher expectation of receiving CPR or Heimlich maneuver PAs from EMDs, than their male counterparts. However, males with problems not deemed by the EMD to be an emergency were more likely to accept non-emergency transfer to phone-advice professionals than females. The responding citizens under 45 years of age and those over 60 had the highest expectation of receiving PAs.

Nearly 90% of all citizens reported that, if their problem was determined not to be urgent, they were “okay” with being transferred to phone-advice professionals for further advice. Within this group, citizens age 15 to 45 years were significantly less likely (odds reduced by 66%) to accept a transfer to phone-advice professionals when the problem was determined that their medical problem was not an emergency. Although not statistically significant, citizens age 60 to 75 years were four times more likely to expect to receive CPR instructions and twice as likely to expect Heimlich maneuver choking relief instructions. Similarly, they were nearly twice as likely to accept transfer to phone-advice professionals.

Households with an income higher than Salt Lake City’s median level had high expectations of receiving CPR instructions and were likely to accept transfer to phone-advice professionals. On the other hand, the higher income households were less likely to expect Heimlich maneuver instructions (odds reduced by 24%). The differences in both these instances, however, were not statistically significant, but certainly of interest. Overall, there was no significant difference between the expectation of receiving CPR and Heimlich maneuver instructions, although both were quite high (91.2%).

The clinical effects of these levels of public expectation regarding PAs are several and potentially wide reaching. A new standard of public safety telephone care and practice now clearly exists where it did not (and could not) 3 decades ago. These public expectations now likely include other aspects of 9-1-1 intervention in areas related to advice and direction by EMDs. Such aspects include the acceptance of improved interrogation (questioning); the addition of more intricate instructions, such as the recent advent of phone instructions for high-risk childbirth situations (including breech birth, shoulder dystocia, and cord presentation); as well as new phone procedures for stroke identification and agonal breathing detection.4,34 We believe that public acceptance of new and more complicated instructions can now be reasonably predicted.

In our opinion, the most unexpected result of the study was the high acceptance of being transferred to phone-advice professionals when the problem was determined by the EMD as not being an emergency. That this expectation was reported by about 90% of respondents was most surprising, however, in today’s healthcare climate, it is not totally unexpected.

These findings support and build upon the earlier findings of Billittier et al.,29 reported 10 years ago, in a geographic area with significantly less history of receiving 9-1-1 telephone instructions.

Other concerns that could potentially affect public expectations (for better or for worse) include publicized governmental requirements, dispatcher liability, and PAI-related lawsuits. However, the public is likely not aware of the existence of statutes or EMS/EMD rules and regulations that establish a governmental standard of care for EMD training and protocol use, including PAI provision, in their area. The first process of this kind, started in Utah in 1982, resulted in State EMS regulations that required 9-1-1 centers to have an EMD protocol in place, including private ambulance companies or any service receiving emergency calls from the public. The mandating of an EMD process, as opposed to EMS and paramedic laws, rules, and regulations, has only very slowly spread within the US. According to the International Academies of Emergency Dispatch® (IAED™) statistics, only 21 states have any statewide requirements.

### Table 3: Association between public expectation of receiving PAs from EMDs for gender, age, and household income.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cardiopulmonary Resuscitation (CPR)</th>
<th>Heimlich Maneuver</th>
<th>Phone Advice Nurse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>PAIs: n (%)</td>
<td>OR (95%CI)</td>
</tr>
<tr>
<td>Male</td>
<td>80</td>
<td>69 (86.3)</td>
<td>1.01 (0.50, 2.04)</td>
</tr>
<tr>
<td>Female</td>
<td>102</td>
<td>97 (95.1)</td>
<td>3.09 (1.07, 8.91)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>n</th>
<th>PAIs: n (%)</th>
<th>OR (95%CI)</th>
<th>p</th>
<th>n</th>
<th>PAIs: n (%)</th>
<th>OR (95%CI)</th>
<th>p</th>
<th>n</th>
<th>Transfer: n (%)</th>
<th>OR (95%CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-45</td>
<td>56</td>
<td>52 (92.9)</td>
<td>1.38 (0.45, 4.25)</td>
<td>0.779</td>
<td>55</td>
<td>50 (90.9)</td>
<td>0.98 (0.34, 2.79)</td>
<td>1.000</td>
<td>49</td>
<td>39 (79.6)</td>
<td>0.34 (0.14, 0.86)</td>
<td>0.033</td>
</tr>
<tr>
<td>45-60</td>
<td>54</td>
<td>48 (88.9)</td>
<td>0.68 (0.24, 1.91)</td>
<td>0.568</td>
<td>55</td>
<td>48 (87.3)</td>
<td>0.55 (0.20, 1.48)</td>
<td>0.268</td>
<td>50</td>
<td>46 (92.0)</td>
<td>1.72 (0.57, 5.15)</td>
<td>0.439</td>
</tr>
<tr>
<td>&gt;75</td>
<td>38</td>
<td>37 (97.4)</td>
<td>4.34 (0.70, 5.3)</td>
<td>0.199</td>
<td>43</td>
<td>41 (95.4)</td>
<td>2.33 (0.57, 5)</td>
<td>0.369</td>
<td>38</td>
<td>35 (92.1)</td>
<td>1.68 (0.49, 5.66)</td>
<td>0.571</td>
</tr>
</tbody>
</table>

| Income† | High | 35 | 32 (91.4) | 1.04 (0.30, 3.60) | 1.000 | 37 | 33 (89.2) | 0.76 (0.24, 2.35) | 0.747 | 35 | 32 (91.4) | 1.50 (0.44, 5.06) | 0.768 |
| Low       | 146 | 133 (91.1) | 1.45 (0.15, 1.34) | 0.176 | 154 | 141 (91.6) | 1.14 (0.33, 3.90) | 1.000 | 138 | 121 (87.7) | 1.38 (0.48, 4.56) | 0.770 |

PAIs = Pre-Arrival Instructions from EMDs. *Excludes all the “I don’t know/not sure” responses (CPR: n = 22, Heimlich maneuver: n = 11, Phone advice nurse: n = 30). †Odds ratio and 95% confidence interval. ‡Two-sided Fisher’s Exact test p-value. §The upper limit of 95%CI was undeterminable. #Median household income (median; minimum-maximum: $41,864; $31,868 – $73,322). Low: household income is less than or equal to the overall median, High: household income is greater than the overall median.

| Table 4: Profile of citizen responses categorized by gender, age, and type of PAI. |
|-----------------|-------|-----------------|-----------------|-----|-------|
| Citizen’s medical problem | n | PAIs: n (%) | OR (95%CI) | p |
| Cardiopulmonary resuscitation (CPR) | 182 | 166 (91.21) | 1.01 (0.50, 2.04) | 1.000 |
| Heimlich maneuver | 192 | 175 (91.15) | | |
mandated EMD requirements. Even this does not insure that PAIs are "always given when possible and appropriate" or given correctly. The fact that the public has such a high expectation of receiving PAIs, establishes, in-and-of-itself, a clear standard of care. We also know that about 3,100 centers in the U.S. have, at one point, adopted these PAIs using some version of the MPDS. Model EMD Legislation and Model EMD Regulations and Standards documents have been published by the IAED, and have been used in several states and jurisdictions to set governmentally required standards of EMD care and practice.

Contrary to what is often assumed, there has never, to our knowledge, been an issue of legal liability in any interaction with the public during a 9-1-1 call in terms of the public's acceptance of following dispatcher-given PAIs. Historically, this assumption often came from within the reluctant-to-change public safety community itself, at times supported by ill-informed city or county attorneys. Rather it is the failure to provide PAIs, and not the public's willingness to follow dispatcher-given PAIs that becomes a legal liability. Generally, when the lay public or elected officials are told that their community is not providing PAIs, they comment, amazed, "You mean we are not doing this already?" Frequently, the public is exposed to cases of failure to provide PAIs – for which the unofficial legal term is "dispatcher abandonment." Public outrage can be significant in communities bearing the brunt of high profile cases where failure to provide PAIs seems so blatant. Indeed, one mother started an organization called Parents Against Negligent Dispatch Agencies (P.A.N.D.A.), after losing a twin daughter in a backyard drowning incident (the dispatch center provided no PAIs having been told by local authorities not to give telephone instructions for fear of liability). The issue of receiving PAIs becomes little more than common sense once the public is exposed to the idea. To date, there has never been a successful lawsuit that we are aware of, regarding the worldwide provision of medically approved PAIs. On the contrary, each legal case in this arena is related to the failure to advise. Such absence of any reported, publicly known error or legal case regarding the provision of telephone instructions by EMDs could be assumed to be a contributing factor to the public's acceptance and the public safety community's support and expansion of telephone-provided care. Future investigation should concentrate on other areas of scripted telephone-provided care and advice, as well as how to best provide these verbal services in the proper format, context, and linguistic presentation. As a recent chief of the Salt Lake City Fire Department stated in a written order, "Failure to provide pre-arrival instructions is not an option at City Fire."

**Study limitations**

Although this survey was conducted in Salt Lake City, which has used MPDS for over 3 decades, there is no guarantee that the same results could be applied to other communities. In addition, the sample size may have been too small to make valid conclusions. However, Salt Lake City should provide results consistent with other cities that have had PAIs consistently given by EMDs for a period of time significant enough to create similar expectations. Future studies in other locations are recommended to validate these findings. Lastly, a small but important number of citizens were still unsure of their expectations of receiving PAIs from 9-1-1 EMDs (CPR: 10.8%; Heimlich maneuver: 5.4%; and transfer to phone-advice professionals: 14.7%). While we believe citizens' expectations of receiving PAIs from EMDs reflect widespread current reality, interpretations of these results should be done with some caution.

**Conclusion**

The public in Salt Lake City clearly expects to receive PAIs from EMDs when they call 9-1-1 and the level of expectations is significantly associated with female gender, but not with age. Females have higher expectation than males of receiving CPR or Heimlich instructions. Males are slightly more likely to accept transfer to phone-advice professionals when EMDs determined their medical problem to be "not an emergency". Citizens in households with higher median income have a moderate level (i.e., odds ratio slightly more than 1.0) of expectation of receiving CPR PAIs, along with accepting transfer to phone-advice professionals for non-emergent medical conditions. In the future, with well constructed, scripted telephone instructions in EMD protocols, we can expect public acceptance of wider ranging and more comprehensive forms of telephone-directed patient evaluations, advice, and care.

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**Contributors:** AC, PS, JC and SF conceived the study design. All the authors substantially participated in the implementation of the study and the acquisition of the data. CO validated the data and performed data analysis and interpretation. All the authors drafted and critically revised the article for important intellectual content, and finally approved of this version of the manuscript for submission to *The Journal*.

**Conflict of Interest:** JC is CEO and Medical Director of the Research and Standards Division of Priority Dispatch Corp. and member of the Council of Standards, and Board of Trustees of the International Academies of Emergency Dispatch. He is the inventor of the Medical Priority Dispatch Protocol and Quality Assurance System studied herein.

**Ethical approval:** The study was approved by the International Academy of Emergency Dispatch (IAED)’s Institutional Review Board (United State Department of Health and Human Services registration number: IRB00006450).

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