Availability of mobile phones for discharge follow-up of pediatric Emergency Department patients in western Kenya

Darlene R House, Philip Cheptinga, Daniel E Rusyniak

Objective. Mobile phones have been successfully used for Emergency Department patient follow-up in developed countries. Mobile phones are widely available in developing countries and may offer a similar potential for follow-up and continued care of ED patients in low and middle-income countries. The goal of this study was to determine the percentage of families with mobile phones presenting to a pediatric ED in western Kenya and rate of response to a follow-up phone call after discharge. Methods. A prospective, cross-sectional observational study of children presenting to the emergency department of a government referral hospital in Eldoret, Kenya was performed. Documentation of mobile phone access, including phone number, was recorded. If families had access, consent was obtained and families were contacted 7 days after discharge for follow-up. Results. Of 788 families, 704 (89.3%) had mobile phone access. Of those families discharged from the ED, successful follow-up was made in 83.6% of cases. Conclusions. Mobile phones are an available technology for follow-up of patients discharged from a pediatric emergency department in resource-limited western Kenya.

Availability of Mobile Phones for Discharge Follow-Up of Pediatric Emergency Department Patients in Western Kenya

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Abstract

47 Introduction. Mobile phones have been successfully used for Emergency Department (ED) patient
48 follow-up in developed countries. Mobile phones are widely available in developing countries and may
49 offer a similar potential for follow-up and continued care of ED patients in low and middle-income
50 countries. The goal of this study was to determine the percentage of families with mobile phones
51 presenting to a pediatric ED in western Kenya and rate of response to a follow-up phone call after
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55 department of a government referral hospital in Eldoret, Kenya was performed. Documentation of
56 mobile phone access, including phone number, was recorded. If families had access, consent was
57 obtained and families were contacted seven days after discharge for follow-up.
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59 Results. Of 788 families, 704 (89.3%) had mobile phone access. Of those families discharged from the
60 ED, successful follow-up was made in 83.6% of cases.
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62 Conclusions. Mobile phones are an available technology for follow-up of patients discharged from a
63 pediatric emergency department in resource-limited western Kenya.

64
65 **Introduction**
66
67 In developed countries, mobile phones have been successfully used for Emergency Department (ED)
68 patient follow-up. They have been used to continue discharge education, to evaluate treatment
69 compliance, to identify and intervene when patients are clinically worsening, to assess patient
70 satisfaction, and to improve upon patient experiences (Arora et al. 2014; Guss et al. 2013; Jones et al.
71 1988; Lee 2004; Patel & Vinson 2013). For example, Arora found that patients who received mobile
72 phone follow-up had improved medication compliance and disease management (Arora et al. 2014). In
73 another study, Chande and Exum found that ED patients who received a follow-up phone call were
74 more likely to follow-up with their primary care physicians compared to those who received no follow-
75 up phone call (Chande & Exum 1994). Additionally, Jones et al. showed the utility of a telephone
76 follow-up system in providing improved clarification of discharge instructions and in intervening in
77 patients doing poorly (Jones et al. 1988). Overall, the use of phones for patient follow-up have been
78 shown to improve the care of patients discharged from the ED (Arora et al. 2014; Chande & Exum
79 1994; Jones et al. 1988).
80
81 Mobile phones are also widely available in developing countries with more than 75% of the world's
82 population having access to a mobile phone (World Bank Group 2012). Given the lack of primary care
83 follow-up and resource constraints, mobile phones offer a similar potential for follow-up of ED
84 patients in low and middle-income countries (LMIC). Despite this, there have been no studies to date
85 showing their availability for ED follow-up in LMIC settings.
86
87 We designed a study to determine the percentage of ED patient families with mobile phones presenting
88 to a pediatric ED in resource-limited western Kenya. Furthermore, we determined the rate of response
89 to a follow-up phone call seven days after ED discharge.
90
91 **Materials and Methods**
92
93 **Study Design**

94

95 A prospective, cross-sectional observational study of children presenting to Moi Teaching and Referral
96 Hospital in Eldoret, Kenya was performed between the months of February and April 2013. The study
97 was approved by both Indiana University Institutional Review Board (Approval IRB #1301010311)
98 and the Institutional Research and Ethics Committee at Moi Teaching and Referral Hospital.

99

100 **Study Setting**

101

102 Eldoret is a town of approximately 220,000 people located in western Kenya and serves as the
103 administrative center of Uasin Gishu District of Rift Valley Province. Eldoret is home to Moi
104 University School of Medicine and Moi Teaching and Referral Hospital (MTRH). MTRH is a
105 government referral hospital in western Kenya that serves a catchment population of 13 million people.
106 All sick children that present to the referral hospital are evaluated and treated in the MTRH Sick Child
107 Clinic. The Sick Child Clinic serves as the pediatric emergency department for the hospital, evaluating
108 all acute pediatric medical and trauma patients. The department evaluates and treats approximately 100
109 children a day. Patients are either seen by a clinical officer (equivalent to an advanced practitioner) or a
110 medical officer (physician). MTRH is also the base for a partnership between the United States Agency
111 for International Development (USAID) and the Academic Model Providing Access to Healthcare
112 (AMPATH), an organization that provides HIV care, primary health care, and chronic disease
113 management.

114

115 **Study Population**

116

117 All families with children presenting and subsequently discharged from the Sick Child Clinic during
118 the study were eligible. Patients admitted were excluded from the study as the remainder of their care
119 is followed by the inpatient pediatric team while discharged patients have no clear follow-up in this
120 setting.

121

122 **Study Protocol**

123

124 Convenience sampling was performed during daytime ED hours. Documentation of access to mobile
125 phones, including phone number, was recorded during registration of patients presenting to the Sick
126 Child Clinic. If families had access to a mobile phone, consent was obtained to contact them for
127 follow-up at seven days after being discharged from the ED. Families of patients who were admitted
128 from Sick Child Clinic were not contacted for follow-up. At seven days from discharge, an attempt to
129 contact the patient's family was made. To provide further construct validity to the use of mobile
130 phones for follow-up of ED patients, a clinical officer made these calls using a script to obtain the
131 following information: how their child was doing, any return visits within the seven days from
132 discharge, comprehension of ED diagnosis and plan, compliance with medications, and any
133 complications. Patients who had not shown any improvement or were doing worse were instructed to
134 return for further evaluation. If the phone call was not answered, a repeat call was made each
135 subsequent day. If after three attempts there was no answer, the follow-up was classified as
136 unsuccessful.

137

138 **Statistical Analysis**

139

140 Descriptive statistics regarding families' access to mobile phones, successful follow-up, and status
141 upon follow-up were calculated.
142
143 **Results**
144
145 Of the 1168 patients seen in the Sick Child Clinic during the study, 854 patients were seen during
146 sampling hours. Of these patients, 788 families were approached for the study. 704 (89.3%) families
147 had mobile phone access. Of those with mobile phone access, 659 families were eligible for the study
148 (See Figure 1). Successful follow-up was made in 551 (83.6%) of these cases.
149
150 Most patients seen were under five years of age (See Table 1). Also, the majority of patients had either
151 a respiratory or gastrointestinal illness (See Table 2).
152
153 In families successfully contacted, 490 patients were reported to be doing better, 50 patients were
154 reported to be doing the same, and 11 patients were reported to be worse. Of the patients who were
155 doing better at the time of follow-up, 20 had been seen again since their initial visit, four had been
156 admitted and discharged. Of the 50 caregivers who reported their child was doing the same, nine
157 patients had been seen again since their initial visit and five of these patients were admitted. The
158 remaining 41 patients were instructed to return for further evaluation. Of the patients who had
159 worsened, seven patients had been seen again and subsequently admitted. Two of those patients died.
160 The other four patients who reported to be worse were told to return for further evaluation.
161
162 Regarding patient instructions, 488 parents reported understanding their discharge diagnosis and
163 instructions and 63 asked for further clarification. Only 23 patients reported not being compliant with
164 their medications.
165
166 **Limitations**
167
168 The study was done in a referral center that requires payment for care of children. This potentially
169 biases our population toward families having the resources to own a mobile phone. Further studies
170 evaluating the availability of mobile phones in more rural areas in resource-limited settings should be
171 conducted. Another limitation is potential bias with convenience sampling. While nearly all families
172 that were seen during the sampling hours were approached for the study, families that came at night
173 may potentially have less or more access to mobile phones. Further study would need to be done that
174 could include families presenting at all hours to assess if any differences exist. Also, another limitation
175 is that data only represents what families self-reported. This offers the potential for recall bias and false
176 reporting. Although the data is self-reported, the study provides evidence that families were accessible
177 and receptive to receive phone follow-up.
178
179 **Discussion**
180
181 This study provides the first evidence suggesting that mobile phones may be an effective tool for
182 following up patients discharged from an ED in a resource-limited country. Nearly all families
183 presenting to the ED had access to mobile phones and the majority could be reached by phone to
184 discuss their child's condition.
185

186 Our study found 89% of our ED families had access to a mobile phone. Similarly, a previous study
187 done in Kenya also found 85% of Kenyans surveyed had access to a mobile phone; however phone
188 ownership diminished with mean monthly income (Wesolowski et al. 2012). This is just slightly lower
189 than found in the US, where 95% of ED patients have access to mobile phones (Ranney et al. 2012).
190 Additionally, we found that we could successfully follow-up with patients 83.6% of the time. This is
191 better than most follow-up rates found in the US that varied from 68-73% (Menchine et al. 2013;
192 Suffoletto et al. 2012). However, one study done in the US by Jones et. al. had a similar follow-up rate
193 of 81% with three phone call attempts (Jones et al. 1988). Therefore, with similar rates to the US where
194 phones have been successfully implemented for ED follow-up care, the availability and high response
195 rates to follow-up phone calls in this resource-limited setting offers tremendous opportunity to provide
196 ongoing care to ED patients.
197
198 Follow-up is especially important in developing countries where morbidity and mortality are high,
199 resources are limited, and primary care is almost nonexistent. In our study, an appreciable number of
200 patient families were either unsure of discharge instructions, not compliant with medications, or
201 clinically unimproved. Mobile phone follow-up, therefore, provides the health care provider another
202 opportunity to educate families and provide further medical advice regarding evaluation and treatment.
203 Also with an economically disadvantaged patient population, patients may delay seeking care given the
204 costs of transportation and medical visits. This invites the use of low-cost means to obtain patient
205 follow-up. Using mobile phones is a potential solution. Since phone calls made to patient families are
206 free to the patients, this provides an additional medical service to families without any additional
207 financial burden. Telephone follow-up provides a free, for the patient, means to provide ongoing care
208 and education and could potentially prevent revisits, decrease travel and associated costs, and provide
209 the opportunity to intervene if patients are deteriorating. Although follow-up phone calls add expense
210 to the ED related to phone usage and staffing, the cost may be offset by improved patient outcomes and
211 improved patient satisfaction. Another advantage of mobile phones, as this study demonstrates, is they
212 can be used to collect data for quality improvement or research purposes.
213
214 In a similar study, Maslowsky et al. showed that patients discharged after hospital admission in
215 Ecuador could be reached by mobile phone for further post-hospitalization medical advice and
216 facilitation of further care (Maslowsky et al. 2012). Other studies done in resource-limited settings
217 have implemented text messaging for evaluating disease management and medication compliance
218 among patients being treated for both communicable and non-communicable diseases (Deglise et al.
219 2012; Lester et al. 2010; Pop-Eleches et al. 2011). While we did not implement text messaging due to
220 cost to families to text back, all the phones of the families in our study had texting capabilities. This
221 could be another modality for ED patient follow-up in resource-limited settings. Together with our
222 study, these studies highlight the broad applicability of mobile phones for both ED and hospital
223 discharge follow-ups.
224
225 Accessibility of mobile phones in resource-limited settings provides the groundwork for further
226 research and clinical opportunities. With demonstrated availability of mobile phones and
227 responsiveness upon follow-up in this ED, next steps would include replicating ED discharge follow-
228 ups in other developing countries as well as more rural areas to determine broader application. Next
229 steps would also include randomized studies assessing outcomes and effectiveness of mobile phone use
230 for follow-up compared to standard discharge instructions. Other applications could include
231 development of a pre-hospital call system to guide home care, offering cost-effective medical advice,
232 disease management and treatment, as well as triaging patients to appropriate levels of care.

233 Developing pre-hospital and ED discharge follow-up systems that utilize mobile phones has great
234 potential to improve emergency care of patients in resource-limited settings.
235
236 **Conclusion**
237
238 Mobile phones are an available technology for follow-up of patients discharged from a pediatric
239 emergency department in resource-limited western Kenya.
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333   Figure 1: Patient Enrollment and Follow-Up

Figure 1: Patient enrollment and follow-up
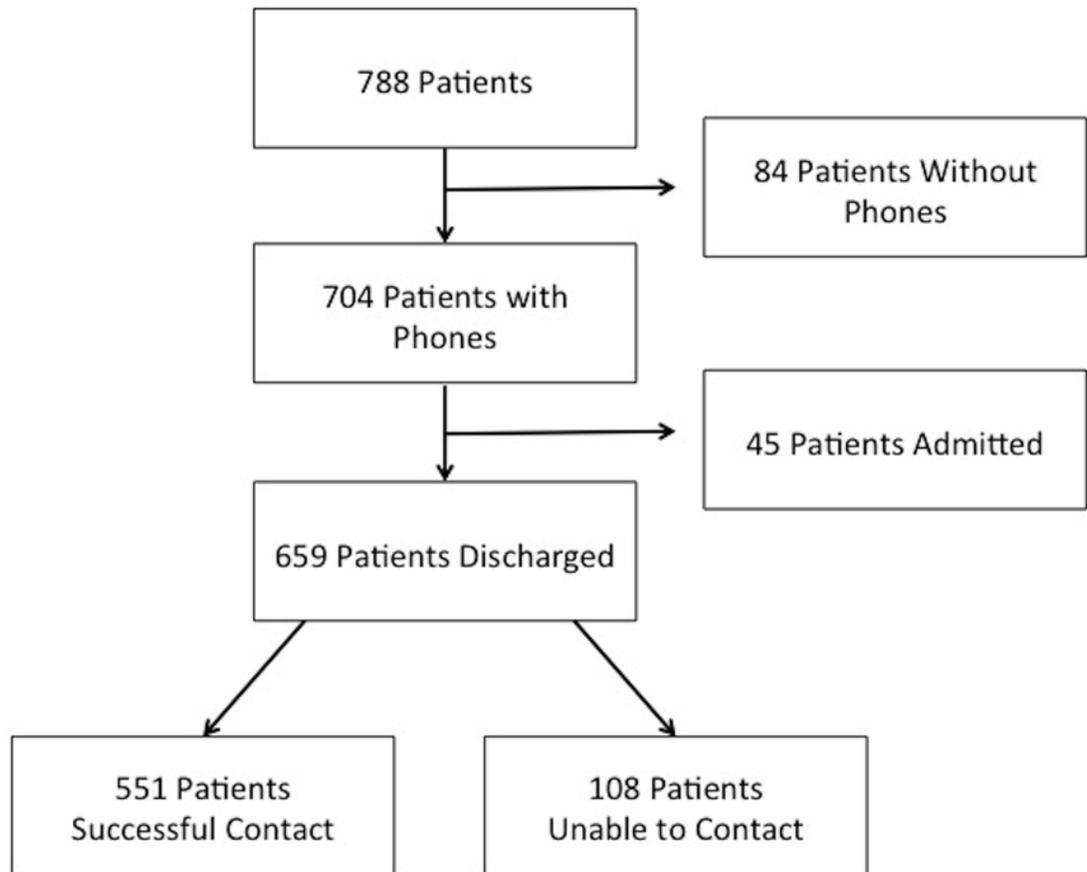
Table 1 Patient Demographics

Table 1: Patient Demographics	
Male	53.1%
Female	46.9%
Age	
< 1 mo	4.2%
1 mo – 12 mo	24.0%
1 y – 5 y	40.6%
> 5 y	31.2%

Table 2: Patient Diagnoses

Table 2: Patient Diagnoses

Respiratory Tract Infections	30%
Vomiting/Diarrhea	25%
Injuries	12%
Seizure	8%
Febrile Illness	8%
Rashes	6%
Urinary Tract Infection	6%
Other	5%