Feasibility of Panda, a Pediatric Post-Discharge Pain Management Smartphone Application for use by Parents

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Introduction: As the number of pediatric outpatient surgeries increases [1], it is important to empower families to adequately manage their children's pain in the days following surgery. Some families poorly manage their child's postoperative pain at home [2], and this can cause significant behavioural issues such as eating problems and anxiety [3]. The reasons for poor post-operative pain management include inadequate discharge instructions, failure to appropriately assess pain [2], inability to recall medication instructions [2], and underestimation of a child's pain [3]. To address these problems, we have developed Panda, a smartphone application (app) that alerts parents when to give medication and provides a standardized and validated tool for parents to assess their child's pain (Figure 1). This study evaluated the feasibility of providing the Panda app to parents for use at home, based on their compliance and satisfaction with the app.

Methods: Following ethical approval and informed consent, families used Panda for 1-7 days at home after their child's surgery. With assistance from a research assistant, parents set up user preferences and a medication schedule on either a research device or their own personal Apple or Android phone. At each scheduled notification, the parents used validated pain assessment tools and safety checks before completing the administration of medications. Data collection consisted of an audit function recording all actions within the app, responses to app alerts (pain scores and medication given), feedback through a post-study structured telephone interview, and the completion of the Computer Systems Usability Questionnaire (CSUQ) [4].

Results: Twenty-nine families were recruited to use the app and completed a post-study interview. Recruitment was done in 3 rounds with small improvements, such as graphics and alert noises, made between rounds. Families received an average of 13 alerts during the study period, 46% were responded to within an hour and 74% were responded to before the next alert occurred. The CSUQ was completed by 22/29 (76%) families. The median (interquartile range [IQR]) CSUQ approval rating was 2 (1-3) "agree". The most highly rated statement "It was easy to learn using this interface" had a median (IQR) rating of 1.5 (1-2) "strongly agree to agree". In interviews, participants reported the app as easy to use and useful for those who are forgetful, but suggested many ways to expand its functionality and improve its usability. Parents wanted more flexibility and control within the app, including more dynamic medication schedules, custom alerts, and the addition of numeric (adult) pain scales.

Conclusion: We have shown that with minimal help from a research assistant, it is feasible for parents to use this app at home in a real world setting. There are several suggestions to improve the app, which we are currently reviewing. We hope to incorporate the app into standard discharge instruction for outpatient surgeries and to add a healthcare provider communication component in the near future, which will include a hospital-based patient recovery information dashboard receiving pain and medication details from Panda.

References: [1] Pain Res Manage. 2012; 17(5): 328–34. [2] Paediatr Anaesth. 2013; 24(3): 239–48. [3] Arch Dis Child. 2012; 97(10): 879–84. [4] Int J Hum Comput Interact. 1995; 7: 57-78.
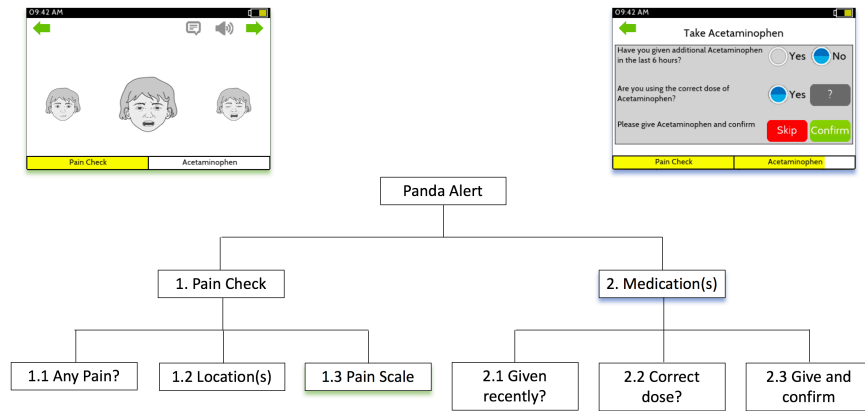

Figure 1: The two-step process of responding to a Panda alert is performing a pain check and then safety checks for medication(s).