CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

J1415

Project Title

Tag Your Meds: Reduce Accidental Drug Overdose Using NFC Tags

Abstract

Objectives/Goals

In 2010, accidental drug overdoses led to over 2 million visits to the ER and 30,000 deaths. According to the Centers for Disease Control, more Americans die each year from drug overdose than from traffic accidents or firearms. I devised a solution to reduce the occurrence of accidental drug overdose by tracking medicine consumption using Near-Field-Communication (NFC) tags and Android smartphones.

Methods/Materials

I encoded NFC tags with information about the medicine and attached the tags to the medicine labels. I then developed an Android smartphone application that reads the information in the NFC tag to track medicine intake and warn users about potential overdose. Users tap their smartphone against the medicine label before consuming the drug. To validate my app, I conducted 2 phases of tests with 24 adult participants. Phase 1 was a usability test for my app and NFC technology. In Phase 2, participants performed 4 tests # 2 manually, and 2 with my smartphone application. All tests were simulations and no medicines were actually ingested. In Tests 1 and 2, I asked participants to select medicines and record their selection manually on paper. In Tests 3 and 4, participants tracked their consumption with my smartphone app. In Tests 2 and 4, participants were asked to consume 2 medicines with acetaminophen to see how many would detect the potential overdose. At the end of the test, the subjects were asked for their feedback on this experience.

Results

The tracking accuracy using the manual method was 94%, while the accuracy using my solution was 100%. In Test #2, where participants selected medicines manually, only 12% of the users detected the overdose. In Test #4, the app warned participants about a possible drug overdose and 82% of participants correctly chose to not consume the medicine. My solution reduced the occurrence of accidental overdose by 70%. All participants reported feeling more confident knowing that their medicine intake was being monitored.

Conclusions/Discussion

These results, along with feedback from participants and pharmacists prove that my application is feasible and has tangible real world benefits to patients and their caregivers. In future versions, the app can be integrated with medical databases for up-to-date drug advisories and can be extended to accurately track patient participation in drug trials.

Summary Statement

My project explores the possibility of using technology to improve tracking of medicine consumption and reduce the occurrence of accidental overdose.

Help Received

Science teacher, Mrs. Nguyen, guided me; Parents helped gather test subjects and materials; Test subjects who participated; Pharmacists provided feedback