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CLINICAL SUMMARY

Nurses' acceptance of smart IV pump technology

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TYPE OF STUDY

Prospective Study

AIM

Examine nurses' experience with the implementation and use of a smart IV pump in an academic hospital.

METHODOLOGY

Nurses from a single healthcare organization were surveyed pre-implementation through to one-year post-implementation of smart IV pumps. Data was collected in three longitudinal surveys:

a) Pre-implementation paper-based survey (n = 190/600, response rate: 32%)
b) Six-week post-implementation email survey (n = 322/1034, response rate: 31%)
c) One-year post-implementation email survey (n = 399/1054, response rate: 38%)

Surveys examined:

a) The technology implementation process
b) Technical performance of the pump
c) Usability of the pump
d) User acceptance of the pump

Data was analyzed using SPSS (Statistical Package for the Social Sciences). A multivariate Analysis of Variance (ANOVA) test was conducted to assess if there were differences between the three surveys. If there were significant findings, follow-up ANOVA and post-hoc tests were conducted to compare user perception and user acceptance of the smart IV pump across the three surveys for each individual variable.

RESULTS

Efficiency – For seven out of eight questions on efficiency, perceptions improved from the six-week post-implementation to one-year post-implementation: "enables me to accomplish tasks more quickly" ($p < .001$), "improves the quality of care I provide" ($p < .05$), "improves the safety of care I provide" ($p < .01$), "enhances my effectiveness on the job" ($p < .01$), "makes it easier to do my job" ($p < .001$), "increases the safety of care provided to our patients" ($p < .001$), and "pump functions as I expect" ($p < .01$).

Satisfaction – Nurses reported easier interaction with the pump one-year after implementation, compared to either before or six-weeks after implementation ($p < .001$ for both comparisons).

Usability – Learning to operate the pump became easier one-year after implementation, compared to either before or six-weeks after implementation ($p < .001$ for both comparisons). Responses to the question "pump is designed for all levels of users" were more positive one-year after implementation than before or six-weeks after implementation ($p < .05$ for both comparisons).

Implementation – Respondents rated the information they received more useful before the implementation than six-weeks after implementation ($p < .05$). Respondents reported that the training materials were more confusing in the six-week and one-year post-implementation surveys ($p < .01$ for both comparisons) than before implementation ($p < .01$).

Technical performance – User experience with pump reliability and noise significantly changed from pre- to one-year post-implementation ($p < .05$ and $p < .001$, respectively). Respondents' perception of pump reliability one-year after implementation was significantly lower than before implementation ($p < .05$). Compared to their expectations of pump noise before implementation, more negative responses were given in both the six-week post-implementation survey and the one-year post-implementation survey ($p < .001$ for both comparisons).

CONCLUSION

This study demonstrated positive user acceptance of smart IV pump technology by nurses. User experience with the pump in general improved over time. However, user experience of the pump implementation process and pump technical performance did not improve from pre-implementation to post-implementation.

Increased collaboration between the designers and manufacturers of the technologies and the user community can lead to many benefits; part of this collaboration should rely on understanding the use of the technologies in a real "production" environment.

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