

Integrating Smartphone Communication Strategy and Technology into Clinical Pharmacy Practice: A Mixed Methods Research Study

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Introduction

In 2012, the Vancouver Island Health Authority (VIHA) Pharmacy Department endorsed the iPhone® as the standard communication device for pharmacists. This was the result of a VIHA study which demonstrated that smartphone use reduced the time required to answer drug information questions, and improved confidence and competence in resolving drug therapy problems.

Other VIHA staff use a spectrum of communication technologies including personal and corporate smartphones, pagers, Vocera® hands-free badges, etc.

Use of such a diverse range of technologies has inherent issues, including but not limited to, 1) outdated technology (e.g. pagers), 2) unsecure and unencrypted data transmission (e.g. SMS messaging), and 3) absence of a central directory for VIHA employees' mobile devices.

Uniqueness of Research

- Often technology is implemented without an objective assessment of the impact
- Mobile technology, primarily PDA use by physicians, has been studied and subjectively associated with positive outcomes; however, there is a lack of evidence to support smartphones as the primary communication tool
- To our knowledge, this is the first research study of an integrated smartphone communication app in a health care setting - and the first use of Vocera® Collaboration Suite (VCS) in Canada

Study Objective

To determine how the use of an integrated smartphone communications solution affects communication (and the efficiency of communication) between hospital pharmacists, physicians, switchboard operators, and ICU nurses/unit clerks compared to the current state

Methods

Design

- Prospective, observational pilot study
- Multi-center: Royal Jubilee Hospital (RJH), Victoria General Hospital (VGH)
- Additional feasibility arm with pharmacists (n=8) at Campbell River Hospital (CRH)

Inclusion Criteria

- Pharmacists, intensivists, ICU Clinical Nurse Leaders (CNLs), obstetricians, and hospitalists at RJH & VGH who use a corporate or personal iPhone® compatible with the app
- Switchboard operators or non-physician ICU staff with access to desktop-based web console

Exclusion Criteria

- Project research team

Statistical Methods

- Mann-Whitney test of medians (primary outcome)
- Chi-squared approximation for 95% confidence intervals (secondary outcomes)

Outcome Measures

1. **Page Turnaround Time**
 - Participating clinical & dispensary pharmacists recorded pages sent to physicians for 3 weeks before and 3 weeks with the VCS intervention
2. **Usage Data**
 - Volume of messages and alerts received through app; aggregated by discipline
3. **Survey Responses**
 - Entry and exit surveys including five-point Likert scale questions and narrative feedback regarding:
 - Participant demographics and satisfaction of current communication supports
 - Efficiency, accuracy, satisfaction, and drawbacks of new integrated smartphone communication app

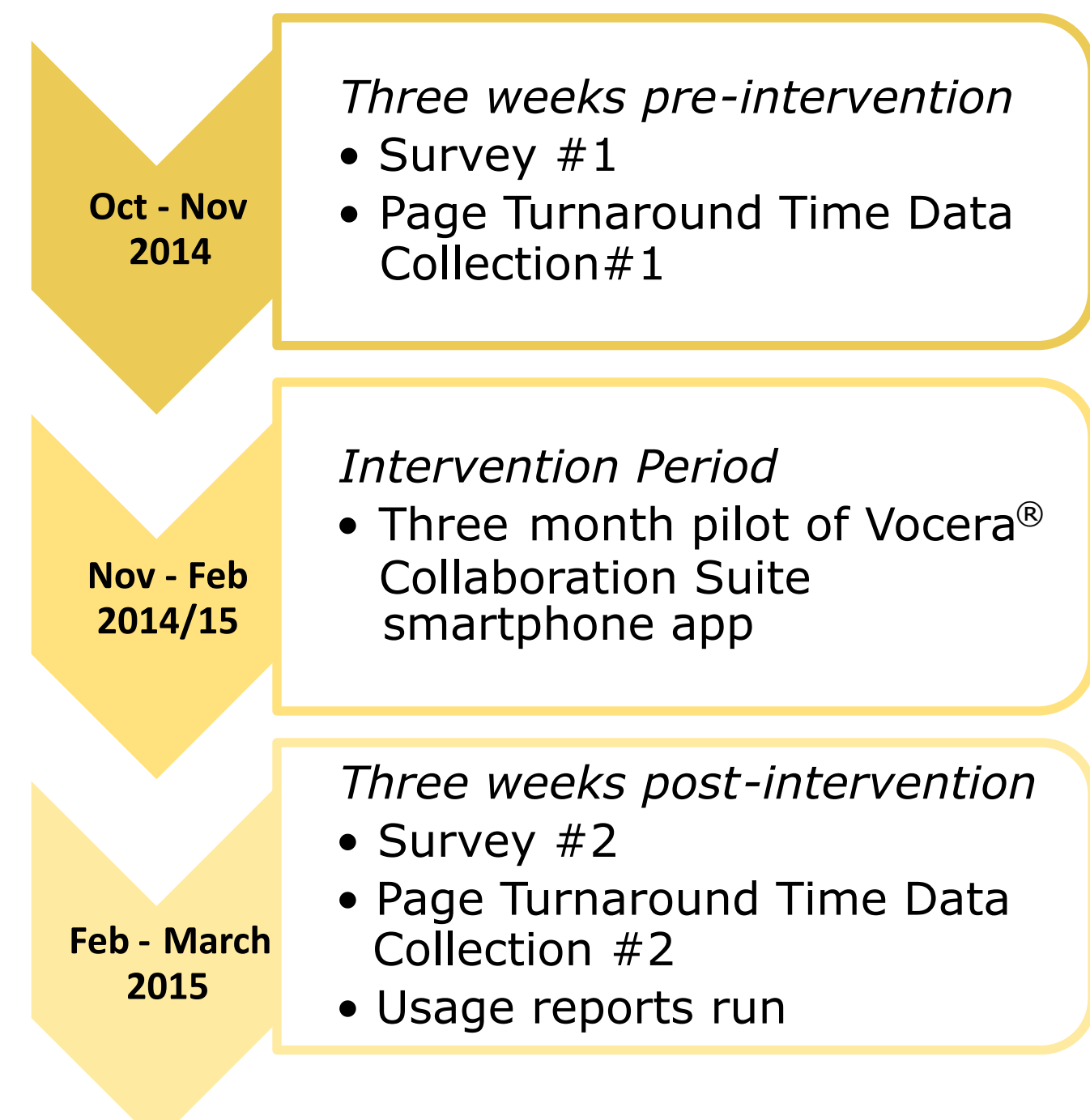
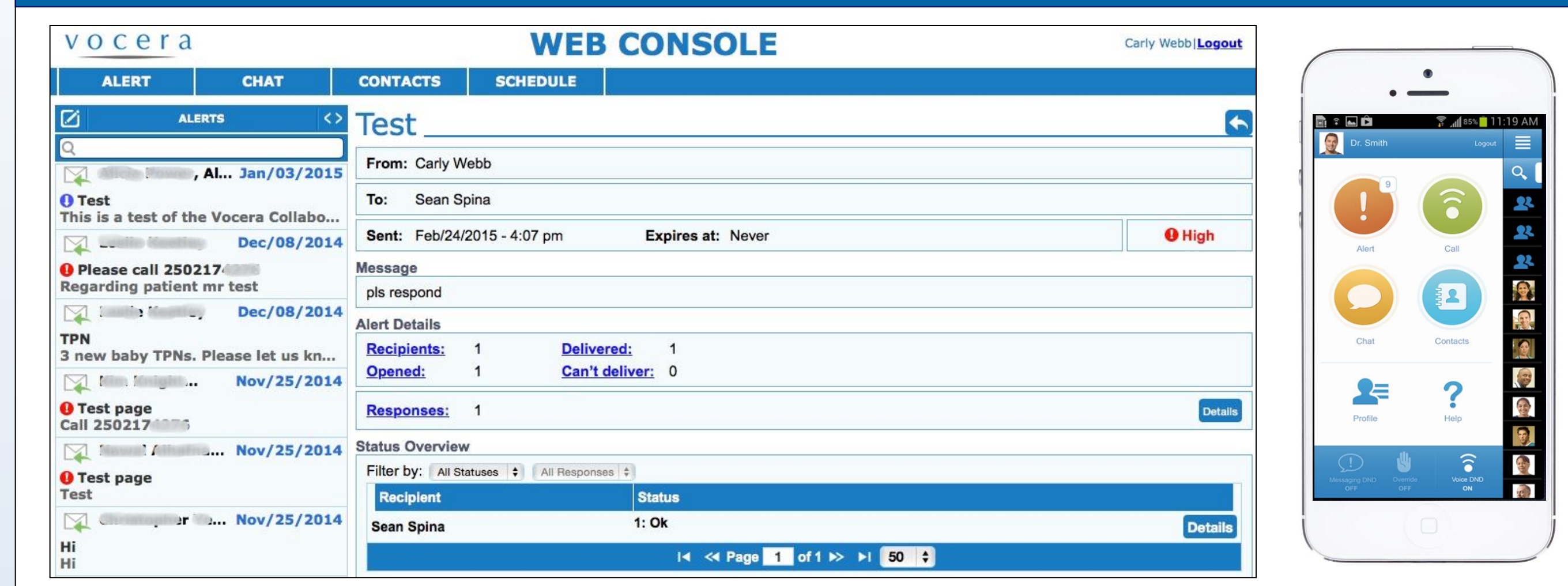


Figure 1: Study Design

Vocera® Collaboration Suite



Results

Table 1: Participants

Category	Count
iPhone® App Users	106
Hospitalists	29
Intensivists	9
Obstetricians	8
ICU Clinical Nurse Leaders	2
Pharmacists	58
Web Console Users	47
ICU Nurses & Unit Clerks	30
Switchboard Operators	17

Category	Count
Withdrawals	4
Personal Reasons/	3
Time Constraints	
Battery Issues	1

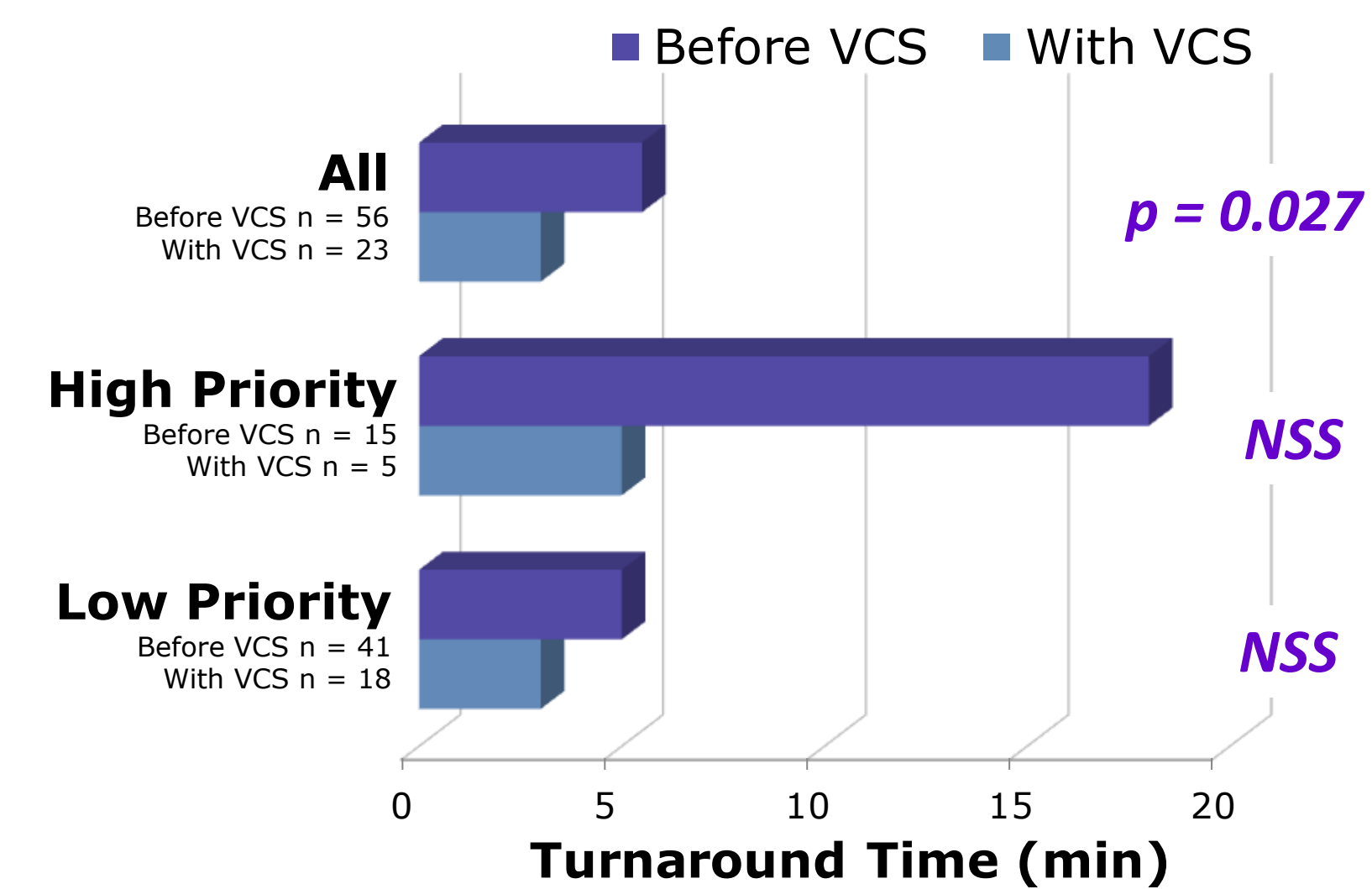


Figure 2: Median Turnaround Time of Pages sent to Physicians from Pharmacists
* NSS = not statistically significant

Table 2: Number of messages received over 3 months (Nov 2014 - Feb 2015)

	Alerts	Chats
Hospitalists	2388	754
Intensivists	817	315
Obstetricians	111	59
ICU CNLs	9	35
Pharmacists	483	4528
Total	3808	5691

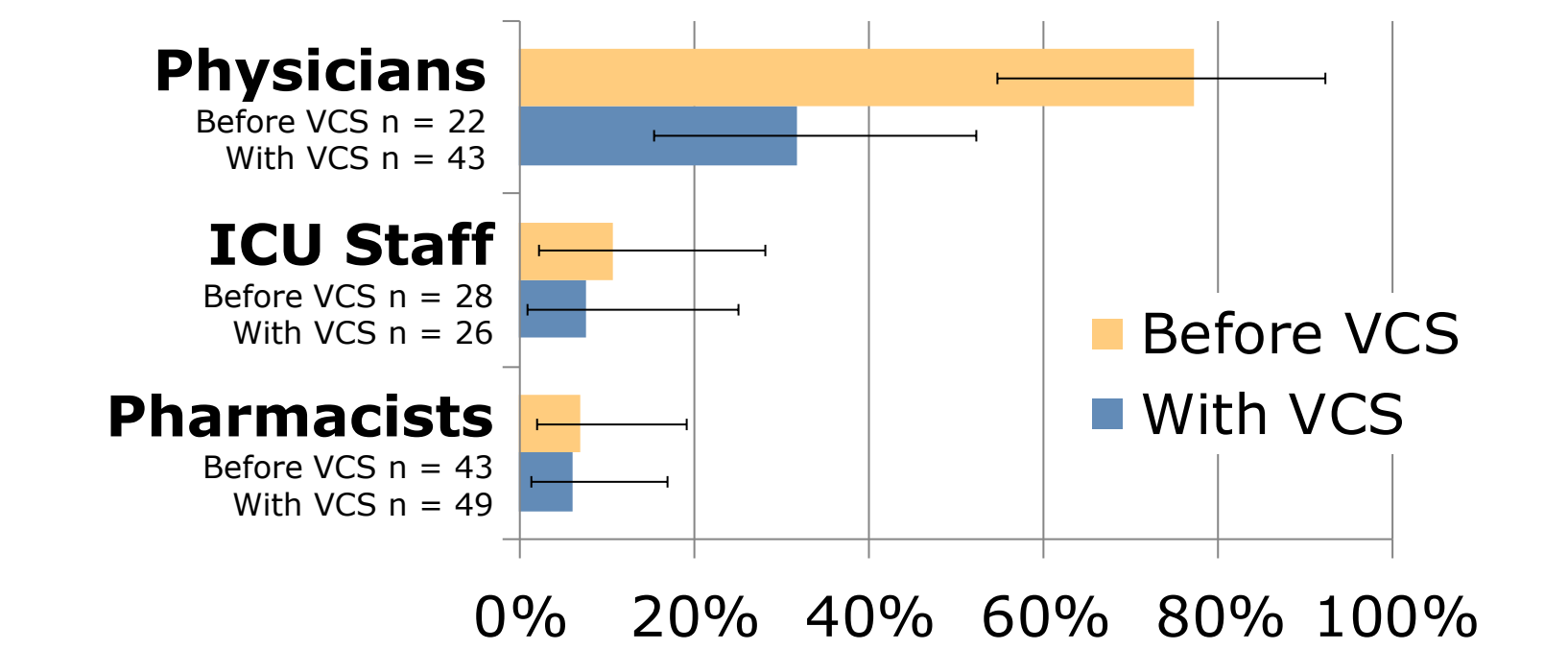


Figure 3: Proportion of respondents who stated that sending or receiving pages interrupts patient care "Often" or "Very Often"

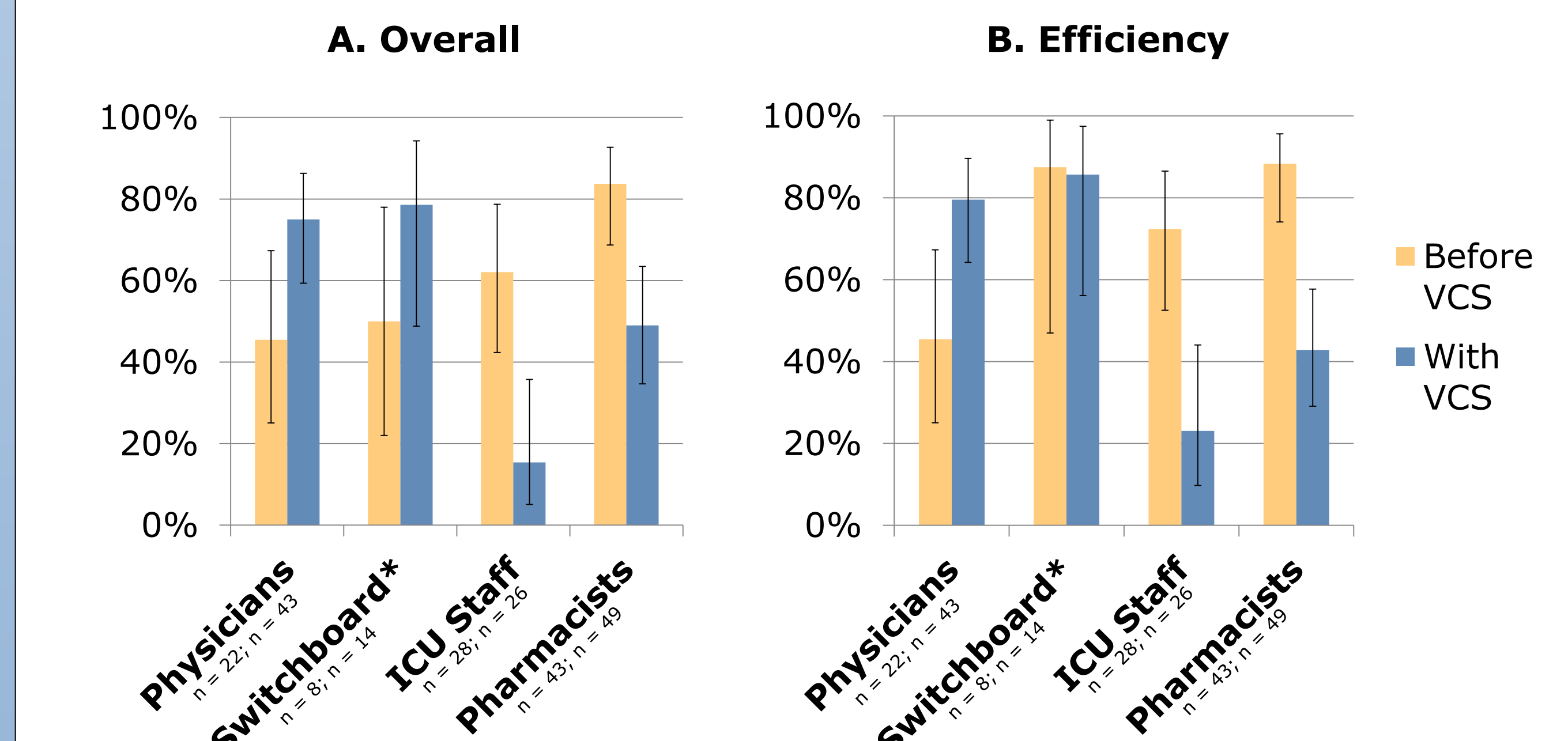


Figure 4: Proportion of respondents who were "Satisfied" or "Very Satisfied" with their current communication systems

* Confidence intervals (using Chi-squared approximation) for this group may be incorrect due small group size

Results (continued)

Table 3: Proportion of respondents who stated they "Agree" or "Strongly Agree" with the following statements

Statement	Physicians (n = 43)	Switchboard (n = 14)	ICU Staff (n = 26)	Pharmacists (n = 49)
VCS improved patient care	28.6%	14.3%	18.2%	34.7%
VCS improved patient safety	31.0%	28.6%	9.1%	32.7%
VCS enabled faster care	38.1%	21.4%	9.1%	36.7%
I would like to continue using VCS	81.0%	71.4%	18.2%	42.9%

Table 4: Positive aspects of Vocera® Collaboration Suite

Aspect	Physicians (n = 43)	Pharmacists (n = 49)
Ability to contact someone directly without going through switchboard	56.8%	68.0%
Ability to send/receive additional information, rather than just callback number	65.9%	66.0%
Knowledge that the recipient received the page or message	43.2%	56.0%
Convenience of only needing one device	88.6%	38.0%
More reliable coverage (works on both WiFi + cell network)	29.5%	22.0%
Ability to customize volume or vibrate settings of device	40.9%	20.0%

Table 5: Negative aspects of Vocera® Collaboration Suite

Negative Aspect	Physicians (n = 43)	Pharmacists (n = 49)
I experienced battery life issues after installing VCS	68.2%	62.0%
Battery drain negatively affected my day-to-day WORK activities	59.1%	52.0%
Battery drain negatively affected my day-to-day PERSONAL activities	52.3%	24.0%
Battery drain negatively affected patient care activities	18.2%	22.0%
Having to enter password to view pages or messages	9.1%	14.0%
Phone being in "Do Not Disturb" and alerts not coming through	27.3%	8.0%

Survey Response Rate

Survey #1: >70% for pharmacists; >30% for physicians, switchboard, and ICU staff
Survey #2: >80% for pharmacists, physicians, and switchboard; >30% ICU staff

Discussion

- VCS had extensive uptake into practice, indicated by 3808 alerts and 5691 chat messages received over a three month period.
- VCS produced a statistically significant reduction in the time it took for physicians to respond to pages (3.5 min vs 5 min). We hypothesize that physicians are able to triage pages better with VCS since they receive more contextual information than just a callback number.
- Eighty-one percent of physicians stated that they wished to continue using this system. Physicians found that sending and receiving messages/pages using VCS reduced interruptions to patient care.
- Pharmacists and ICU staff were the least satisfied with VCS. We hypothesize that since pharmacists were already using corporate iPhones® in their practice, they may have perceived VCS to be less efficient than their main baseline method of communication (iMessage®). Logging onto the web console for ICU nurses and unit clerks also may have been more inconvenient compared with their usual practice of paging through switchboard.
- Shortened battery life was reported by sixty-eight percent of physicians and sixty-two percent of pharmacists. This concern resulted in seven participants receiving Mophie® external battery packs, which double iPhone® battery life. Five of these participants stated that they would not have been able to continue using VCS without the Mophie® battery pack.

Potential Limitations

- Reporting bias
- Inability to obtain all the requested usage data
- Incomplete enrollment required two communication methods which caused some confusion (only specific clinician groups, voluntary participation)

Conclusion

- Physicians respond to pages from pharmacists more quickly when using Vocera® Collaboration Suite (VCS). This increased efficiency of communication may result in improved patient care.
 - Physicians and Switchboard Operators are supportive of replacing the current communication system with an integrated smartphone system.
 - The use of an external battery pack is required to mitigate VCS battery issues.
- Next Steps**
- This research provides evidence to continue to support the use of Vocera® Collaboration Suite in the replacement of pagers.
 - This project will inform Island Health's future Communication Strategy
 - Results will be shared at various Canadian events