

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Use of such a diverse range of technologies has inherent issues, including but not limited to, 1) outdated technology (e.g. pagers), 2) unsecure and unencrypted data transmission (e.g. SMS messaging), and 3) absence of a central directory for VIHA employees' mobile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

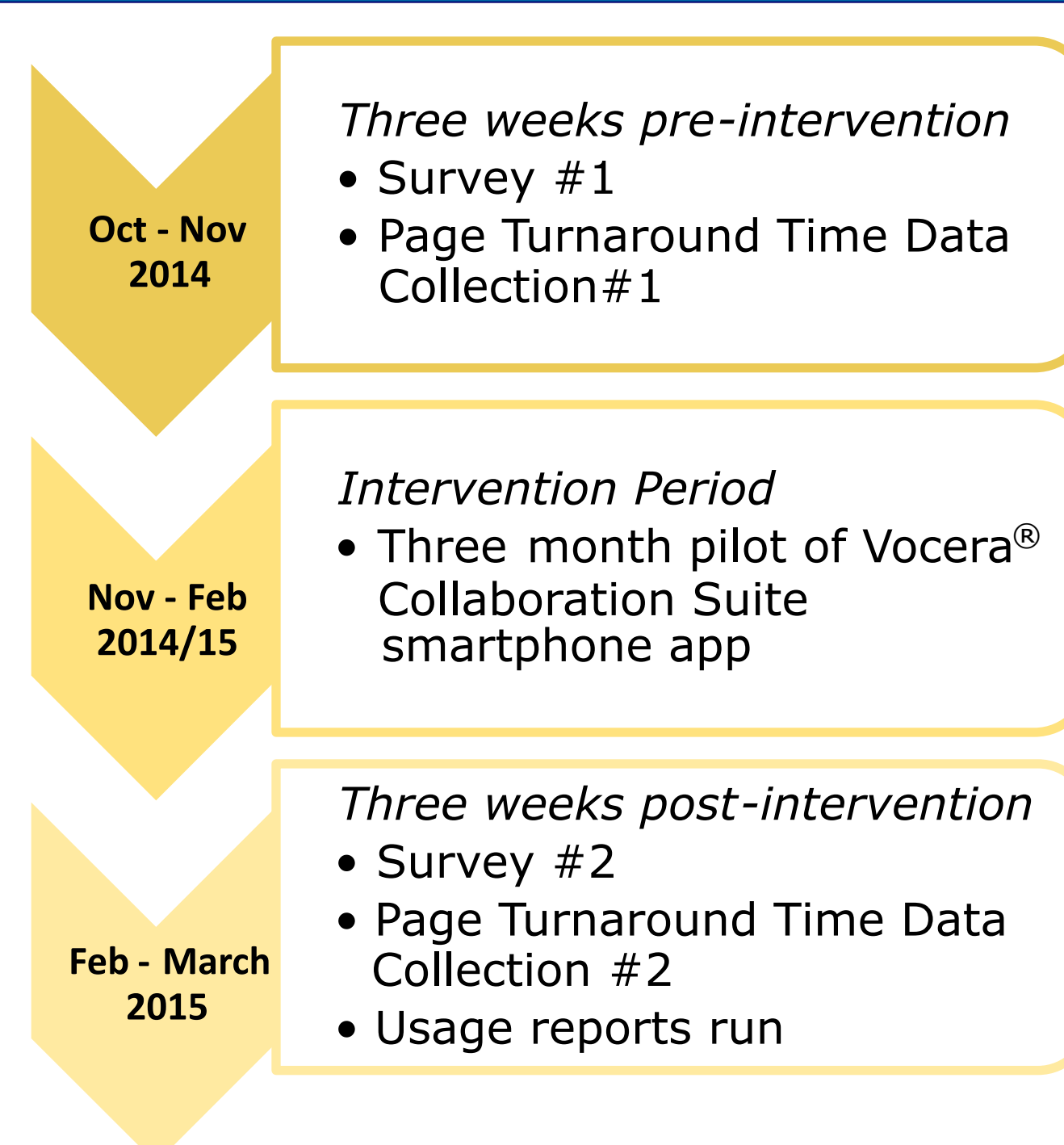
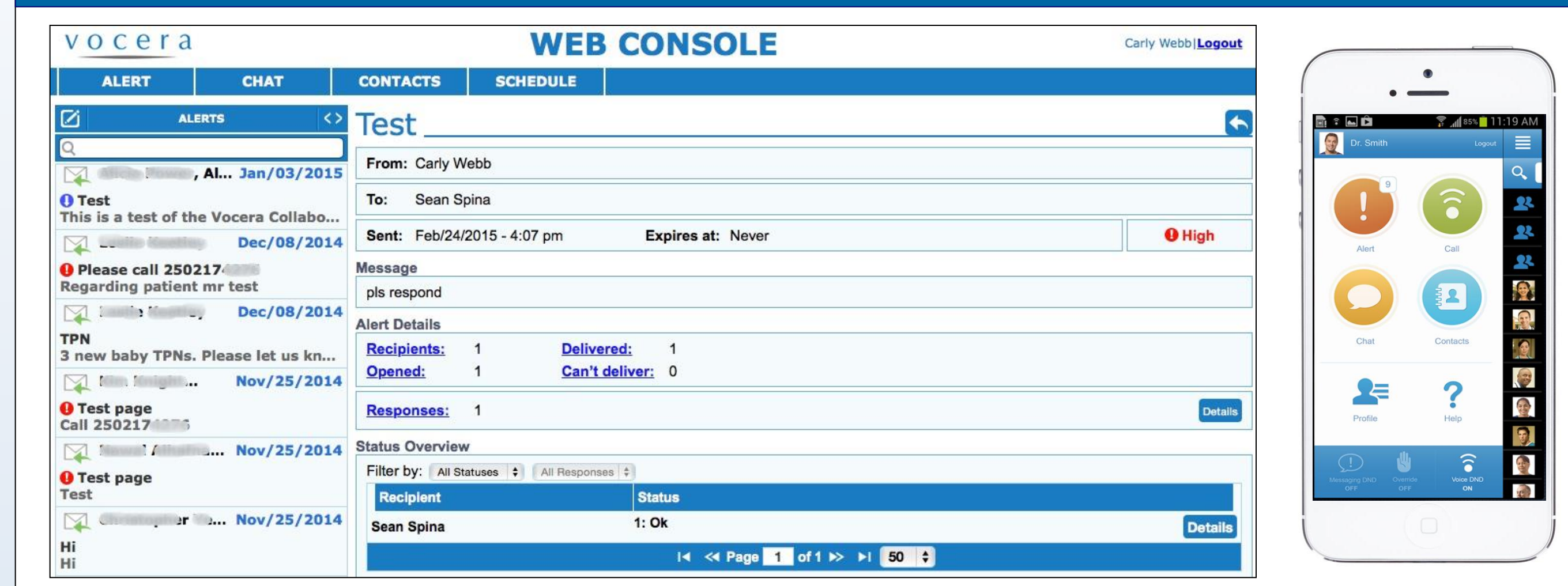


Figure 1: Study Design

## Vocera® Collaboration Suite



## Results

Table 1: Participants

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

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

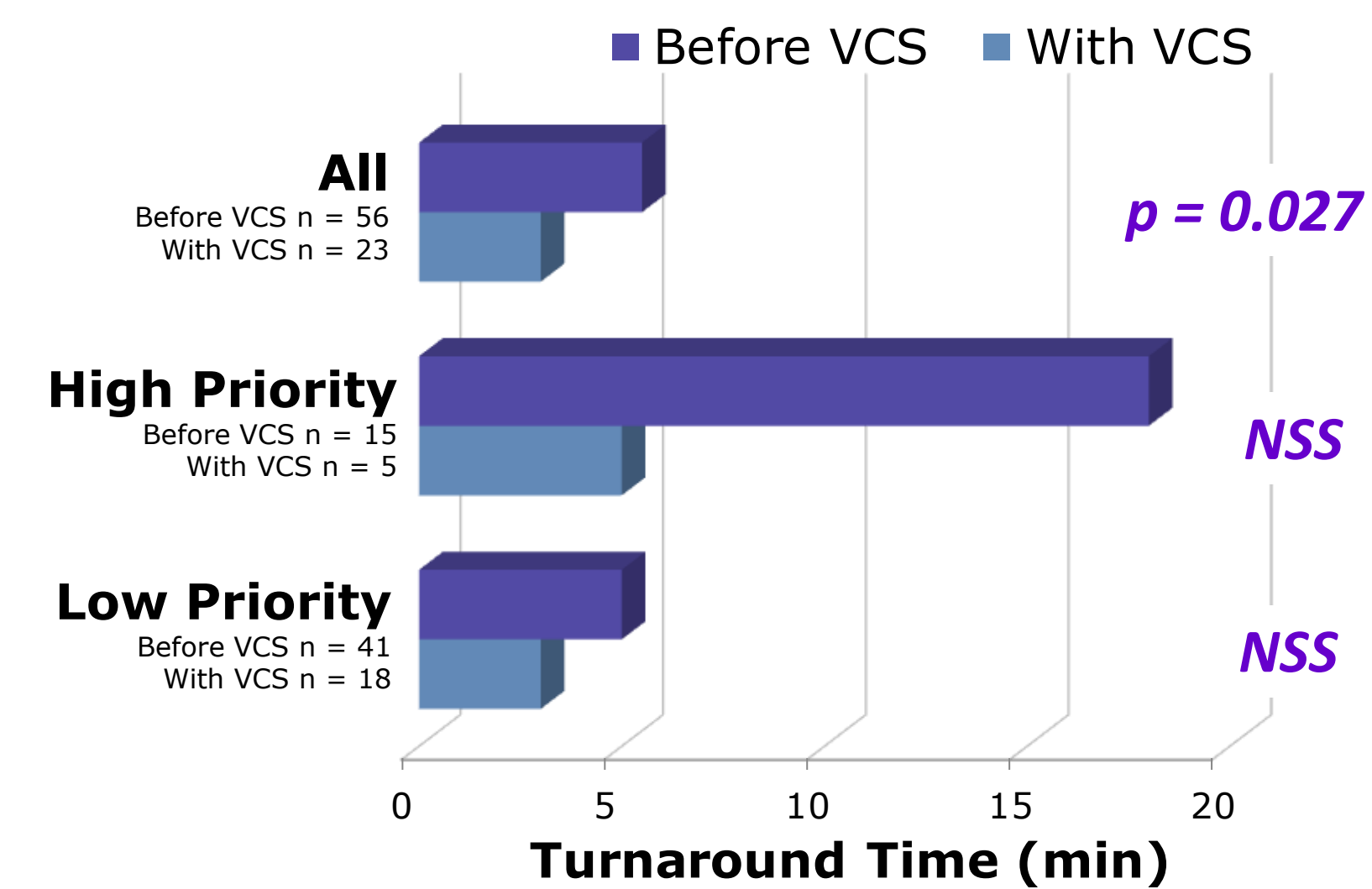


Figure 2: Median Turnaround Time of Pages sent to Physicians from Pharmacists  
\* *NSS* = not statistically significant

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
<b>Total</b>	<b>3808</b>	<b>5691</b>

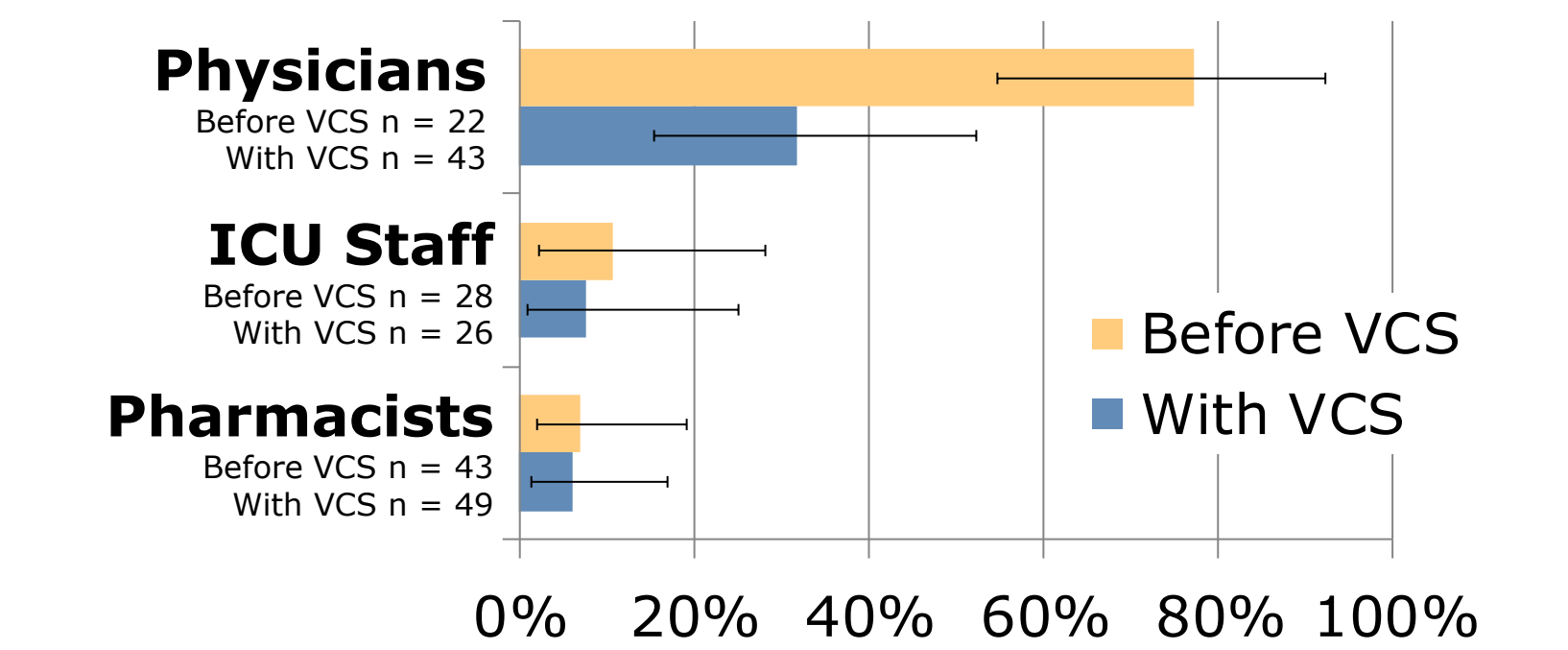


Figure 3: Proportion of respondents who stated that sending or receiving pages interrupts patient care "Often" or "Very Often"

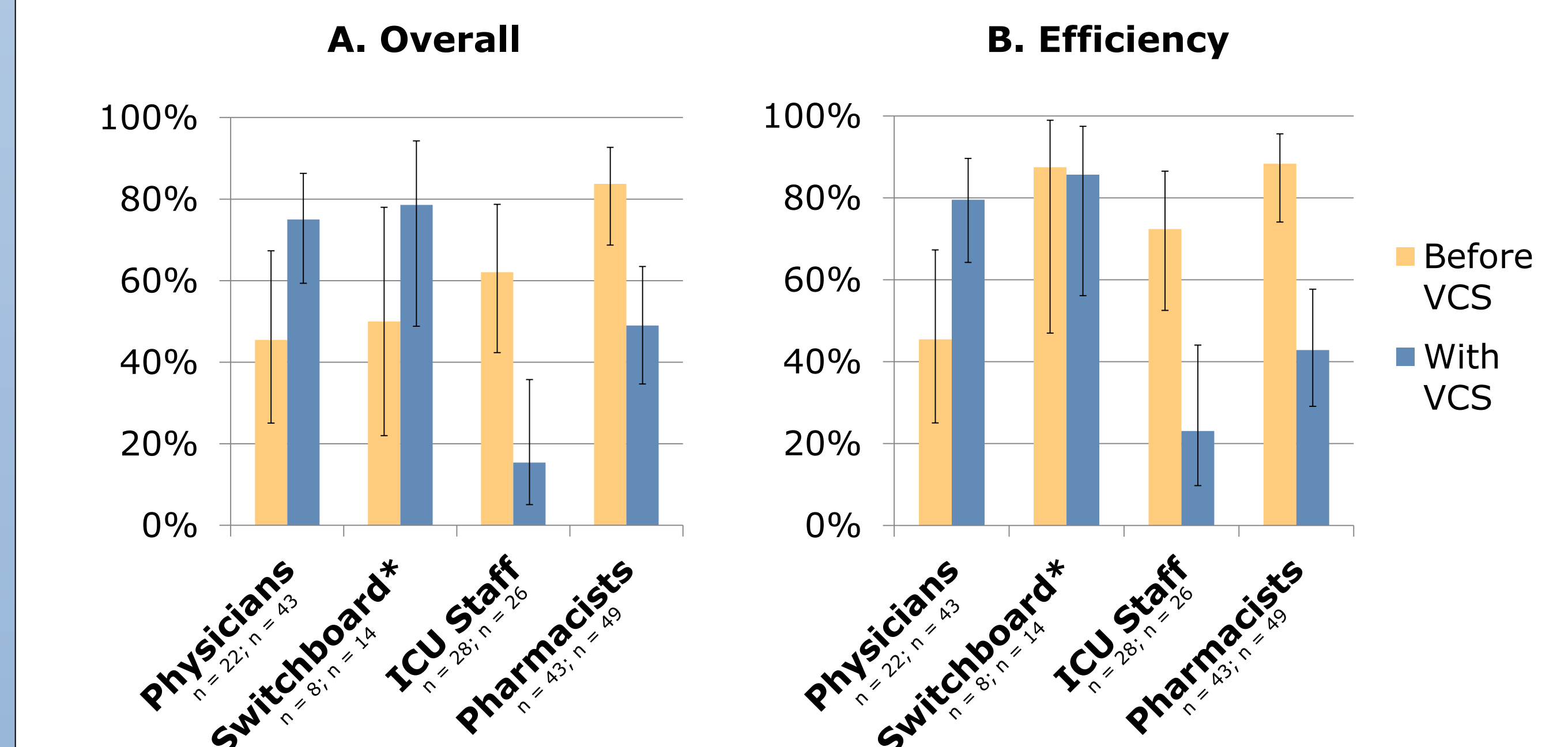


Figure 4: Proportion of respondents who were "Satisfied" or "Very Satisfied" with their current communication systems

\* 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%
<b>I would like to continue using VCS</b>	<b>81.0%</b>	<b>71.4%</b>	<b>18.2%</b>	<b>42.9%</b>

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