Using Technology to Create a Medication Safety Net

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Background/Rationale

In the hospital:
- 1 in 9 patients receives the wrong medications or the wrong dose
- 9,250 to 23,700 people died in a Canadian hospital as a result of a medication error
- 38% of adverse events were determined to be preventable
- 24% of AEs related to medication errors

Source: Canadian Adverse Event Study (2004)

- 23% of patients in a study of 328 patients had an AE after discharge
- 72% of all AEs were related to medication (Forster, *CMAJ*, 2004)
- **Focus group themes:** Retention of information in hospital difficult due to poor memory, recall and concentration; patients had questions about side effects once they were home; inconsistent information; confusing use of interchangeable class, trade and generic drug names; and all patients requested additional information on the actions and side effects of medications and what action to take

Research Question

Does the use of an interactive voice response (IVR) system improve medication compliance and reduce adverse events?

What Is IVR?

INTERACTIVE VOICE RESPONSE
A technology that uses the telephone system. It delivers a set of automated questions to which a patient can respond using voice instead of keypads. This interaction identifies the patient by name and collects the responses in a database.

How It Works

- Enter name of patient, contact number and discharge date
- System dials patient on scheduled dates
- Text-to-speech engine personalizes the call
- System asks questions in the algorithm
- Patient responses are dropped into a database
- System highlights issues that require management by health care provider

IVR Literature Review

Feasibility	Baer	Depression
IVR is a feasible technology in certain patient populations	Christ & Siegel	Cancer
	Piette & Mah	Diabetes
Reliability and Validity	Studies in low back pain	
IVR can provide valid, reliable data	Reporting of drug and alcohol use	
	Reporting of psychiatric symptoms	
	Diabetic follow-up	
Clinical Follow-up	Alemi	RCT in pregnant drug-dependent women
IVR can be used in the clinical setting for intervention and follow-up	Freidman	RCT in hypertensives
	Meneghini	Pre- and post-test of glycemic control
	Piette	RCT in diabetes self-care

Method

- Enrolment occurred from June 06 to May 07
- **RCT with 2 groups:** IVR follow-up and Usual Care (UC)
- **Inclusion:** All patients over 18 discharged from the UOHI after CABG and/or valvular surgery with telephone service in their home and speaking English or French
- **Exclusion:** Other surgeries (cardiac transplantation), and/or discharged to a care facility or other institution
- Approval by the UOHI Human Research and Ethics Board was obtained

Treatment Group

- Automated calls at 1, 2, 3, 4, 6, 8, 10, 12, 16, 20 and 24 weeks after discharge
- Patients' voiced responses (yes or no) were recorded into a central database

Algorithm

- 11 questions
- **Medication safety/compliance:** *"Did you fill the Rx that you were given on D/C?"*
- **Information on 8 medications on average:** *"On discharge, you were prescribed xxx, also known as xxx. Are you continuing to take it?"* followed by: *"Would you like to hear more information about this medication?"*
- **Outcome:** *"Have you been seen in ED or been readmitted to a hospital?"*
- 9 final reminder tips

Usual Care

- All cardiac surgery patients at the UOHI receive an IVR call day 3 and 10 after discharge for symptom screening
- Currently, there are no questions on medications or information given on medications during this symptom screening call
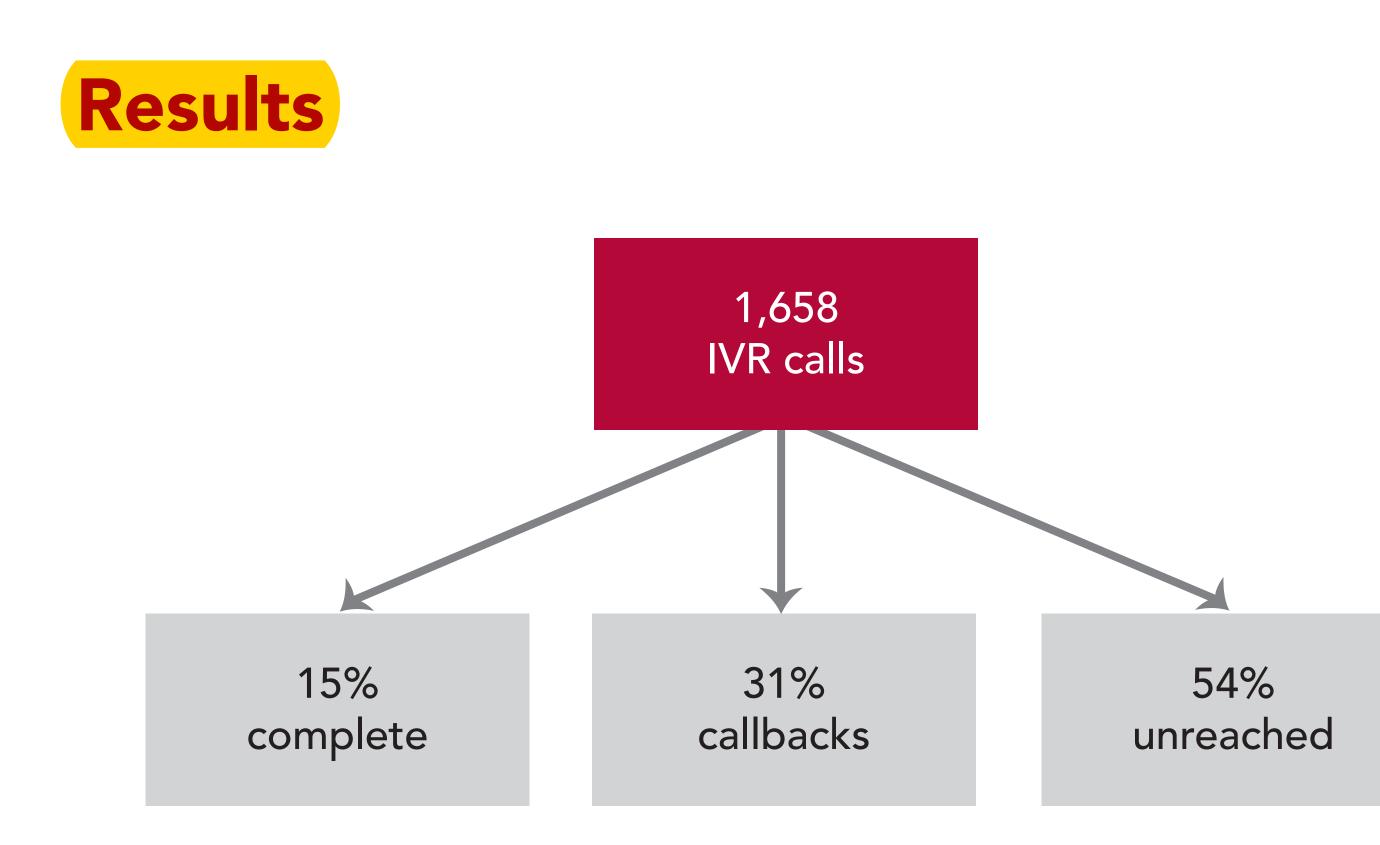
Statistical Analysis

- Conducted on an intention-to-treat basis
- **Primary outcome:** Composite based on increased medication compliance and decreased adverse events
- **Secondary outcomes:** Medication compliance, ER visits, hospitalizations
- Event rate of 50% in UC group was used with alpha-value of 0.05 and power of 90%

Participants

- 330 patients (UC n = 167; IVR n = 163)
- Mean age = 63.8 yrs (range 36–86)
- 73% male
- 70% CABG
- 83% had high school or higher education
- 53% retired

There were no statistical differences in baseline characteristics between the 2 groups.

Results

1,658 IVR calls
→ 15% complete
→ 31% callbacks
→ 54% unreached

"CALLBACK" RESPONSES

Questions	Responses (n)
Did you fill the prescriptions that you were given at discharge from the Heart Institute?	9
Are you taking any medications other than those prescribed for you on discharge?	163
Do you have any symptoms that you think are related to your drugs?	72
Have there been any situations where you took more medications than prescribed or missed a dose of a medication?	41
Have you been prescribed a drug that you are allergic to?	11
Have you run out of drugs before you could get them refilled or have you had any difficulty getting a repeat of a prescription?	28
Has your physician added, stopped or changed any of your medications?	176
Have you contacted a health care provider such as a nurse, pharmacist or doctor for any reasons?	223
Have you been seen in an emergency department or been readmitted to a hospital?	69
Do you have any other issues about medications you would like to discuss or would you like any further medication information?	44

516 Calls Flagged as "Callback"

- 63 calls required an intervention by the nurse
- **Interventions:** Offering tips on how to remember to take medications, facilitating a Rx renewal, discussing adverse reactions, having MD reissue Rx at the request of the surgeon when medication had been discontinued

Outcome Analysis

	IVR (%)	UC (%)	p
Primary outcome	51.1	38.5	<0.041
Medication compliance	74.5	49.7	<0.0001
ED visit	29.9	31.0	0.897
Hospitalization	18.0	15.0	0.519

Patient Satisfaction

- 56% requested medication information from the IVR system
- 97% were satisfied with the information provided
- 93% would prefer an IVR follow-up to no telephone follow-up

Conclusion

- There is a statistical difference between the 2 groups for the primary outcome and the secondary outcome of medication compliance
- Using IVR technology improves medication safety and provides extended patient follow-up
- The number and frequency of calls is an important consideration for future algorithms
- Components of this algorithm can be inserted into other existing condition-specific IVR programs such as the Heart Failure Follow-up program

Acknowledgments

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