UNIVERSITY OF OTTAWA HEART INSTITUTE
INSTITUT DE CARDIOLOGIE DE L'UNIVERSITÉ D'OTTAWA

# 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

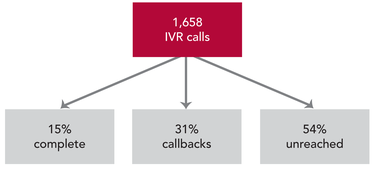
- Conducted on an intention-to-treat basis
- **Primary outcome:** Composite based on increased medication compliance and decreased adverse events
- **Secondary outcomes:** Medication compliance, ER visits, hospitalizations
- Event rate of 50% in UC group was used with alpha-value of 0.05 and power of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




### "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

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