Interactive Voice Response Technology To Prevent Type 2 Diabetes in Cardiac Population

Overview

The University of Ottawa Heart Institute (UOHI) with an annual rate of 6000 admissions is committed to understanding, treating and preventing heart disease. Twenty-three percent of our population has prediabetes. Given the high risk nature of heart disease and prediabetes, it is essential that safe and cost effective interventions be developed for this population to reduce the risk of developing diabetes. “The prevention or delay of diabetes not only would alleviate the individual burden of diabetes but also could decrease associated morbidity and mortality” [2].

The aim of this study is to introduce a novel way of delivering and monitoring best practice guidelines through the use of Interactive Voice Response (IVR) technology for patients with prediabetes with an end point of delaying progression to Type 2 Diabetes. IVR technology has been used to transition patients safely home [3,4,5]. IVR is an automated calling system that can assess patient compliance while incorporating patient education into messaging. The IVR program is designed to use a regular or cellular phone to deliver preset questions and information to patients in their home. Responses are captured in a database which allows for documentation. Patient responses that are outside the set normal are flagged and a diabetes nurse educator contacts patients for more personalized interventions.

UOHI has established a unique inpatient diabetes management program. It has an integrated approach which includes assessment, treatment, follow up in a diabetes clinic and linkages to community resources which allows for seamless transition home. To further enhance the adherence to best practice guidelines, UOHI has successfully implemented an IVR algorithm for patients with HbA1c of 6.5% or greater. Preliminary findings suggest that the use of IVR improves adherence to medication compliance, hypoglycemia management, attendance at community education programs, retinal screening and foot care.

All patients admitted to UOHI have their HbA1c drawn on admission as per a medical directive. Patients with HbA1c of 6.0 – 6.4% with no pre-existing diagnosis of diabetes are educated on prediabetes. As part of the medical directive, patients are given a pamphlet on prediabetes and a follow up referral is made to community diabetes education programs. A letter along with CDA’s screening and diagnosis algorithm for type 2 diabetes are sent to their primary health care professional notifying them of this new condition and further advice for future follow-up.

Current Project Status

This award provided the resources necessary to develop an IVR algorithm for our prediabetes population (Appendix 2) and to have it activated on our pre-existing IVR follow up programs to reduce risk of patient fatigue from numerous contacts. These calls started to be received by our patients in September. It took alittle longer than anticipated to get all parties who do the data entry to get orientated before the questions could be added by our provider. Abnormal responses are flagged and a diabetes nurse educator contacts the patient to further investigate. This award has provided the necessary resources to extend our reach to this high risk population.

Primary Outcomes: We look forward to measuring the HbA1c of our patients at one year from admission to determine whether this intervention delayed the onset of diabetes.

Secondary Outcomes: Adherence to physical activity, healthy eating, attendance at community education and patient satisfaction will be measured.

Anticipated results, impact and future implementation:

We anticipate that the use of an IVR technology follow-up will improve adherence to best practice guidelines for prediabetes management and reduce progression to diabetes. This may have an impact on cardiovascular disease, renal failure, blindness and premature mortality (CDA 2013).
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Translating best practice guidelines into everyday clinical practice can be a challenging task. We hope to continue to follow this group of patient forward to see how long they continue to avoid developing diabetes. Development of this innovative and cost-effective intervention to reduce the risk of developing type 2 diabetes is warranted to alleviate the burden of diabetes. Future implementation would be to disseminate this tool to other health care institutions.

Name of team: University of Ottawa Heart Institute

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Dr. Amel Arnaout MD, FRCPC  Heather Sherrard RN, MHA, CHE
Sandhya Goge RN, BScN, MScN

Appendix 1 - References


Interactive Voice Response Technology To Prevent Type 2 Diabetes in Cardiac Population
Prediabetes IVR Algorithm 2015

Prediabetes IVR calls for HbA1c = 6 – 6.4%

For ACS, HF and Cardiac Surgery population

Prediabetes refers to blood glucose levels higher than normal but not yet high enough to be diagnosed as diabetes. You were found to have prediabetes, please answer the following questions.

Q1: If you did not receive a prediabetes pamphlet during your stay in the hospital, would you like one mailed to you?

Yes
Flag: Mailout & go to Q2

No
Go to Q2

Q 2: Are you walking daily for 30 minutes?

Yes
Excellent!
Go to Q3.

No
Try being active most days of the week. If 30 minutes of continuous exercise is difficult, alternate 3-5 minute intervals of walking and resting with the goal of reaching 30 minutes.
Aim for 150 minutes of aerobic exercise per week.

Q 3: Are you eating 3 meals evenly spaced out throughout the day?

Yes
Well done! Healthy eating and regular physical activity reduce your risk of developing type 2 diabetes by 58%

No
Eat three meals per day spaced no more than six hours apart helps your body control blood glucose levels.
Follow Canada’s Food Guide for Healthy Eating.
Include vegetables and fruit at each meal.
You should be screened annually by your primary health care provider.

Q4: Have you attended prediabetes education in the community since you were discharged?

Subsequent Calls: Have you attended prediabetes education in the community since your last call?

Yes
Go to Q5.

No
Please call Diabetes Central Ottawa at 613-238-3722 or visit www.champlainrcc.ca for more information.

Q5: Have you seen your primary health care provider to discuss your prediabetes condition?

Yes
Go to Q6.

No
Please contact your primary health care provider to schedule an appointment.

Q6: Did you find the automated calls helpful to stay on track with your prediabetes?

Yes

No
Use of Interactive Voice Response Technology (IVR) to Improve Compliance with Dysglycemia Best Practice Guidelines

Sandhya Goge RN, BScN, MScN
Diabetes Nurse
Outline

• Dysglycemia Burden

• Best Practice Guidelines & Dysglycemia

• IVR and Dysglycemia

• Our Findings
Dysglycemia Burden: Global
Diabetes in Canada: Prevalence by Province and Territory

Age-standardized† prevalence of diagnosed DM among individuals ≥ 1 year, 2008/09

† Age-standardized to the 1991 Canadian population.

NL, NS and ON had the highest prevalence, while NU, AB and QC had the lowest.

## Dysglycemia Burden at UOHI

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>Patients/year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Admissions</strong></td>
<td></td>
<td>~ 6000</td>
</tr>
<tr>
<td><strong>Prediabetes</strong></td>
<td>23%</td>
<td>~ 1380</td>
</tr>
<tr>
<td><strong>Newly Diagnosed Diabetes</strong></td>
<td>10%</td>
<td>~ 600</td>
</tr>
<tr>
<td><strong>Pre-existing Diabetes</strong></td>
<td>30%</td>
<td>~ 1800</td>
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</table>
Clinical Practice Guidelines: Diabetes
Interactive Voice Response (IVR)

- Automated calling system
- Uses regular or cellular phone
- Delivers preset questions & information to patients
- Responses are captured in database
- Abnormal responses are flagged
- Diabetes nurse educator contacts the patient
## IVR Call Schedule

<table>
<thead>
<tr>
<th>Program</th>
<th>Call Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS + Dysglycemia</td>
<td>Day 2, Week 4, Week 12, Week 52</td>
</tr>
<tr>
<td>Heart Failure + Dysglycemia</td>
<td>Day 2, Week 4, Week 12, Week 52</td>
</tr>
<tr>
<td>Surgery + Dysglycemia</td>
<td>Day 2, Week 4, Week 12, Week 52</td>
</tr>
</tbody>
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Patient Demographics

Mean Age = 65

n = 144

78% Male

22% Female

Mean Age = 65
Medication Adherence

<table>
<thead>
<tr>
<th></th>
<th>Day 2-3</th>
<th>Month 1</th>
<th>Month 3</th>
<th>Month 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>63%</td>
<td>46%</td>
<td>40%</td>
<td>45%</td>
</tr>
<tr>
<td>HF</td>
<td>55%</td>
<td>45%</td>
<td>56%</td>
<td>36%</td>
</tr>
<tr>
<td>Surgery</td>
<td>79%</td>
<td>60%</td>
<td>64%</td>
<td>57%</td>
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</tbody>
</table>

- ACS
- HF
- Surgery
Blood Glucose Monitoring

ACS: 53%
HF: 52%
Surgery: 62%
Three Meals a Day

ACS: 59%
HF: 54%
Surgery: 55%
Exercise Adherence
Hypoglycemic Incidence

<table>
<thead>
<tr>
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<th>Day 2-3</th>
<th>Month 1</th>
<th>Month 3</th>
<th>Month 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>25%</td>
<td>28%</td>
<td>18%</td>
<td>11%</td>
</tr>
<tr>
<td>HF</td>
<td>9%</td>
<td>18%</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Surgery</td>
<td>9%</td>
<td>18%</td>
<td>12%</td>
<td>12%</td>
</tr>
</tbody>
</table>
Diabetes Education

- ACS: 26%
- HF: 18%
- Surgery: 18%
Follow Up with Endocrinologist

Bar chart showing percentages for ACS, HF, and Surgery.

- ACS: 23%
- HF: 20%
- Surgery: 24%
Yearly Foot Screen

- ACS: 43%
- HF: 50%
- Surgery: 42%
Yearly Retinal Screen

- ACS: 31%
- HF: 20%
- Surgery: 32%
Found IVR Helpful

- Day 2-3: 38% ACS, 27% HF, 53% Surgery
- Month 1: 43% ACS, 36% HF, 53% Surgery
- Month 3: 37% ACS, 45% HF, 51% Surgery
- Month 12: 51% ACS, 27% HF, 44% Surgery
Prediabetes IVR Questions

Prediabetes refers to blood glucose levels higher than normal but not yet high enough to be diagnosed as diabetes. You were found to have prediabetes, please answer the following questions.

1. If you did not receive a prediabetes pamphlet during your stay in the hospital, would you like one mailed to you?

2. Are you walking 30 minutes most days of the week?

3. Are you eating 3 meals evenly spaced out throughout the day?

4. Have you attended prediabetes education in the community?

5. Have you seen your primary health care provider to discuss your prediabetes condition?

6. Did you find the automated calls helpful to stay on track?
Conclusion

- Diabetes and prediabetes are on the rise around the world
- 60% of UOHI patients have dysglycemia
- 60% of UOHI patients are not at target on admission
- IVR used as a knowledge transfer tool
- Diabetes IVR main themes:
  1) Follow up with Endocrinologists
  2) Attendance at Diabetes Education programs
  3) Yearly Retinal Screen
  4) Sustaining physical activity
- Prediabetes IVR: Early Phase
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