SHINe: Medication Safety Reducing the Incidence of Hypoglycemia

Dr Ian Phoon
Program Manager, and Family Physician
27th Sept 2016
Facility Description

• Singhealth Polyclinics (SHP) : a 9-clinic Primary care (out patient) facility in SINGAPORE that manages > 68 thousand diabetics in 9 clinics annually

• Each Doctor sees about 50 - 60 patients a day
  – From newborns to the elderly
  – medical and surgical conditions

• Pasir Ris (Pilot site – a “medium-sized” clinic)
  – 8 - 10 doctors a day
  – typically see 40 - 70 diabetics (whole clinic) a day.
Journey to our aim ... What are we trying to accomplish?

- We joined the SHINe collaborative in May 2014
- Our stream was “Medication Safety – Diabetic Medication”
- More specifically, our initial mission statement was:

To reduce the incidence of hypoglycemia in diabetic patients seen at our institution (SHP), due to insulin / sulphonylureas (SU) within 3 year from May 2014 – Apr 2017
General Approach to Problem Solving

- Define the **Problem, Objectives**
- **Get Sponsorship** – From institution leaders
- **Form the Team**
  - Multi-disciplinary
  - with expert knowledge of ground processes
  - Core Team, Pilot Site Team
- **Start with a Pilot Site**
  - For testing, refining interventions
- **Plan for Spread**
  - Keep Leaders, Sister units Updated on Progress
  - Communication, Engagement, Buy-in
- **Continue to Monitor data**
Team

Program Manager: Dr Ian Phoon

Pilot Clinic team - PASIR RIS CLINIC:
• Pharmacist Corina Tan Sock Ching
• NC Ou Lee Hua
• SSN Zainab Binte Muhammad Nor
• SSN Marlina Binte Kamaruddin
• SSN Koh Ai Keng Lindy
• SN Diana Binte Mohamed Yusoff

Central team
(members of P&T committee):
• Dr Peter Moey
• Pharmacist Teo Hui Ling
• Pharmacist Huang Yu Fang
• APN Lian Lay Geok
• APN Vera Ang

Sponsors:
• Dr Chow Mun Hong (Sponsor)
• Dr Lim Hwee Boon (Co-sponsor)
Some points to note and Operational definitions

• Hypoglycemia is **operationally defined** as either:
  a) Documented blood glucose < 4.0 mmol/l (by lab or self monitoring) OR
  b) With **typical symptoms***, which are quickly resolved with food or a sweetened drink
      *Dizziness/ tremors/ cold sweats/ confusion/ severe hunger

• The **insulin / SU** should be prescribed by a Dr from SHP

*Note: No baseline incidence of hypoglycemia or target for improvement is mentioned in the mission statement.*
Hypoglycemia in DM patients on SU / Insulin

**Cause Effect Diagram for Hypoglycemia in SHP**

- **Patient**
  - Co-morbid
  - Troublesome
  - No SMBG
  - Cost
  - No reporting
  - Did not educate

- **Drugs**
  - Insulin
  - Long acting SU

- **Not Educated**
  - Lack awareness
  - Learning barriers
  - Meal timing/portion
  - Sick Day

- **Not Routine / No Awareness**
  - Did not encourage SMBG
  - Not time

- **Special cause: Ramadan**
  - No system to detect hypos
  - No systematic way to educate

- **Healthcare worker**
  - System/ Process
Hypoglycemia Causes (Patient Factors)

- Delayed meal: 13 cases
- Unknown: 8 cases
- Reduced food intake: 7 cases
- Skipped meal: 5 cases
- Inject w/o food: 1 case

34 cases reviewed, 5 May - 21 June 14
Patient Awareness on Hypoglycemic Symptoms & Management

Survey of 12 DM patients in waiting area 15 Sep 2014

<table>
<thead>
<tr>
<th>No. of hypoglycemic symptoms patient can identify</th>
<th>None</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
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<tr>
<td>Counts</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>0</td>
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<table>
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<tr>
<th>Counselling before about hypoglycemia</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Counts</td>
<td>8</td>
<td>8</td>
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<table>
<thead>
<tr>
<th>Know some management of hypoglycemia</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Counts</td>
<td>5</td>
<td>7</td>
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Summary of Baseline Findings

• **Assessment** of hypoglycemia **not routine**
  — about 80% of cases not done, based on case-record audit.
  — **cannot track incidence of hypoglycemia** if this piece is not firm.

• Most patient factors related to a **skipped / delayed meal, or eating less than usual.**

• **Education** and counselling **about hypoglycemia** (recognition and management) **generally low,** especially on how to **prevent it** (i.e. time it with meals)

• As of **Jan 2014,** we were prescribing **115 thousand pills** of **Glibenclamide** (a **long acting** sulphonylurea)

• Though we have a sizable **Muslim** Population, **pre-Ramadan counselling** for diabetic patients was **rare** (none in 18 cases audited)
Areas to Work on for our Interventions

1. **Glibenclamide**
   - Long acting SU associated with prolonged hypoglycemia, especially in those > 60 years old, or with CKD (FDA advisory in 2014)
   - Availability of safer alternatives
   - **Need to reduce the use of Glibenclamide**

2. **Ramadan**
   - Fasting month for Muslim patients
   - Increased vulnerability of hypoglycemia well documented in literature
   - Large pool of Muslims who are diabetics seen at SHP
   - Review of 18 cases in Jun 2014 (Muslim + DM + SU/insulin)
     - None had any dose adjustments nor advice on Ramadan
     - Awareness low amongst Doctors
   - **Need to improve pre-Ramadan counselling, dose adjustments**
Areas to Work on for our Interventions

3. **Assessed for hypoglycemia at each chronic visit.**
   - Clearly, EXPLICITLY documented in clinical records
   - **Need to improve documentation for hypoglycemia**

4. **Education on hypoglycemia** avoidance, recognition and management
   - Initiation of SU/Insulin should be followed by a brief counselling on this.
   - Identifying patients with hypoglycemia for further counselling
   - Looking to improve our educational material
   - **Need to improve patient’s education regarding hypoglycemia**
Intervention 1: Restrict/ Reduce use of Glibenclamide (since Jan 2014)

- **Electronic pop-up alert** has been placed in electronic case records, to flag patients on Glibenclamide who are > 60 years old since Jan 2014
  “Alert message: Patient >60yrs old, review Glibenclamide

<table>
<thead>
<tr>
<th>Date</th>
<th>PCM Alert Message</th>
<th>By User</th>
<th>Acknowledge</th>
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<tbody>
<tr>
<td>21/01/2014</td>
<td>Patient &gt;60yrs old, review Glibenclamide</td>
<td>PGLUAT</td>
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</table>

- May 2014, communication slides had been sent to all clinics / doctors to
  - Actively **switch** patients away from Glibenclamide (ALL age groups)
  - **Not to start** new patients on the drug
  - Pharmacy staff to clarify with Dr if a new prescription of glibenclamide is picked up
  - Included in the **new doctor’s induction training** in Jun 2014
Intervention 1: 
Restrict/ Reduce use of Glibenclamide (since Jan 2014)

Leveraging on IT decision support alert to warn our clinicians against the use of Glibenclamide for those >60 years old or with CKD

- Below: Data from Jan2014 – May 2016 for 9 SHP clinics

As of May 2016, 4003 tablets of Glibenclamide were prescribed

Electronic pop-up warning for those > 60 years or with CKD Jan 2014

Drs informed to avoid using Glibenclamide May 2014

Compulsory acknowledgement of alert July 2014

Reduction in the Usage of Glibenclamide (a long acting sulphonylurea)
Intervention 2: Improving pre-Ramadan counselling and drug dose adjustments (4 Jun 2014)

• **Educational talk + Email to Doctors / Nurses** – Pilot clinic 1st.
  - Ramadan period (28 Jun – 27 Jul, 2014)
  - The need for dose adjustments if patient is on SU or Insulin or 3 times a day
  - **Practical guide** how to do the dose adjustments
  - Patient educational pamphlets

• **Sharing of the audit findings**
Intervention 2 SPREAD: Improving pre-Ramadan counseling and drug dose adjustments (March 2015)

Clinic actions:

- Reminder to all clinical staff in 9 clinics the Ramadan Period each year
- Communication/Education slides, with practical guide to pre-Ramadan dose adjustments
- To advise Muslim patients to avoid doing fasting bloods during Ramadan
- Prompt in PPIS (our electronic medical record system)
- Audit:
  - 10 case audits should be done on the 1st week of Apr, May and June
  - To share results with clinic, to raise awareness
Ramadan Alert!
Pre-Ramadan Pamphlets for Diabetics

A Medication Action Plan for Patients

What You Should Know About
A Safer Ramadan for Patients with Diabetes
Ramadan Lebih Selamat untuk Penghidap Kencing Manis

Learn how you can manage your diabetes during Ramadan.

Ramadan fasting is to go without food, drinks, medications and
even abstains from smoking between the hours of dawn till sunset.
Muslims with diabetes feel strongly about observing the holy month
of Ramadan as it is one of the five pillars of requirement to fulfill as a
Muslim.

However, for patients with diabetes, there are serious health risk
associated with fasting such as:
- Hypoglycaemia (low blood sugar)
- Hyperglycaemia (high blood sugar)
- Dehydration (fluid loss from the body)

Manage your diabetes during Ramadan
If you are planning to fast during Ramadan, here are some helpful
tips for you:
- Consult your doctor and seek advice on your fasting decision.
- Take your medication as prescribed by the doctor.
- See your nurse to plan for Ramadan education at least 2-3 months before the start of Ramadan.
- Monitor your blood sugar even during Ramadan. Know the symptoms of hypoglycaemia (confusion, light headed, cold sweats). Consult your doctor if this happens often.

Under some Circumstances
Break fast immediately if you have:
- Hypoglycaemia (blood sugar less than 4.0 mmol/l)
Check your blood sugar. Take a cup of sweetened drink or a
sweet quickly if this happens.
- Hyperglycaemia (blood sugar above 16 mmol/l)
Check your blood sugar. Drink plenty of water. Maintain
moderate food intake. Do not forget to take your medication.

Medication Intake When Fasting

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<tr>
<th>Medication</th>
<th>Morning (Meal at dawn)</th>
<th>Evening (Break Fast)</th>
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% of Ramadan Medication Counselling at 9 SingHealth Polyclinics (Overall), 2015 vs 2016

- March 2015: 64.80%
- March 2016: 69.09%
- April 2015: 76.10%
- April 2016: 77.78%
- May 2015: 69.20%
- May 2016: 82.28%
Intervention 3: Improving Assessment & Documentation for Hypoglycemia (Sep 2014)

• In Sep 2014: Drs & nurses were briefed on the importance of checking for this.
  – Feedback: Time needed for documentation, often “forgotten” due to multiple task
  – Intervention: **Acronym expansion** (see next slide)

• Audit of 15 – 25 cases ON INSULIN done, 2 x a month – for documentation of hypoglycemia
  – Explicit or Implicit documentation
    ▪ **Explicit** = Specifically mentioned hypoglycemia, or it’s absence
    ▪ **Implicit** = Comments e.g. “No complaints”, No problems/side effects of medication”, and “Asymptomatic”.
    ▪ **Nil** = No documentation regarding any hypoglycemia nor side effects to medication.
Intervention 3: Improving Assessment & Documentation for Hypoglycemia

Standardise Documentation (16 Jan 2015)

- Acronym Expansion – A computer function which facilitates creation of documentation templates. A “Digital stamp”

- Modified acronym expansion to standardize documentation when reviewing a patient with hypoglycemia
  - “DMr/v” = “DM review
    - HbA1c %
    - FBG/RBG
    - Compliance to medication: Yes/No
    - Any hypoglycemia: Yes/No
    - Diet
    - Exercise
    - SMBG:”
Assessment of Hypoglycemia

Audit of 15-25 cases (twice/month) from Pasir Ris Polyclinic

**Result:** Improvement in hypoglycemia specifically being asked

**Explicit:** Presence / Absence of Hypoglycemia specifically documented

** Implicit:** “Well/ No complaints” without mention of hypoglycemia

**Not assessed:** “Here for medicine/ review” with no mention

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**Modiﬁed Acronym expansion (Early Jan 2015)**

**Advised to ask/docu hypoglycemia. Acronym expansion (Mid Sep 2014)**
Hypoglycemic assessment for Insulin Rx patients
(Sep – Dec 2015, and Jun-Jul 2016) – e.g. from 2 other clinics

Seng Kang - Hypoglycemia Assessment

- Total
- Explicit
- Implicit

Outram – Hypoglycemia Assessment

- Total
- Explicit
- Implicit

Gap from Jan-May 2016 due to focus on pre-Ramadan
Summary of hypoglycemia assessment

- Pasir Ris (pilot site) has reached about 80% explicit assessment for hypoglycemia for most months

- Other clinics show variable performances.
  - Outram clinic achieved mostly 80% since Oct 2015
  - Others show improvement, but was not sustained.
  - Jan – May 2016, focus on Pre-Ramadan counselling
  - From Jun 2016, return focus on hypoglycemia assessment
  - Engage Drs on barriers
  - Encourage Drs to include hypoglycemia assessment in their acronym expansion for DM consults.
**Intervention 4: Improving Patient Education on Hypoglycemia**

**New pamphlet**

Hypoglycaemia occurs when the sugar level in your blood falls to a point where your body and brain are unable to function properly.

**Symptoms of low blood sugar (hypoglycaemia) include:**

- Dizziness
- Sweating
- Chills or shakiness
- Weakness
- Headaches
- Blurred vision
- Extreme hunger

**If you experience any of the above symptoms, you should:**

1. Check your blood sugar level if you can. Low blood sugar occurs when your blood sugar level falls below 4.0 mmol/l.
2. Consume one of the following options immediately:
   - ½ cup juice or regular soda
   - 2-4 teaspoon honey or sugar
   - 3 sweets
3. Check your blood sugar level again after 15 minutes. If it is still less than 4.0 mmol/l, repeat step 2 and visit your doctor as soon as possible.

**LOW BLOOD SUGAR**

- Always take your medication or injection with meals.
- Have a light snack before bedtime if you are on insulin.
- Have 3 regular meals a day. Avoid skipping or delaying meals.
- Do not take your diabetic medication or injection in the morning if you are fasting for blood test.
Feedback on new patient pamphlet
Survey of 5 patients (31 Oct 2014)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>No. of patients able to answer questions relating to Hypoglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before being shown pamphlet</td>
</tr>
<tr>
<td>1.</td>
<td>List 3 symptoms of low sugar</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>How you manage low sugars</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>How to prevent low sugars</td>
<td>1</td>
</tr>
</tbody>
</table>

Scores improved for Qn 1 & 3.
All patients found the pamphlet easy to understand.

Usage of new hypoglycemic pamphlets

- Pamphlet may be used by any staff, including Nurses and Pharmacy staff
- Pharmacy may also help to issue the pamphlet if it is noted at Pharmacy, that patient has been started on a SU without prior counselling, and was not willing to return to see the nurse.
Hypoglycemia pamphlet: Jan / Feb 2016

- When: (i) Hypoglycemia is detected  (ii) SU or insulin is initiated
- Use of pamphlet by: Dr, nurse or Pharmacy
  - Pamphlet can be used for counselling. Can send to HC for this.
  - When SU/insulin is initiated, Drs to insert remarks on prescription
    - “Start medication”, and send to HC, who can counsel about hypoglycemia prevention, management with the PIL
    - Pharmacy staff can also help to counsel patients with the PIL, when “start medication” is noted for an SU.
Summary of interventions to reduce hypoglycemia

• Glibenclamide computer alert
  – On our main electronic medical record (EMR) system. Available in all 9 clinics.
  – Fall in use of this drug: across all clinics, and sustained

• Ramadan-DM computer alert; Audit for Muslim (Malay) patients
  – Alert pop-up for all clinics since Feb 2015. Will come on 4 month prior to Ramadan yearly
  – 10 case monthly audits 4 months before Ramadan, to monitor consistency in Ramadan counseling and dose adjustments

• Hypoglycemia Assessment for every DM consult
  – Encourage the use of the “acronym expansion”
  – Monthly clinic audits (10 cases)
  – Variable results from the other clinics

• New hypoglycemia pamphlet
  – Designed with Corp Comms, mass printed for all clinics as of Feb 2016.
  – Can be used by Drs, Nurses, Pharmacists
Sponsorship and Communication for Spread

• Regular updates through Clinical Governance Steering Committee (CGSC)
  – Last update in June 2016 – Endorsement of spread
  – Includes all HQ and clinical directors
  – Buy in and sponsorship

• Communication slides to clinic Directors and Deputies

• Regular (monthly) clinic audits by clinic CVD reps
  – Data reported centrally.
  – Shared with clinic staff.
Results (Audits from Pilot Clinic)

% of documented hypoglycemia

2014 2015 2016
We all “SHINE” brightly

Hypoglycaemia is an often neglected part of managing patients with diabetes. It can be dangerous, even life-threatening. It can be a frightening experience for those unprepared for it.

Dr Ian Phoon
Family Physician
SHP-Pasir Ris

A pilot team at SHP-Pasir Ris was therefore setup with a central multi-disciplinary project team, to focus on medication safety and the aim was to reduce the incidence of hypoglycaemia in diabetic patients seen at SHP.

Several interventions were implemented, including:

1. Encourage our doctors and nurses in SHP-Pasir Ris, to consistently assess patients with diabetes for hypoglycaemic episodes.

2. Leverage on IT to influence prescribing habits to ensure safe and appropriate use of hypoglycaemic agents.

3. Educate patients on self-care with re-designed patient information leaflet.

What is SHINE?

Singapore Healthcare Improvement Network (SHINE) is a national collaborative effort spearheaded by MOH. The Network aims to accelerate the pace and scale of improvement, leading to system-wide, transformative healthcare in Singapore.

SHP is one of the many participating institutions in SHINE.
Questions?

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ian.phoon.k.y@singhealth.com.sg
THANK YOU