IATROGENIC HYPOGLYCAEMIA IN THE ELDERLY: AN ANALYSIS OF DIABETIC MEDICATION USAGE PATTERNS ACCORDING TO AGE

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INTRODUCTION
- Diabetes mellitus is a common disease among Malaysians with an estimated prevalence of 17.5% among adults in 2013. Prevalence of diabetes also increases with age from 5.5% of young adults aged 18-19 years to 39.1% among adults 70-74 years old.1
- Hypoglycaemia is a common problem faced by patients and has been shown to increase the risk of mortality, lower quality of life, as well as decrease adherence to therapy.2
- A large proportion of elderly diabetics (62.8%) were reported to have experienced mild hypoglycaemia in one Malaysian study.3
- Among the causes identified to increase risk of hypoglycaemia in the elderly are cognitive problems, renal impairment and polypharmacy.4 However, certain medications can also increase hypoglycaemia risk including anti-diabetic drugs such as sulfonylureas (SU), and non-diabetic drugs such as ACE inhibitors (ACE-I) and beta-blockers.5

METHODOLOGY
- The analysis was performed using data of type 2 diabetes mellitus (T2DM) patients managed at Malaysian public sector primary care clinics in year 2012, obtained from the Malaysian National Diabetes Registry (NDR) database.6
- Commonly used medication classes captured by the NDR were analysed to determine differences in drug utilisation rates by different age groups.
- We selected commonly used drugs in diabetes: some with evidence of association with iatrogenic hypoglycaemia reported in literature including SU,6 insulin,7 ACE-I and beta-blockers,8 whereas others have less association with hypoglycaemia i.e. metformin9,10 and acarbose11,12.
- Descriptive analysis was performed to examine medication utilisation across different age groups categorised as: <45 years old, 45-64 years old, 65-79 years old and ≥80 years old while analysis of variance (ANOVA) was performed to determine the statistical significance of differences in the use of medications across age groups.

RESULTS
- A total of 130,246 T2DM patients were included in the analysis with a mean age of 59.78 years and a mean duration of diabetes of 7.03 years. (Table 1)
- Elderly patients aged between 65 and 79 years comprised 29.8% of the study population while patients aged 80 and above were 3.5% of the population. (Table 1)
- Metformin was the most commonly prescribed anti-diabetic medication in our patient population, followed by SU and insulin. A small proportion of patients were treated with acarbose. (Figure 1)
- Use of metformin declined with age from 84.7% of patients aged 45-64 years to 68.9% of patients aged above 80 (p<0.001). Similarly, use of insulin declined from 24.7% of patients aged <45 to 12% of patients aged over 80 (p<0.001) whereas use of SU did not vary by age group (p=0.500). (Figure 1)
- Among diabetics with hypertension, ACE-I was the most prescribed anti-hypertensive medication but its use decreased with age from 64.4% to 50.0% in patients aged under 45 and 80 and above, respectively (p<0.001). In contrast, use of beta-blockers increased with age from 20.1% of patients aged under 45 to 35.6% of patients in the 65-79 age group (p<0.001). (Figure 1)

Table 1: Patient characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Statistics</th>
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<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>59.78 years (11.16)</td>
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<tr>
<td>Age distribution, n (%)</td>
<td></td>
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<tr>
<td>&lt;45 years old</td>
<td>10,880 (8.4)</td>
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<td>45 - 64 years old</td>
<td>38,843 (29.8)</td>
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<tr>
<td>65 - 79 years old</td>
<td>43,911 (31.5)</td>
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<tr>
<td>≥80 years old</td>
<td>38,843 (29.8)</td>
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<tr>
<td>Female, n (%)</td>
<td>78,477 (59.5)</td>
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<td>Duration of T2DM, mean (SD)</td>
<td>7.03 years (3.06)</td>
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<td>Glycated haemoglobin (Hba1c), mean (SD)</td>
<td>8.11% (2.16)</td>
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<td>Systolic Blood Pressure, mean (SD)</td>
<td>135.51 mmHg (18.26)</td>
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<tr>
<td>Diastolic Blood Pressure, mean (SD)</td>
<td>79.36 mmHg (10.03)</td>
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<tr>
<td>Body Mass Index, mean (SD)</td>
<td>27.18 (5.05)</td>
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CONCLUSIONS
- Our analysis shows the use of insulin decrease with age. However, SU is used equally by younger and older patients despite the known risk of hypoglycaemia. Conversely, the use of metformin decreases with age.
- Although second generation SU’s are less likely to cause hypoglycaemia, the pattern of common SU use in the elderly raises concern about its widespread use in this group.
- Our findings suggest that there is scope for the prescribing of SU to be decreased whereas the use of metformin and insulin could be increased when patients and carers are able to manage appropriate insulin administration.3
- In terms of hypertension treatment, the evidence for ACE-I is controversial, whereas hypoglycaemia has been well-associated with beta-blockers. Yet, we found that beta-blockers are used with increased frequency among the older age group.
- A limitation of our study was that we were unable to identify the specific SU drugs or any other specific drug type used due to unavailability of such data in the dataset. Further study is warranted to understand the actual occurrence of hypoglycaemia events and their association with drug treatment in this patient group.
- Despite limitations, our findings could serve as food for thought for prescribers about the risk of iatrogenic hypoglycaemia in the selection of treatment options for elderly patients. It encourages health care professionals to give greater consideration to more appropriate treatment options in this group.

REFERENCES