

Validating QcDMui with a published tool

Figure S1 is a screenshot of the configuration specified in QcDMui when analysing a test data set used by a published tool [1] by using the same cut-off values and exclusion criterion applied to the test data by the published tool to generate a glucometrics report (see Figure S2). The complete glucometrics report ('Glucometrics_test_data.pdf') and test data used to generate this report ('test1.csv') are available from https://github.com/nyilin/QcDM_Project/tree/main/Supplementary_data. Figure S3 is the resulting glucometrics report generated from QcDMui.

After excluding patient stays in the test data set that have less than 2 blood glucose (BG) measurements, the QcDMui reported the same number of patient-samples, patient-days and patient-stays as the published tool (indicated by a red rectangle in Figure S2 and S3). Both tools generated the same information for median and mean glucose for patient-samples, patient-days and patient-stays (indicated by a purple rectangle in Figure S2 and S3). By specifying 300 mg/dL as the cut-off value for severe hyperglycaemia (indicated by orange rectangles in Figure S2 and S3), 70 mg/dL and 40 mg/dL as the cut-off values for moderate and severe hypoglycaemia (indicated by green rectangles in Figure S2 and S3), and 70 mg/dL and 180 mg/dL as the cut-off values for the target range of BG levels (indicated by the blue rectangles in Figure S2 and S3), both tools generated the same information, suggesting the QcDMui was able to reproduce the statistics reported by the published tool concerning adverse events (i.e., hyperglycaemia and hypoglycaemia) and the target range.

Figure S1. A screenshot of the specifications applied to QcDMui that corresponded to the cut-off values and exclusion criterion used to generate a glucometrics report by a published tool [1].

QcDM UI
About the interface
Data
Glucometrics
License

Data folder

After selecting the data folder, please specify the unit of BG readings used in ALL data files within this folder:
☐ mmol/L
☒ mg/dL

Confirm data folder and unit of BG readings

Hypo cutoff
Please specify the first hypo cutoff (mg/dL):
70

Hyper cutoff
Please specify the first hyper cutoff (mg/dL):
180

Target range
Please specify the lower value of the target range (mg/dL):
70

Hyperglycemia index (HGI)
Please specify the cutoff for HGI (mg/dL):
180

Please specify the second hypo cutoff (mg/dL):
60

Please specify the second hyper cutoff (mg/dL):
250

Please specify the lower value of the target range (mg/dL):
180

Please specify the third hypo cutoff (mg/dL):
40

Please specify the third hyper cutoff (mg/dL):
300

Exclusion criteria
☒ Exclude patient stays having fewer BG measurements than the number specified below

2

☐ Exclude patient stays having length of stay less than or equal to the number specified below in terms of hours

24

After selecting the right data folder and parameters, please click on 'Confirm' button below before proceeding to the panel on the right.

Confirm

Process complete.

Time range:

From
Year
2005
Month
3

To
Year
2005
Month
4

Confirm time range

Wards
☒ All wards with data in the selected time range
☐ Selected wards

Confirm choice

Confirm ward

Number of unique patients in each selected ward and month:
Show 10 entries
Search:

| | Wards | Mar 2005 | Apr 2005 |
|---|-------|----------|----------|
| 1 | A | 27 | 54 |

Showing 1 to 1 of 1 entries

Previous

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Figure S2. A screenshot of a glucometrics report by a published tool [1] when applied to a test data set.

File: test1 Computed on: Thursday, March 24, 2011 at 11:54:25

Glucometrics

http://metrics.med.yale.edu Yale Center for Medical Informatics & the Yale School of Medicine, Section of Endocrinology

Institution: 123 Ward: CV Ward type: Adult Thoracic Surgery Coronary Care Unit
 Glucose type: poc Patient subgroup: none
 3.23.2005 to 4.21.2005

| | Patient - samples | | Patient - stays (means) | | Patient - days (means) | |
|----------------------------|-------------------|----------|----------------------------|----------|---------------------------|----------|
| number | 2444 | | 60 | | 298 | |
| median | 125 | | 132 | | 131 | |
| mean | 134 | | 140 | | 139 | |
| 5 th-95th percentile | 78-230 | | 102-196 | | 97-219 | |
| spread | 152 | | 93 | | 121 | |
| Adverse events | n | % | n | % | n | % |
| at least one glucose < 40 | 6 | 0.2 | 4 | 6.7 | 6 | 2.0 |
| at least one glucose < 70 | 74 | 3.0 | 18 | 30.0 | 45 | 15.1 |
| at least one glucose ≥ 300 | 28 | 1.1 | 8 | 13.3 | 17 | 5.7 |
| Target range | | | | | | |
| 70 ≤ glucose < 180 | 2044 | 83.6 | 52 | 86.7 | 263 | 88.3 |
| Other ranges | | | | | | |
| 70 ≤ glucose < 110 | 708 | 29.0 | 4 | 6.7 | 53 | 17.8 |
| 110 ≤ glucose < 140 | 831 | 34.0 | 31 | 51.7 | 142 | 47.7 |
| 140 ≤ glucose < 180 | 505 | 20.7 | 17 | 28.3 | 68 | 22.8 |
| 180 ≤ glucose < 240 | 226 | 9.2 | 8 | 13.3 | 26 | 8.7 |
| 240 ≤ glucose < 300 | 72 | 2.9 | 0 | 0.0 | 6 | 2.0 |
| 110 ≤ glucose < 180 | 1336 | 54.7 | 48 | 80.0 | 210 | 70.5 |
| 70 ≤ glucose < 240 | 2270 | 92.9 | 60 | 100.0 | 289 | 97.0 |

Note: Rectangles in the same colour in Figure S2 and S3 indicate the same statistics reported from the QcDMui and the published tool.

Figure S3. A screenshot of a glucometrics report by QcDMui when analysing a test data set used by a published tool [1].

| | | | |
|---|----------------|----------------------------|----------------------------|
| Data Summary | | | |
| Summary of BG measurements | | Summary | |
| Total (N) | | | 2456 |
| Minimum (mg/dL) | | | 11 |
| 5-th percentile (mg/dL) | | | 78 |
| 25-th percentile (mg/dL) | | | 104 |
| 75-th percentile (mg/dL) | | | 153 |
| 95-th percentile (mg/dL) | | | 230 |
| Maximum (mg/dL) | | | 453 |
| Non-numeric values (N) | | | 0 |
| Exclusion Summary | | | |
| Total number of patient-stays | | | 72 |
| Number of patient-stays excluded with | | | |
| | | Count (%) | |
| Less than 2 glucose readings during hospital stay | | | 12 (16.7) |
| Note that these criteria are not mutually exclusive. | | | |
| Glucometrics | | | |
| Summary | | | |
| Location | | A | |
| Period | | 23 Mar 2005 to 21 Apr 2005 | |
| Count | Patient-sample | Patient-day ^{#1} | Patient-stay ^{#2} |
| | 2444 | 298 | 60 |
| GLYCEMIC CONTROL | | | |
| Hyperglycemia | | | |
| Percent with glucose ≥ 180 mg/dL | 326 (13.3%) | 121 (40.6%) | 37 (61.7%) |
| Percent with glucose ≥ 250 mg/dL | 82 (3.4%) | 40 (13.4%) | 19 (31.7%) |
| Percent with glucose ≥ 300 mg/dL | 28 (1.1%) | 17 (5.7%) | 8 (13.3%) |
| Hyperglycemia index (HGI): AUC (> 180 mg/dL)/LOS (in hours) | | | |
| | Median (IQR) | | 0 (3) |
| | Mean (SD) | | 7 (17) |
| Other metrics | | | |
| Percent with glucose ≥ 70 and < 180 mg/dL | 2044 (83.6%) | 263 (88.3%) | 52 (86.7%) |
| Mean glucose (mg/dL) | | | |
| | Median (IQR) | 125 (34) | 132 (32) |
| | Mean (SD) | 134 (31) | 140 (29) |
| Average of mean glucose from patient-days within a patient-stay (mg/dL) | | | |
| | Median (IQR) | | 135 (34) |
| | Mean (SD) | | 142 (31) |
| HYPOGLYCEMIA | | | |
| Percent with glucose < 70 mg/dL | 74 (3%) | 45 (15.1%) | 18 (30%) |
| Percent with glucose < 60 mg/dL | 34 (1.4%) | 23 (7.7%) | 14 (23.3%) |
| Percent with glucose < 40 mg/dL | 6 (0.2%) | 6 (2%) | 4 (6.7%) |
| Percent of patient-stays with a recurrent hypoglycemia (< 70 mg/dL) day (10-240 mins) | | | |
| | | | 0 (0%) |
| GLYCEMIC VARIABILITY | | | |
| Standard deviation: SD (mg/dL) | | | |
| | Median (IQR) | 25 (24) | 30 (30) |
| | Mean (SD) | 31 (21) | 36 (23) |
| J-index (mg/dL) | | | |
| | Median (IQR) | 25 (18) | 27 (19) |
| | Mean (SD) | 32 (24) | 33 (18) |
| ^{#1} : 45 (15.1%) patient-days were removed for calculation of patient-day SD and J-index. | | | |
| ^{#2} : 0 (0%) patient-stays were removed for calculation of patient-stay SD and J-index. | | | |

Note: Rectangles in the same colour in Figure S2 and S3 indicate the same statistics reported from the QcDMui and the published tool.

Reference:

- 1 Thomas P, Inzucchi SE. An internet service supporting quality assessment of inpatient glycemic control. In: *Journal of Diabetes Science and Technology*. SAGE Publications Inc. 2008. 402–8. doi:10.1177/193229680800200309