

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 anonymized test data used to generate this report ('test1.csv') are available from

https://github.com/nyilin/QcDM_Project/tree/main/Supplementary_data. The year of the anonymized date is further masked as 0000 and users are advised to replace year with 2005 before applying the QcDM tool to reproduce the results in this document. 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 mean BG, 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

Data folder

Confirm data folder

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

Time range:

From

Year

2005

To

Year

2005

Month

3

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
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Showing 1 to 1 of 1 entries

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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 \geq 180 mg/dL	326 (13.3%)	121 (40.6%)	37 (61.7%)
Percent with glucose \geq 250 mg/dL	82 (3.4%)	40 (13.4%)	19 (31.7%)
Percent with glucose \geq 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 \geq 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