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].

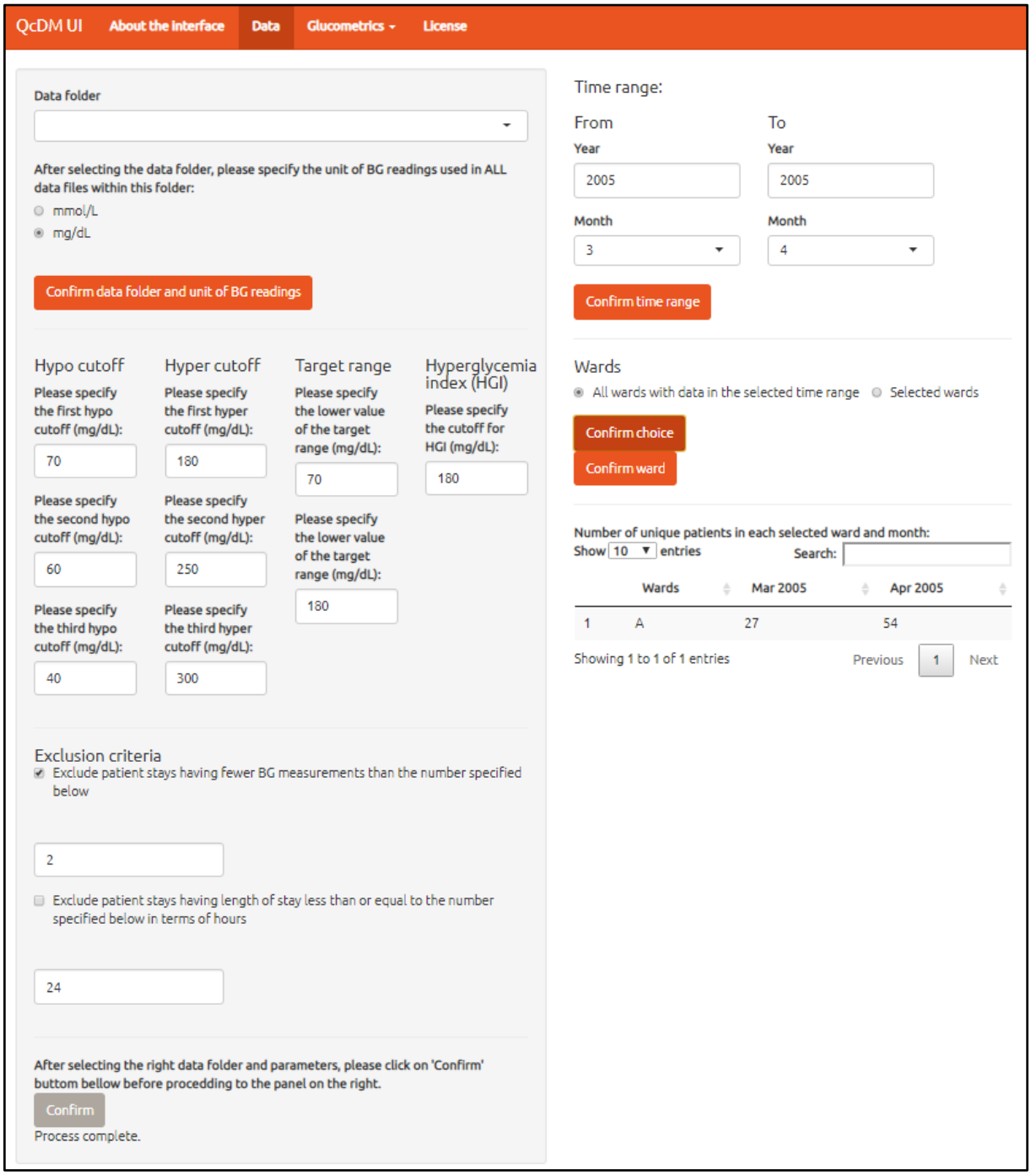
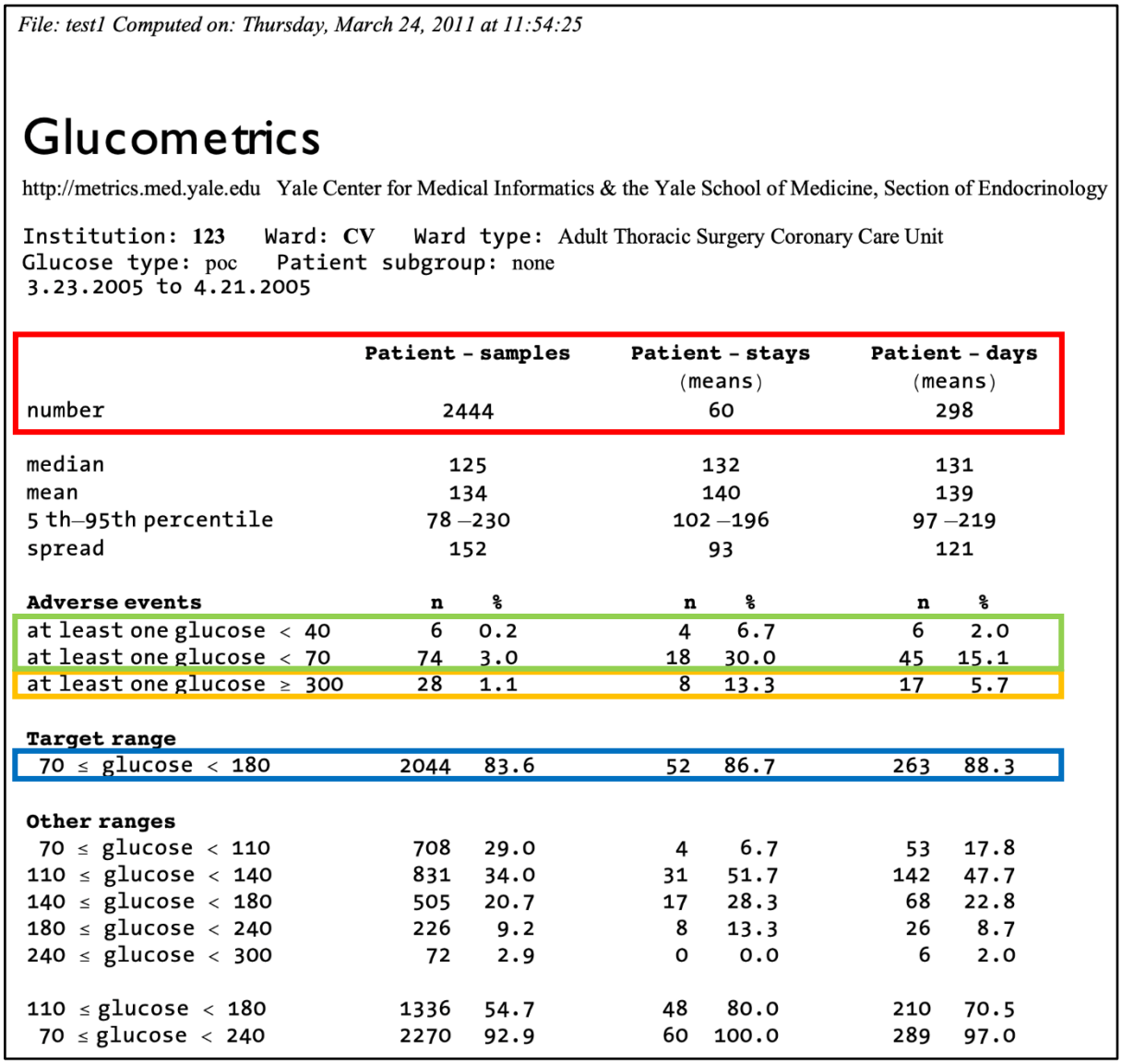


Figure S2. A screenshot of a glucometrics report by a published tool [1] when applied to a test data set.



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

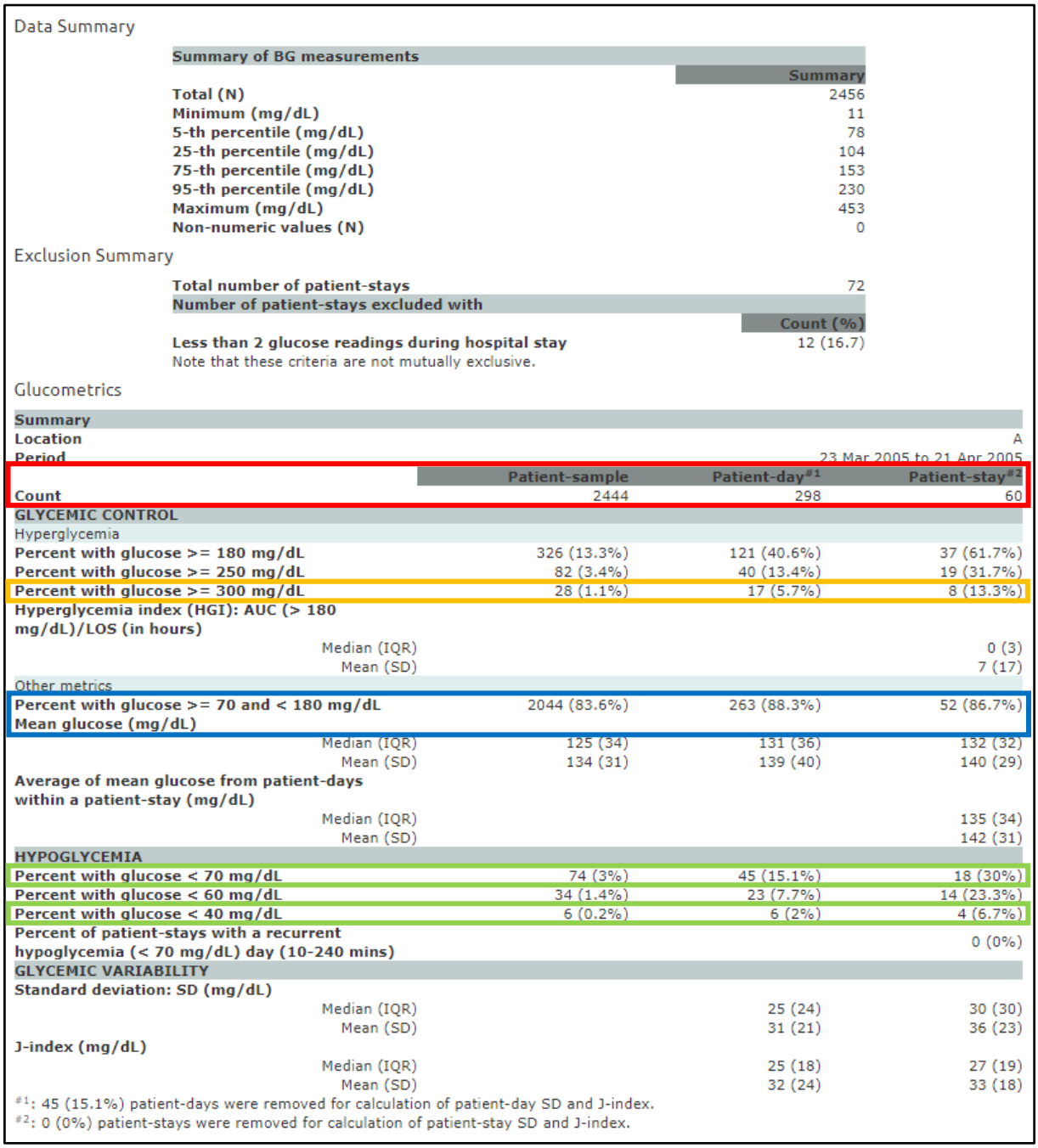
Institution: 123 Ward: CV Ward type: Adult Thoracic Surgery Coronary Care Unit
Glucose type: poc Patient subgroup: none
3.23.2005 to 4.21.2005

	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
	Patient-sample	Patient-day[#1]	Patient-stay[#2]
Count	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)	131 (36)	132 (32)
Mean (SD)	134 (31)	139 (40)	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