

GLUCOSE TESTING SUSQI PROJECT REPORT

Start/End of Project: April 2022 – Sept 2022

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Background:

Over half of the carbon footprint of a set of blood tests is attributable to the venesection process: blood tubes, needles, connectors, gloves, gowns, sample bags, etc. Therefore, rationalising the requesting of tests has environmental benefits.[1] Glucose sampling is automatically performed as it is included in 'order com' sets of laboratory tests. For some patient groups this is helpful to identify new onset diabetes. For most patients the test is of low value – inpatients with known diabetes have regular bedside capillary glucose testing (CGT) and their diabetic control better assessed with HbA1c, also a more sensitive and specific diagnostic test for diabetes.

Specific Aims:

To review current phlebotomy ordering and appropriateness of glucose sampling.

Methods:

1. identify which order sets include glucose routinely,
 2. assess staff opinions on utility of glucose inclusion in each order set,
 3. consider if removal of glucose would be appropriate, or had potential to increase risk of missed diagnoses, or if replacement with HbA1c would be of higher value;
 4. Adjust order sets accordingly
 5. Estimate 'triple bottom-line' impacts.
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Results:

22 different laboratory order sets exist for renal patients on our ordering system. Fifteen of the 22 had glucose included. Five were appropriate for glucose testing, related to transplant patients or dialysis monthly bloods. Ten order sets had a glucose that was felt to be of low value; of these 4 were simply removed (Renal Inpatient Procedure and Renal Inpatient routine, Outpatient General Nephrology and Outpatient Low Clearance), 6 were replaced with HbA1c (Live-donor Assessment and Follow-up sets, Transplant Admission, and Renal Dialysis Yearly).

Patient/sample numbers: Baseline:

- In-Patient: 65 inpatient beds, most getting daily bloods ~ 250 glucose tests/week; see table below, though does not include ward 4C.
- Average 50 dayward patient samples per week;
- Average 350 outpatient bloods per week, with mean 235 glucose tests per week (data Nov 2021 to May 2022).

Following changes:



- In-patients: 166 fewer glucose tests per week, and 83% reduction down to average 33/week for wards 4A and 4D, addition of admission HbA1c (246% increase, but remaining <3 tests/week average), see Tables below.
- Dayward: Estimated 30 reduction /week, the remaining 20 getting HbA1c or requested glucose
- Outpatient: audited Nov 2022 to May 2023 demonstrating 111 fewer glucose tests/week, the remaining ~120 still having glucose measured includes transplant recipients where no change to order set was made.

Total reduction: average 307 sample bottles (and lab reagents) saved/week.

Environmental sustainability: No carbon metrics available for Glucose testing. Estimates published of 49g CO₂e/ABG (95% CI, 45–53), 99 g/U&E (95% CI, 84–113); changes therefore offer savings estimated at 307x0.049 = 15 kg CO₂e/week, 60 kg CO₂e /month, 780 kg CO₂e /year.

Glucose testing	QEUEH 4A	QEUEH 4D	Total	CO ₂ e (x0.049)
13 wks Sep:Dec				
2021	935	1644	2579	126
2022	219	207	426	21
Reduction	77%	87%	83%	-105 Kg CO₂e
HbA1c testing	QEUEH 4A	QEUEH 4D	Total	CO ₂ e (x0.049)
2021	6	7	13	0.6
2022	8	24	32	1.7
Increase	33%	343%	246%	+1 Kg CO₂e

Economic sustainability: savings unclear, lab staff unsure regarding costs of reagents, NICE Data suggests up to £3 per test but data from 2013.

Patient outcomes: One less sample for majority means quicker venesection and therefore less discomfort; those replaced with HbA1c accrue the benefit of increased diagnostic accuracy [for diabetes mellitus] and clinical value.

Discussion:

As the sample is one of a set of samples being venesected, there is no saving with regard to the needle/tourniquet/gloves/cotton etc. HbA1c also requires a similar size vacutainer as the glucose, so will incur much of the same manufacture/transport 'carbon', but is once per admission (not daily). For outpatient settings, the anticipated increased accuracy and clinical value is the primary benefit.

The better option is the careful consideration of all order sets and blood ordering requests, in line with the concept of 'resource stewardship'. Though this demonstrates that nudging behavior through changes to the system we interface with can improve value of care.

References and Resources

¹ Optimising blood testing in primary care. NHS England Publication 16 September 2021. Available from www.england.nhs.uk/publication/optimising-blood-testing-in-primary-and-secondary-care/

- [SQUIRE | SQUIRE 2.0 Guidelines \(squire-statement.org\)](https://www.squire-statement.org/)
- [Home | Sustainable Quality Improvement \(susqi.org\)](https://www.susqi.org/)

