EFFECTIVENESS OF POCT: A PERSONAL VIEW

Associate Professor in Biomedical Sciences **Paul Waller** questions some of the assumptions made about point-of-care testing.

Point of care testing (POCT) is used in multiple settings (see Table 1), where it is presumed that rapid access to results will improve patient care; assumed benefits include reduced mortality/morbidity and length of stay, and improved patient convenience. It is this assumption that I wish to examine.

Estimates of expenditure on POCT are made using many different methods and so vary widely. Estimates range from 4% to 20% of the total pathology budget – about £200m to £1bn per year in the UK.

Despite this significant expenditure, evidence of the clinical effectiveness of POCT is scarce. About 60,000 papers on POCT are published each year, of which only about 5% investigate clinical effectiveness.

When clinical effectiveness is tested, POCT does not always produce the desired outcome. Three examples of this are illustrated in Figure 1 and Tables 2 & 3.

Why are we in this position?

There are two main reasons. Firstly, POCT is an "enabling technology" and will not deliver innovation alone. Simple replacement of central laboratory testing with POCT will not necessarily change things. Secondly, although ISO15189 states that "management shall ensure that the laboratory participates in... activities that encompass... outcomes of patient care", quality standards are more concerned with processes than outcomes.

SETTING	APPLICATION	ASSUMED BENEFIT
Home	Management of long term conditions e.g. diabetes, heart failure, anticoagulant monitoring	Better awareness of condition; motivation to manage condition; avoid need to attend hospital; avoid cost of transport; avoid time off work
High street pharmacy	Management of long term conditions; patient initiated testing e.g. flu test, strep A test, pregnancy test, cholesterol	Patient convenience; better access to relevant population; greater acceptance by patient; reduce need to visit GP; use when GP centre closed
GP surgery	Management of long term conditions; health checks	Improved long-term healthcare; reduced number of GP visits
Outpatients	"One-stop" clinics (e.g. diabetes, anticoagulant)	Patient convenience; reduced number of hospital visits
Ambulance	Pre-hospital testing e.g. cardiac markers, blood gases; Management of inter-hospital transport	Faster triage through A&E; earlier intervention; reduce risks of inter-hospital transport
Urgent care centres	Urgent care for non-life-threatening conditions; Rule-out testing	Avoid need to attend A&E; use when GP centre closed
A&E	Testing for rapid triage and treatment	Reduced length of stay in A&E
Theatre	Monitoring operative procedures	Reduce post-operative care requirement; convert to day care
ITU	Monitoring vital parameters	Improve mortality and morbidity; reduce length of stay

Table 1. Some opportunities for the use of POCT (adapted from St John, 2010)

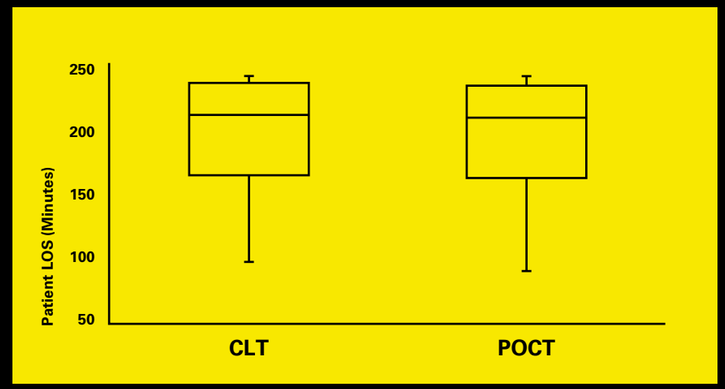

Figure 1. Point of Care Testing has No Effect on Patient Length of Stay in an Accident and Emergency Department (Jama et al, 2014). The use of POCT reduced turnaround time from 63 to 24 minutes, however patient length of stay (LOS) remained unchanged (Central Laboratory Testing (CLT, n=6035) vs POCT (n=1106), median LOS 210 vs 208 minutes, 95th percentile LOS 240 vs 240 minutes).

	MONITORING (n=96)	CONTROL (n=88)	
HbA1c	6.9%	6.9%	No significant difference
BMI (% of baseline)	97%	99%	No significant difference
Proportion of patients taking hypoglycaemic drugs	64%	59%	No significant difference

Table 2. Efficacy of self-monitoring of blood glucose in patients with newly diagnosed type 2 diabetes (adapted from O'Kane et al, 2008). Self-monitoring has no effect on HBA1c, BMI, or the use of hypoglycaemic drugs.

EVENT	RISK RATIO (SELF MONITORING/TESTING VS STANDARD MONITORING (RR, 95%CI)
Thromboembolitic events	0.58 (0.45 – 0.75)
All cause mortality (self-management)	0.55 (0.36 – 0.84)
All cause mortality (self-monitoring)	0.94 (0.78 – 1.15)
Major haemorrhages	0.95 (0.80 – 1.12)

Table 3. The effect on thrombotic events, major haemorrhages, and all-cause mortality of self-monitoring or self-management of oral anticoagulant therapy compared to standard monitoring (adapted from Heneghan et al, 2016). Data from 28 randomised trials (including 8950 participants) showed a reduction in thromboembolic events (RR 0.58, 95% CI 0.45 to 0.75). While self-management caused a reduction in all-cause mortality (RR 0.55, 95% CI 0.36 to 0.84), self-monitoring did not (RR 0.94, 95% CI 0.78 to 1.15). Self-monitoring or self-management did not reduce major haemorrhage (RR 0.95, 95% CI, 0.80 to 1.12).

The challenge

How should this situation be resolved? I suggest that two key principles should be applied. Proposals for the use of POCT should explicitly state what improvements are being sought (e.g. reduced length of stay, improved diabetic control, reduction in the number of outpatient visits), and demonstrate why POCT is necessary to enable these improvements. Pilot studies should fully test the use of POCT for its effectiveness before full implementation.

Healthcare scientists, diagnostics companies, clinicians, IT professionals and universities should collaborate to facilitate this testing, and results should be submitted for publication in peer-reviewed journals; adopting formal research practices provides excellent opportunities to study for research degrees, and research students can become a valuable manpower resource, helping overcome the workload issues that sometimes prevent this type of research being carried out.

Research will benefit all parties; diagnostics companies will be provided with evidence that their products are effective, hospital laboratories and clinical departments can be reassured that resources are being used safely and are improving patient outcomes, and universities will form valuable collaborative research relationships. BMS

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