



CareCube

Economic case study based on CareCube observational study

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1. BACKGROUND

CareCube is a fully integrated digital workflow system. It was designed in collaboration with The Liverpool Heart and Chest Hospital (LHCH) to simplify and centralise the complex scheduling and tracking of patients undergoing cardiovascular interventional procedures in catheter laboratories (cath labs). CareCube provides a framework for clinical teams with the aims of supporting patient safety, reducing human error and making the best use of resources.

CareCube has been in operation at LHCH since November 2017. A case study, reviewing the performance of CareCube over a six-month period, has demonstrated that LHCH has better rates of efficiency and safety efficacy outcomes in its cath labs than other comparable cardiology centres [1].

A key measure of efficiency for cardiology centres is 'touch time'. This is the proportion of available cath lab 'operating time' during which a patient is present in a cath lab [2]. Touch time is a product of a range of factors including delayed starts, early finishes and the time between patients, known as 'turnaround time'.

The national target for optimum use of facilities and best use of resources for cath labs is 85% touch time. After the implementation of CareCube the LHCH reported improved efficiency, with average touch time increasing from 49% to 85% [1].

This paper presents a simplified case study to demonstrate the potential incremental change in activity and associated tariff income if the efficiency improvements observed at LHCH can be replicated in three other cardiology hospital centres.

2. ANALYSIS

Data were extracted from a 2023 retrospective study carried out by Stables *et al.* of pre-pandemic cath lab activity in three regional cardiology hospitals [2]. The study assessed cath lab activity for 2019 to avoid the impact of the Covid-19 pandemic and reflects a time period before the implementation of CareCube in the hospitals. CareCube has now been implemented in each hospital and follow-up data on observed changes in efficiency metrics is planned for collection and analysis in 2024.

Using the baseline (i.e. pre-CareCube implementation) data from that study and the LHCH case study, a simplified case study analysis has been developed to estimate the improvements in cath lab efficiency that could be observed in the three hospitals if, following CareCube implementation, average touch time improved to the LHCH levels of 85%. The improvements in touch time in LHCH have been achieved by minimising delayed starts, early finishes and turnaround time. The assumption is that these will also be the factors that contribute to improved touch time in the three hospitals.

This analysis has estimated the number of additional procedures that could be conducted by the hospitals if they improve their touch time to 85%, based on average values reported in relation to the available time in cath labs, procedure duration and touch time. Average values have been used for the analysis, based on observed ranges for these metrics.

The analysis assumes that the operational hours of the cath labs for all three hospitals were eight hours per day from Monday to Friday. The number of days cath labs are open was calculated on the assumption that cath labs are open five days a week (260 days per year), minus bank holidays (8 days), and the number of days labs are closed per hospital (i.e. for maintenance). The proportion of days without any activity for those reasons was 4% (Hospital A), 5% (Hospital B), and 13% (Hospital C). Hospitals A and B have 4 cath labs and Hospital C has 6.

The median procedure duration for the three hospitals was around 60 minutes (66, 60 and 55 minutes respectively). The calculated baseline touch time for the 3 hospitals prior to the introduction of CareCube has been reported at 68%, 66% and 48% respectively. Using these data, the potential unused time for the three hospitals is shown in Table 1.

Table 1: Baseline data for cath lab activity

Hospital	Available minutes of activity per year	85% national touch time target (minutes)	Baseline touch time (%)	Baseline touch time (minutes)	Unused time (minutes)
Hospital A	462,720	393,312	68	314,649	78,663
Hospital B	458,880	390,048	66	302,860	87,188
Hospital C	630,720	536,112	48	302,745	233,367

A conservative approach was adopted by assuming that 50% of the unused time at each hospital could be used for carrying out additional procedures with a median time of 60 minutes. On that basis, Hospital A could carry out an additional 655 procedures each year, Hospital B could carry out 726 and Hospital C could carry out 1,944.

If the hospitals are able to carry out these additional procedures as a result of greater efficiency generated through the use of CareCube, they would be able to gain additional income through tariff payments, assuming that is how the hospitals are reimbursed by local commissioners. The casemix of the additional procedures is unknown but a weighted average tariff can be used to estimate the additional tariff income. The weighted average tariff for a range of potential procedures that can be carried out in a cath lab is £2,442 using values from the current National Tariff [3]. Table 2 presents the potential tariff values that could be associated with estimated procedures for each hospital.

Table 2: Tariff value of potential additional procedures in cath labs

Hospital	Additional procedures per year	Average tariff value	Additional hospital income
Hospital A	655	£2,442	£1,599,510
Hospital B	726	£2,442	£1,772,892
Hospital C	1,944	£2,442	£4,747,248

From a commissioner perspective, a considerable number of additional patients could receive treatment. Providers could attract additional tariff, as outlined in Table 2, or some other form of reimbursement through marginal activity related to block contracts, agreed at a local level.

There are already indications that potential benefits are being realised. Hospital A has reported a 6% increase in touch time compared to the baseline position and this has resulted in an increase in the number of procedures per session, equating to more than 500 additional cases per year. Hospital C has reported a 20% improvement in monthly case volumes since the start of 2023, achieved through improvements in on-time starts and turnaround times. This is attributed to service improvement through the introduction of CareCube and investment in cath lab technology. Hospitals A and C also reported that the use of CareCube allows for more complete data collection enabling safety compliance improvements. Hospital A has reported a 98% improvement in safety checklist compliance.

The incremental costs associated with the use of CareCube include initial set up costs and annual licensing costs for CareCube for hospitals, which have been estimated by the company to be around £50,000 per year. Hospitals A and C confirmed that the set-up costs were minimal, consisting of around 6 hours of an administrator’s time per week for around 3 months. Both hospitals also commented that following implementation of CareCube, the management and organisation of patients has been greatly streamlined compared to the previous manual systems in place.

REFERENCES

1. Stables RH, Stables WR, Broom J, Mars C. In Pursuit of Excellence in Operational Efficiency and Patient Safety. Cath Lab Digest. 2021.
2. Stables WR, Patel B, Patwala A, Hogarth A, Stables RH. A Retrospective Study Examining Pre-Pandemic Activity in Three UK Regional Cardiac Centers. Cath Lab Digest. 2023 Jan 1;31(1).
3. NHS England National Tariff 2022/23. <https://www.england.nhs.uk/pay-syst/national-tariff/>