

3D VS. 2D-Imaging in Laparoscopic Procedures- Opportunity Costs Associated with the Reduction of Time in the Operating Room (OR)

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OBJECTIVES : Time savings in the operating room (OR) are an important endpoint for hospitals needing to maximise utilisation of operative capacity. Enabling a more natural hand-eye coordination, innovative technologies such as 3D imaging can help to reduce OR time during laparoscopic procedures. Comparing 3D to 2D imaging technology, this analysis quantifies the OR time savings and assesses the opportunity costs thereof.

METHODS : A systematically performed literature review was conducted from December 2019 until March 2020, searching open source databases. The main outcome of interest was OR time savings in minutes. Simulation studies were excluded. A meta-analysis was performed using R version 4.3.3, analysing subgroups per procedure category. Using publicly available data, case mixes of two sample hospitals in Germany (Universitätsklinikum Hamburg-Eppendorf (UKE)) and the UK (Addenbrooke's Hospital, Cambridge University Hospitals NHS Trust) were modelled to evaluate the opportunity costs of not changing to a 3D imaging system.

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RESULTS : A total of 32 studies were included. Overall, mean reduction in OR time using 3D over 2D imaging technology (in the included laparoscopic procedures) was -25.19 minutes [95%CI=-31.71;-18.67] per procedure. Potential OR time savings in the two case mix samples amount to 4.89 hours [95%CI=2.24;7.55] per working day for UKE and 3.21 hours [95%CI=1.43;5.00] per working day for Addenbrooke's Hospital. If this time were to be utilised to perform additional procedures, the case mix in both examples could be increased by up to 21%, subject to bed, staffing and facility constraints. The additional procedures performed could generate additional tariff income of €4,349,551.23 (UKE) and £1,471,405.0 (Addenbrooke's Hospital) for the hospital.

CONCLUSIONS : The adoption of 3D imaging technology for laparoscopic procedures compared to 2D imaging provides a significant opportunity to save OR time and increase revenue to the adopting hospital. Further evidence is needed to quantify the exact magnitude of the economic benefit.

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