

Title: A Business Analytics Software Tool for Monitoring and Predicting Radiology Throughput Performance

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A primary cause for the build-up of patient wait times in radiology departments is a mismatch between capacity and demand. Lack of understanding of this mismatch as well as inefficient management of radiology resources contributes to inadequate capacity planning.

Business Intelligence (BI) software systems combine data gathering, storage and knowledge management with analytical software tools that analyse and present complex data to planners and decision makers. Business Analytics (BA) encompasses statistical analysis, predictive modelling and forecasting systems and is used as an umbrella term for decision support and Business Intelligence systems. BA software applications are currently being utilised as a driver for decision support based on past performance; however, there is little evidence of the utilisation of future predictive analysis to drive decision making in radiology departments. The primary aim of the study was to determine whether a prototype BA software tool could provide analysis of historic as well as future predictive radiology data to assist with departmental decision support towards reducing patient wait times.

A series of semi-structured interviews were conducted with key project stakeholders to determine a set of information technology requirements. Based on these requirements a prototype BA software tool was implemented. The tool combined data from the Electronic Patient Record (EPR), Radiology Information System (RIS) and Picture Archiving and Communications System (PACS) in order to display historic radiology Key Performance Indicators (KPIs) and provide functionality that allows the forecasting and modelling of future demand and capacity data through user-defined predictive scenarios.

A qualitative evaluation of the tool was carried out through a series of semi-structured interviews with key stakeholders. Feedback was collated and emergent themes were identified. The results indicated that BA software applications can provide visibility of radiology data across all time horizons. Historic KPI data provides retrospective analysis that can be used to inform and create predictive scenarios. These scenarios can then be utilised to generate and visualise future predictive demand and capacity data. The study also demonstrated that key stakeholders believe that the visualisation of historic and future forecasted radiology data enables enhanced decision support to deliver improved operational efficiencies and wait times within medical imaging departments. It was also shown that the tool could potentially assist with optimising staff utilisation, reducing inpatient length of stay and improving quality of care.

In order to build on the perceived potential of the application, recommendations were made for a future study to determine actual evidence of benefit post-implementation. Quantitative and qualitative research conducted over a period of time would help determine the application's ability to reduce patient wait times and deliver operational efficiencies.