

# Case Study

## COGSTACK

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King's College Hospital NHS Foundation Trust, together with the South London and Maudsley Hospital, have developed an open-source real-time data warehousing tool called 'Cogstack' that improves operational efficiency significantly.

Cogstack meets the acute need for a more efficient way to clinically code to improve financial and operational efficiencies for providers throughout NHS.

Reading health text for clinical coding underpins operational, financial and forward planning activity throughout the NHS, but there is a significant source of data quality issues in the NHS (Capita, 2014). This is because Clinical Coding as a domain is under significant pressure due to the expanding volume of data in the past decade, resulting in incomplete data capture, and manpower shortages of skilled clinical coders. Big Data techniques may be a solution – search technology, web analytical techniques like natural language processing (NLP) and semantic artificial intelligence (AI) tools that can read and interpret electronic free text at scale. These advances in NLP are accelerating, and Microsoft, Google and Amazon have now all expressed publicly that they are exploring the NLP and search technology use-cases in healthcare. This has the potential to accelerate the efficiency of clinical coders in terms of depth of coding as well as release staff for more complex tasks.

The team at King's College Hospital NHS Foundation Trust and the South London and Maudsley Hospital tested Cogstack for clinical coding in a fracture outpatient clinic setting to identify under-coding and was able to triple the depth of coding within a month (from ~10% of cases to 30% of cases having procedures recorded accurately). This translates to £1,260,000 of financial activity per annum even without the efficiency gains. Using similar methods to Google, Apple Siri and Amazon Alexa, the team have developed further advanced prototype NLP algorithms for performing large-scale tagging of clinical text (Semantic EHR; MedCAT) with machine learning; this has the potential to code all clinical data in real-time with associated efficiency gains.

Cogstack is already functioning and deployed in a large NHS Trust, and has been tested with a real-world NHS problem showing it has potential for substantial disruption of manual healthcare processes. Further accelerated development is being proposed to expand the use of such NHS-grown open-source technologies in the NHS. Near-term benefits would be to improve efficiency of business intelligence and operational tasks initially, and allow release of human resource for more complex tasks. Subsequent medium-term and long-term benefits would emerge as the AI systems develop an understanding of medical language, revolutionising how clinical staff interact with computers.