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Data visualisation to support decision making and equitable healthcare service provision.

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Objectives

The aim of this research is to explore current advances in data visualisation technology to improve the analysis of health service utilisation data to support decision making and equitable health care service provision.

Approach

Multi-dimensional mapping allows for informative presentation of many types of spatial and geographical data. It allows for the visualisation, question, analysis, and interpretation of data to identify relationships, patterns, and trends. Such techniques can be used to identify patterns in healthcare utilisation relative to a point in time. This can be calendar time, where the event may be a change in services (such as the building of a new hospital) or a change in policy or practice across the system. Or it may be relative time, where the event is a transition in a patient's health or a new diagnosis.

Patterns recognised through such data visualisations may be the result of apophenia, i.e. where patterns are observed in what is essentially random information. Thus, data visualisations such as these are a method to help generate hypotheses which can then be rigorously testing using statistical methods. The entire linked Western Australian Data Collections from 2002-2015 (including population-wide hospital admissions, emergency department presentations, cancer registry records, mental health care, maternity records, and mortality records) were examined. Both changes in the source (patient residential location) and target (location of service used) were visualised. Hypotheses generated were then statistically examined.

Results

Three analyses will be presented.

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Mean emergency department (ED) presentations follow a specific pattern of rising and falling in the years around a diagnosis of heart failure. The geospatial utilisation of ED over time will be visualised and areas of high and low use of ED will be identified.

Mental healthcare involves both ED presentations and inpatient services. The geospatial pattern of ED and inpatient service use by mental health patients over time will be visualised and implications for provision of healthcare services discussed.

Finally, in a specific current example, the closure of a metropolitan ED and the subsequent opening of a nearby ED has changed the local population's pattern of ED use. These changes will be visualised.

Conclusion

Advanced methods of data visualisation improve the analysis of large population based datasets to support decision making and equitable health care service provision.