Can algorithms be used to automate extract quality indicator (QI) assessments from resident records in aged care facilities?

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Headline: Most aged care quality indicators are not amenable to current techniques of automated data collection. Artificial intelligence, such as natural language processing, may offer some improvements.

What is the problem?:

- Measuring quality of care, represented by quality indicators (QIs) is a key imperative for healthcare systems globally, including for residents of aged care.
- To do this at scale and efficiently, algorithms can be used to automatically extract QIs from care records.
- However, algorithms rely on data being collected in structured fields, rather than free-text fields. If information in care records is documented in free-text data fields, QIs extraction relies on manual record reviews which is time-consuming and costly.

Objective:

To analyse the proportion of QIs that are documented in residents' care records in free-text or structured fields. This is a sub-study of the Australian *CareTrack Aged* study, which is the first systems-level study in the world of evidence-based care delivered to residents in aged care facilities (1).

Methods

The *CareTrack Aged* study developed 233 QIs which represent evidence-based care for residents of aged care facilities across 16 conditions, including Cognitive impairment and Medication management (1,2) (Figure 1). The QIs were developed by systematic searches of peer-reviewed literature and review by national experts (researchers and clinicians) via a Delphi process(1, 2).

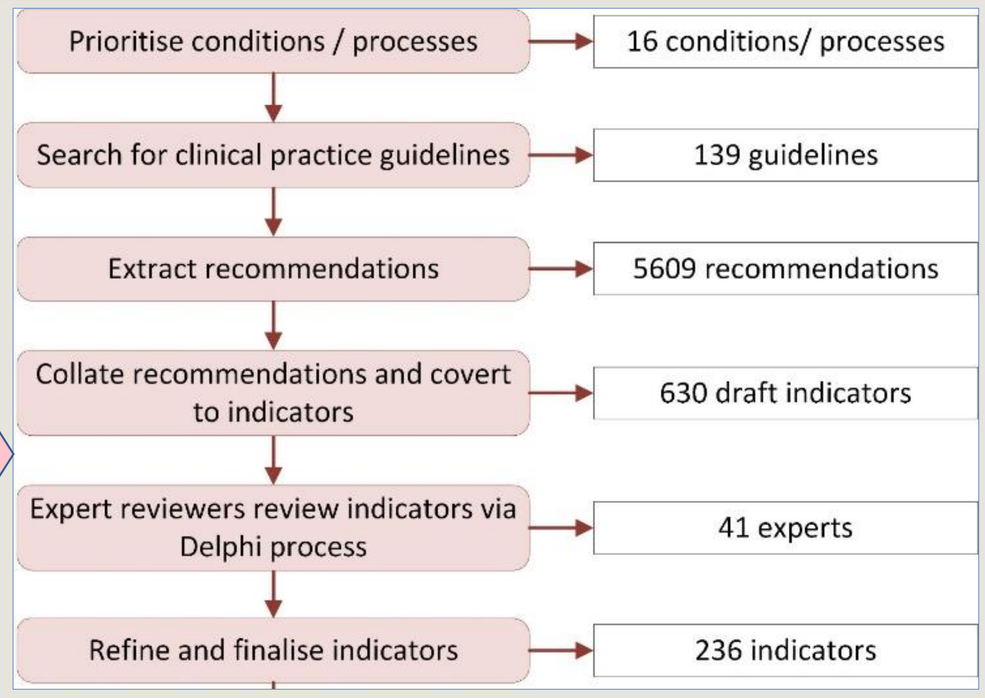


Figure 1. CareTrack Aged indicator development process

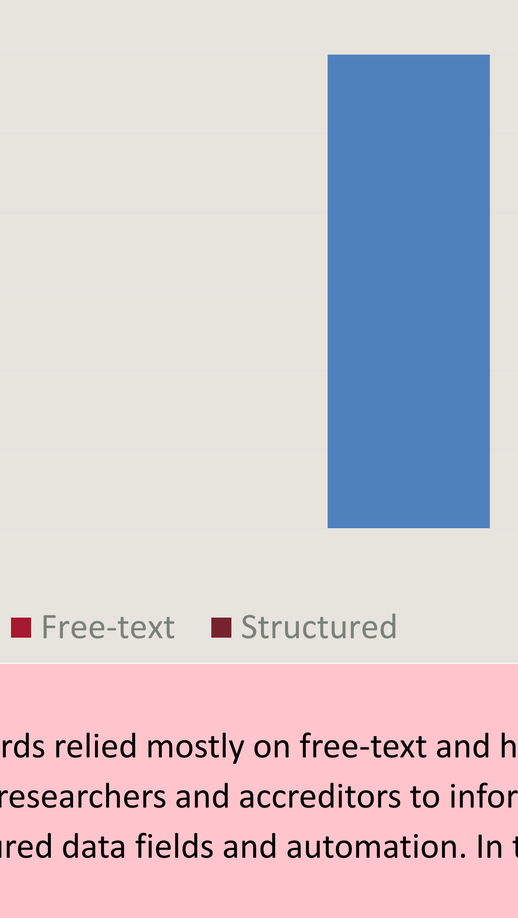
Trained aged care nurses undertook manual care record reviews to identify the data field types used (structured, free-text, hybrid i.e., combined free-text and structured) to determine eligibility and adherence with evidence-based QIs for care delivered to residents in 2021(1). See Box 1.

Box 1: Method to assess whether CareTrack Aged quality indicators are structured or free text

Example CareTrack Aged Indicator ADMI20:

Residents on admission should be weighed and have their height measured.

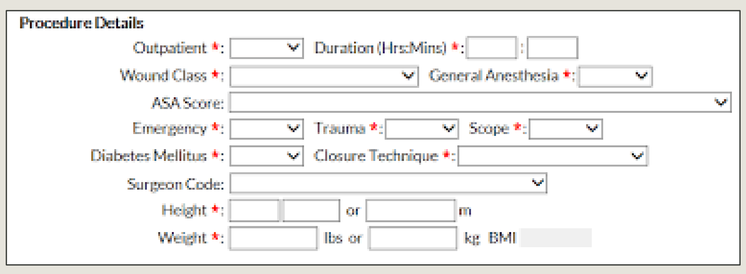
Is this information in the aged care resident's care record?



Is the information in a free text or structured (or hybrid) form?

Free text: 7th December 2022: Mrs Flintstone weight was 67kgs and her height was 160cms.

Structured



Results

Data field type was extracted from 6 electronic care record systems across assessments of QI eligibility (n=8343) and compliance (n= 4935) for 114 residents in 40 facilities. Most frequently, QI eligibility relied on free-text fields (44% of assessments, n=3642) and QI adherence on a hybrid of free-text and structured fields (60%, n=2950) (Figure 1). Using only structured data, 17% (n=1425) of QI eligibility assessments were possible, and 5% for adherence (n=251). None of the 233 QIs were assessable for eligibility and adherence using only structured data.

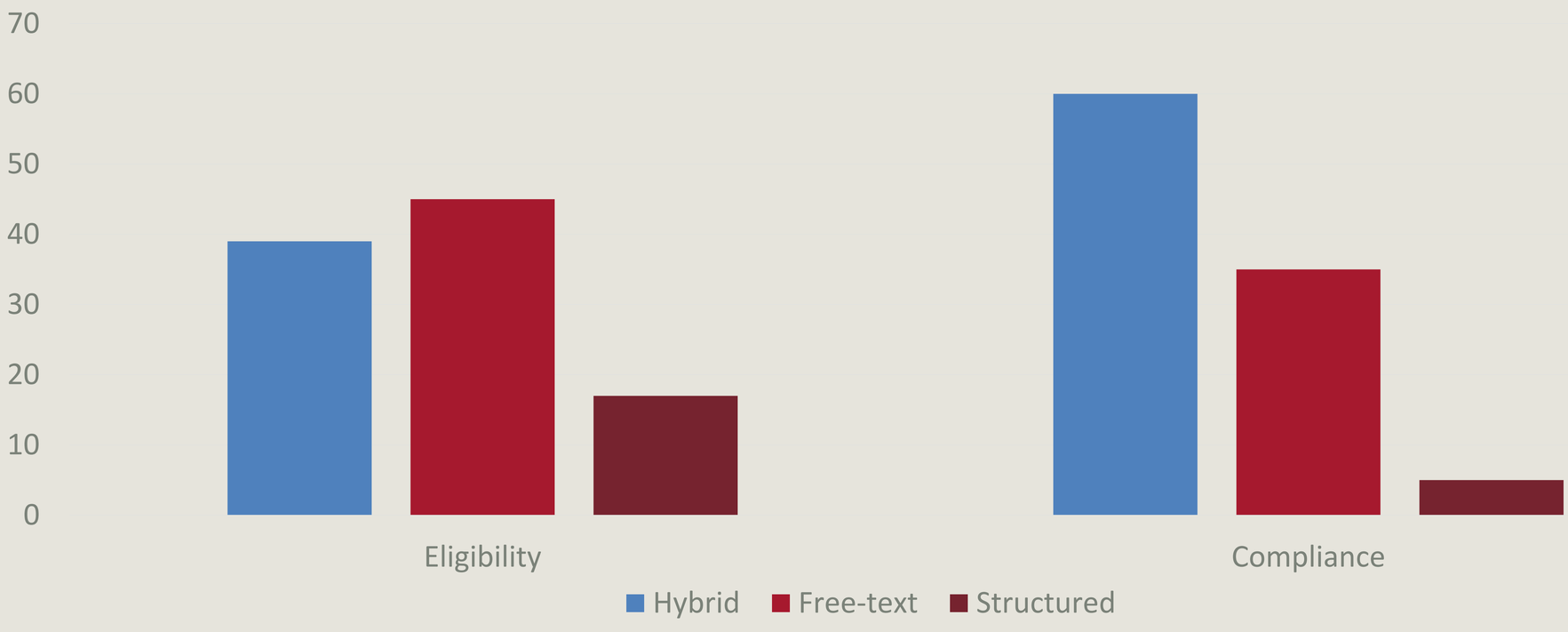


Figure 2: Percentage (%) of CareTrack Aged indicators in free text, structured or hybrid forms

Conclusion

In this study, QI assessments of aged care residents' records relied mostly on free-text and hybrid data fields, meaning QI extraction algorithms would not be currently usable at scale. These findings can be used by aged care researchers and accreditors to inform their data extraction approaches and provides a basis for the future design of QIs and care record systems to leverage structured data fields and automation. In this way, scalable and replicable care quality assessments can be made possible for benchmarking purposes.

Artificial intelligence tools such as natural language processing may offer improved methods to automatically extract QI data.

References:

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Images

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