Using an artificial intelligence platform to enhance Cancer Detection Rates in primary care

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Background

Patients who are diagnosed with cancer in a primary care setting have the best survival outcomes compared to any other route (e.g. emergency department, routine referrals, incidental findings etc). [1-6] This is primarily attributed to detection of cancer at an early stage. [7] In the UK, the Cancer Detection Rate (CDR) metric serves as a measure of this, representing the percentage of cancer diagnoses originating from primary care referral routes. [8-9]

Methods

An observational cohort study was undertaken between 1st May 2021 and 31st March 2022 in which 35 practices (covering a population of 420,000 patients) within the same geographic region in the East of England were offered the use of C the Signs, with the practices opting out serving as controls. All practices had the same access to referral and cancer diagnostic pathways within the region, as well as the same secondary care (hospital) providers.

The primary end point was to identify if C the Signs had a statistical impact on cancer detection rates in primary care through independent nationally linked data via Public Health England.

Secondary outcomes included referral rates (a measure of healthcare resource utilization) and Emergency Department cancer diagnosis (a measure of late stage cancer detection associated with poorer outcomes).

Results

In practices utilizing C the Signs the CDR significantly increased from 58.7% in 2020-21 (prior to the implementation of C the Signs) to 66.0% in 2021-22, reflecting a significant rate of increase of 12.3% (p <0.05). In contrast, practices not using C the Signs maintained a stable CDR of 58.4% in both years (with no improvement).

Cancer detection rate pre and post C the Signs implementation

Intervention group	2020-21	2021-22	Rate of change
● Practices using C the Signs	58.7%	66.0%	12.3%*
● Practices not using C the Signs	58.4%	58.4%	0.0%

The cancer detection rate is the proportion of patients who were diagnosed through a primary care route (e.g. compared with emergency department diagnosis or other areas of the health system etc).
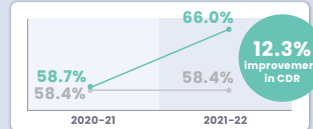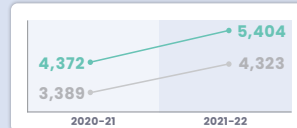

*Statistically significant change (p<0.05)

Referral rate pre and post C the Signs implementation

Intervention group	2020-21	2021-22	Rate of change
● Practices using C the Signs	4,372	5,404	23.6%
● Practices not using C the Signs	3,389	4,323	27.1%

Referral rates are standardized to the number of urgent cancer referrals carried out per 100,000 patient population (which makes the numbers directly comparable between the two groups.

There was no statistically significant variance observed in the referral rate between the two groups, indicating no notable increase in healthcare resource activities.

Discussion

The findings of this study demonstrate a significant improvement in the CDR within primary care settings facilitated by the implementation of the clinical decision support system, C the Signs. Notably, the CDR increased by 12.3% in the intervention group, while the control group saw no improvement at all (0%).

The observed increase in CDR is indicative of the system's ability to aid healthcare providers in identifying suspicious symptoms and signs of cancer at an earlier stage. This is particularly significant considering the well-established association between the CDR and improved clinical outcomes, including higher rates of curative treatment, reduced morbidity, and mortality. [8]

The results of our study indicate that the implementation of C the Signs did not lead to a significant increase in healthcare resource utilization (as demonstrated by the referral rate), despite the considerable improvement in CDR. This finding suggests that AI-interventions such as clinical decision support systems can optimize resource allocation by streamlining the diagnostic process, enabling more efficient use of healthcare resources while improving patient care.

Conclusion

These findings underscore the importance of integrating cutting-edge technologies into primary care to improve cancer detection rates and facilitate early-stage diagnosis. Implementation of such advancements holds promise for reducing cancer-related mortality rates and enhancing overall patient outcomes.