

Enhancing Early Detection of Ovarian Cancer: A Retrospective Analysis Using C the Signs Clinical Decision Support System

S Dadhania¹, R Edgerley², D Milliken³, B. Bakshi⁴, M Payling⁴

1. Clinical Oncologist and Cancer Research UK Research Fellow, Computational Oncology Group, Institute for Global Health Innovation, Imperial College London
2. Cancer Manager, Somerset Foundation Trust
3. Clinical lead for Cancer Somerset Foundation Trust and Consultant Gynaecological Oncologist
4. C the Signs Limited

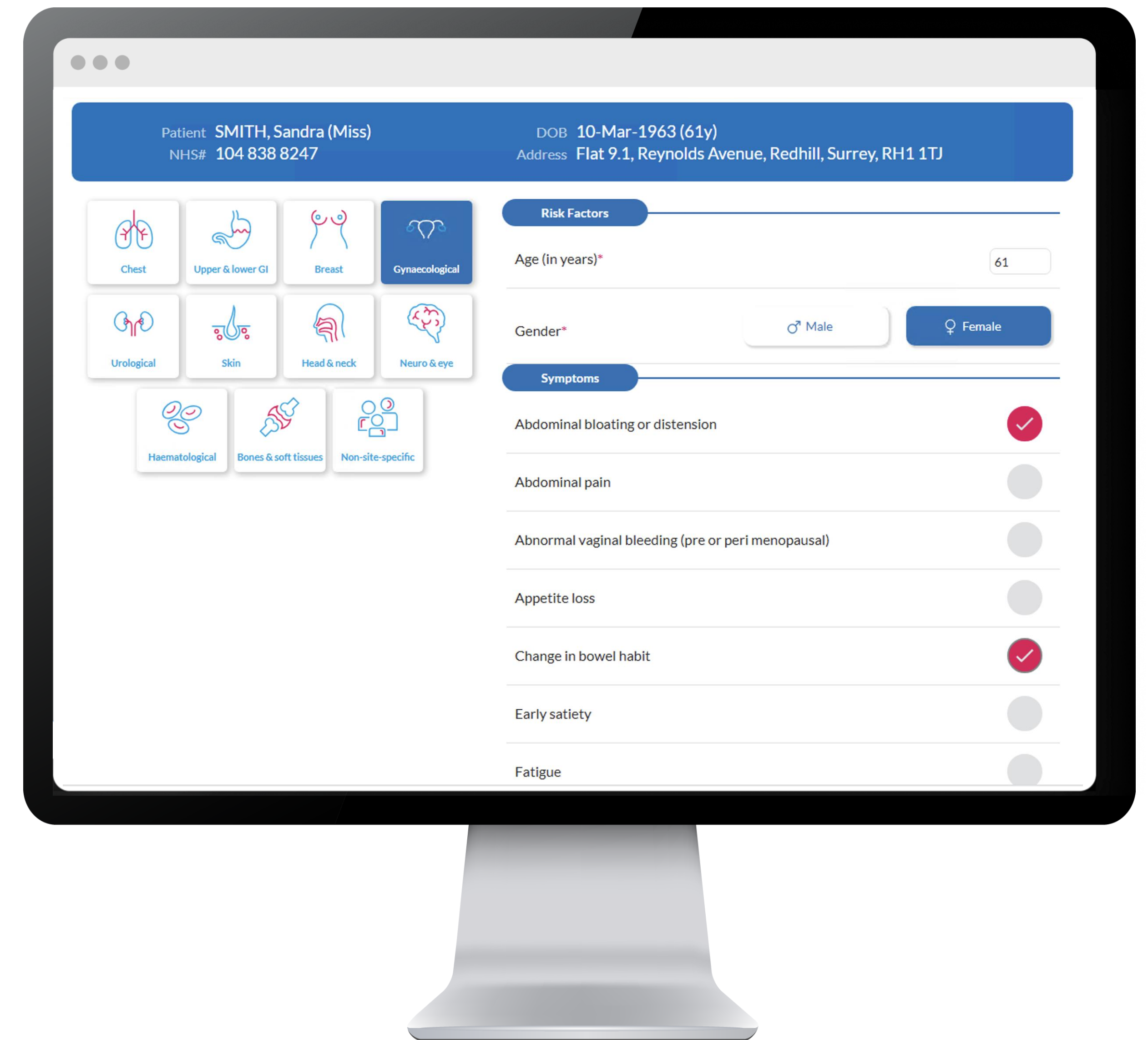


Introduction

Ovarian cancer remains one of the most challenging cancers to diagnose early, affecting approximately 7,500 women annually in the UK [1]. It is the sixth most common cause of death in women in the UK.[1] Despite recent advances in treatments, survival outcomes for ovarian cancer remain heavily contingent upon the stage at diagnosis. This is clearly illustrated by the fact that 98% of women diagnosed with ovarian cancer in stage 1 survive at least one year, whereas only 54% of women survive one year when diagnosed at stage 4 disease. [1, 2] However, ovarian cancer is notorious for its often vague and non-specific symptom onset, which commonly results in delays in diagnosis and poorer clinical outcomes [3]. Delays to diagnosis can have a profound effect on survival. For example, one BMJ study showed that as little as a one-month delay in cancer diagnosis can increase mortality by as much as 10%.[7]

Clinical decision support systems (CDSS) have emerged as valuable tools in addressing diagnostic challenges in primary care. One such CDSS, *C the Signs*, has demonstrated promising results in increasing cancer detection rates by enabling general practitioners to assess cancer risk based on risk factors, symptoms, signs and investigation results in real time [4]. Multiple studies have shown that *C the Signs* has enhanced the cancer detection rate across primary care, which strongly correlates with a shift towards earlier-stage diagnoses and, consequently, improved survival outcomes for patients [8, 9, 10].

In this study, we focus specifically on the impact of *C the Signs* on stage shift in ovarian cancer diagnoses, examining whether the tool contributes to an increase in early-stage diagnoses. Given the established link between early diagnosis and survival, this analysis aims to elucidate the potential of *C the Signs* to effect stage shift and improve clinical outcomes for ovarian cancer patients.



Methods

Study Design:

A retrospective analysis was conducted using data from the Somerset Cancer Registry. The analysis focused on cases of ovarian cancer diagnosed by practices within the Somerset Integrated Care System, comparing practices where *C the Signs* was available before and after its implementation.

Study Population:

The study included all patients diagnosed with ovarian cancer from practices using *C the Signs* during two periods: May 1, 2019, to October 31, 2019 (pre-CTS implementation), and May 1, 2023, to October 31, 2023 (post-CTS implementation). Given the effect covid-19 had on referral activity across the NHS, a period before the covid pandemic and the latest 6 months of data available were analysed, thereby minimising the covid effect on the dataset.

Primary outcome measure:

The primary outcome was the change in the percentage of patients diagnosed with early stage ovarian cancer after the introduction of CTS.

Results

The proportion of patients diagnosed at an early stage rose from 21.7% to 33.3% between the pre-*C the Signs* period and after the implementation of *C the Signs*.

This demonstrated a rise of 53.3%.

21.7%

Before implementation of C the Signs

33.3%

After implementation of C the Signs

53.3%

Improvement in early diagnosis of ovarian cancer following *C the Signs* implementation

Discussion

The findings of this study underscore the potential of *C the Signs* (CTS) to enhance early diagnosis rates for ovarian cancer, with a measurable shift toward earlier-stage diagnoses following its implementation. The observed 53.3% increase in early-stage diagnosis rates after the introduction of CTS, rising from 21.7% pre-implementation to 33.3% post-implementation, supports the effectiveness of clinical decision support systems in aiding early cancer detection in primary care.

Previous research has demonstrated that CDSSs can significantly impact cancer detection rates by prompting clinicians to consider cancer as a differential diagnosis based on a combination of risk factors, symptoms, signs, and available investigation results [4]. The primary care setting, where patients typically first present with symptoms, is critical for early detection of ovarian cancer. Studies have shown that CTS has positively impacted cancer detection rates in primary care which directly correlates with stage shift [5]. This aligns with our study's results, where the implementation of CTS led to a noticeable stage shift in ovarian cancer diagnoses within the Somerset Integrated Care System.

The stage shift observed in this study can be attributed to CTS's design, which incorporates multiple factors in real time to estimate cancer risk. By streamlining the process for GPs to consider and act on possible cancer diagnoses, CTS may overcome some barriers traditionally associated with ovarian cancer diagnosis, such as the subjective interpretation of symptoms or delay in referrals [6].

Reference

1. Cancer Research UK. *Ovarian Cancer Statistics*. Available from: <https://www.cancerresearchuk.org/>
2. Siegel RL, Miller KD, Jemal A. *Cancer statistics, 2020*. CA Cancer J Clin. 2020;70(1):7-30.
3. Hunn J, Rodriguez GC. *Ovarian Cancer: Etiology, Risk Factors, and Epidemiology*. Clin Obstet Gynecol. 2012;55(1):3-23.
4. Collins GS, Reitsma JB, Altman DG. *Clinical decision rules: a review and guide*. J Clin Epidemiol. 2017;70:30-38.
5. NHS Digital. *Impact of Clinical Decision Support Systems on Cancer Detection Rates*. 2021. Available from: <https://digital.nhs.uk/>
6. Curtis L, Ritchie A, Capper R. *Evaluating the Impact of Clinical Decision Support Systems on Oncology*. J Clin Oncol. 2020;38(5):12-20.
7. Hanna TP, King WD, Thibodeau S, et al. Mortality due to cancer treatment delay: systematic review and meta-analysis. BMJ. 2020 Nov 4;371:m4087.
8. Bakshi B, Dadhania S, Holloway P, et al. Using an artificial intelligence platform to enhance cancer detection rates in primary care. JCO 42, 1560-1560(2024).
9. Bakshi B, Payling M. Accuracy of an AI prediction platform in predicting tumor origin: A real-world study. JCO Oncol Pract 19, 74-74(2023).
10. Bakshi B, Payling M. The role of clinical decision support systems in reducing cancer diagnosis disparities from patients with socio-economic deprivation. 4th National Cancer Institute Symposium on Cancer Health Disparities. April 2023.

Conclusion

This retrospective analysis demonstrates the positive impact of *C the Signs* as a CDSS on enhancing the early detection of ovarian cancer. The observed improvement in early diagnosis highlights the importance of integrating innovative technologies into clinical practice to optimise patient outcomes particularly with respect to complex cancer diagnosis.

Scan here for Real-world Evidence paper

