Health Innovation *East*

Impact of an artificial intelligence as a medical device community pathway on urgent suspected skin cancer referral demand: a retrospective real-world evaluation

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OBJECTIVE

To address **rising pressure** on urgent dermatology services, a Health Innovation Network commissioned an evaluation of an **innovative community skin lesion pathway using artificial intelligence as a medical device (AIaMD)** at triage, on the urgent suspected skin cancer (USSC) referral volume and referral quality.

COMPARING USSC REFERRAL VOLUMES FROM PARTICIPATING VS NON-PARTICIPATING PRACTICES:
Modelled impact of AIaMD pathway on monthly USSC referral volumes.

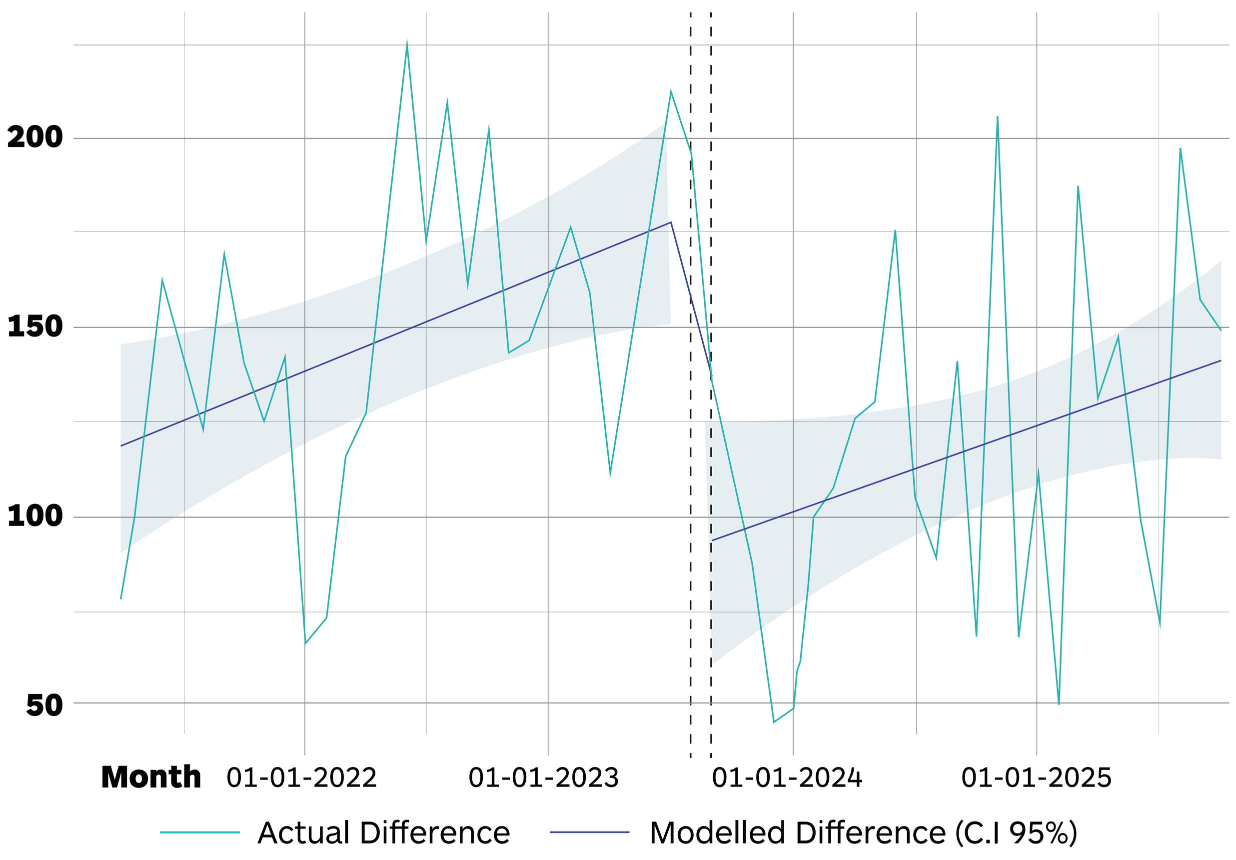

Figure 1: Modelled impact on USSC referral volumes from a community AIaMD pathway using a controlled interrupted time-series analysis, comparing participating practices minus non-participating practices over 27 months pre- and post-implementation. This showed a post-implementation step-reduction of approx 89 USSC referrals per month, ~10% fewer than expected.

METHODS

AIaMD
SCREENING | TRIAGE | ASSESSMENT

HIGH-RISK LESIONS → ROUTED TO **USSC** PATHWAY

LOWER-RISK LESIONS → **NON-USSC PATHWAY** ROUTINE CARE OR DISCHARGE

The pathway used AIaMD in screening, triage and assessment of lesions suspicious for skin cancer in community diagnostic settings. High-risk lesions were routed to the USSC pathway; lower-risk lesions were redirected to primary care, routine care or discharged with safety-netting.

Referral impact was assessed using controlled interrupted time-series analysis [1,2], **comparing practices with and without pathway access over 27 months pre- and post-implementation,** with Newey-West standard errors [3].

Referral quality was assessed using conversion rate, defined as urgent referrals resulting in high-risk skin cancer diagnosis, and detection rate, defined as high-risk cancers diagnosed via the USSC pathway.

RESULTS

40 practices participating in the AIaMD pathway were evaluated against 62 non-participating control practices from the same locality.

Participating practices made 9,976 USSC referrals in the final year of available data.

In controlled interrupted time-series analysis, **participating practices had a significant post-implementation step-reduction of approx. 89 USSC referrals per month** versus the modelled counterfactual without the pathway *(<p0.001) (Figure 1).*

This is equivalent to **1,068 fewer referrals annually, or 10% fewer** than the 11,044 expected without the pathway.

Among patients accessing the AIaMD pathway there was a **statistically significant increase** in both the USSC conversion rate, increasing from **7.5%** [95% CI 7.0–7.9] to **9.4%** [8.3–10.6] *($p = 0.0017$)*, and in the **detection rate,** increasing from **71.4%** [69.0–73.6] **to 94.4%** [89.0–97.3] *($p = <0.001$)*, compared with the pre-deployment local baseline.

The AIaMD Pathway
REDUCED USSC REFERRALS

10% reduction in USSC referrals
9,976 referrals compared to 11,044 expected referrals
= 89 fewer referrals per month

WHILST ENSURING:

Higher proportion of Skin Cancers are referred on the USSC Pathway

94.9%
of high-risk Skin Cancers detected on the USSC Pathway
Compared to 71.4% baseline

Specialist time is spent with more of the high-risk patients

9.4%
of USSC referrals resulted in a diagnosis of high-risk Skin Cancer
Compared to 7.5% baseline

CONCLUSION

Implementation of an AIaMD community skin lesion pathway was associated with reduced USSC referrals, and higher conversion and detection rates.

Monthly difference in urgent suspected skin cancer (USSC) referral volumes between participating and non-participating practices, before and after pathway implementation. A statistically significant upward pre-intervention trend was observed *($p<0.05$)*.

Following implementation, participating practices showed a statistically significant step reduction of approximately 89 referrals per month relative to non-participating practices *($p<0.001$)*, with no evidence of a post-intervention change in trend.

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SUPPORTING ORGANISATIONS:

NORFOLK AND SUFFOLK INTELLIGENCE FUNCTION

Health Innovation East

skin analytics

NHS Norfolk and Suffolk Integrated Care Board