Decision Support for Breast Cancer

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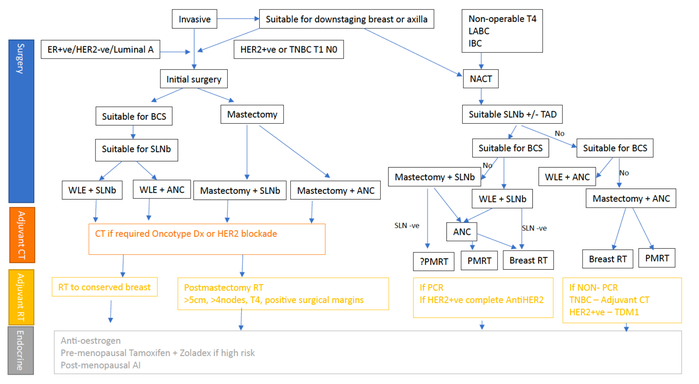
Introduction

The cancer multidisciplinary team meeting (MDM) is regarded as the best platform to reduce unwarranted variation in cancer care through evidence-compliant management. However, MDMs are often overburdened with many different agendas and hence struggle to achieve their full potential. Artificial intelligence (AI) clinical decision-support systems (CDSS) have the potential to help address this challenge. We report here the results of examining the level of agreement (concordance) between treatment recommendations made by the Deontics platform and a breast cancer MDM.



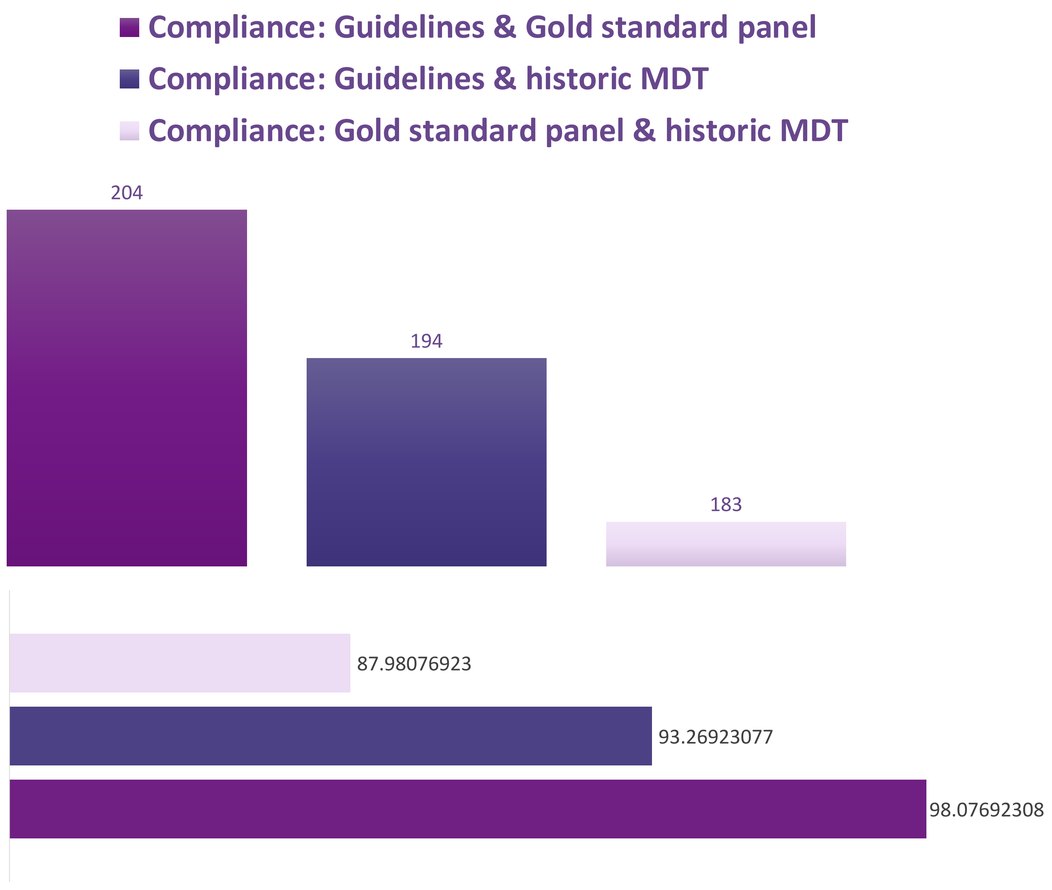
Pre-operative	Post-operative
Invasive cancer AND	ER +ve AND
ER +ve AND	HER2 -ve AND
HER2 -ve AND	WLE and SLNb AND
Axilla normal AND	<2cm AND
Suitable for BCS & SLNb	Clear margins AND
OR	Negative SLNb AND
Invasive cancer AND	Adjuvant RT and ET
ER +ve AND	OR
HER2 +ve AND	ER +ve AND
<2cm AND	HER2 +ve AND
Axilla normal AND	WLE and SLNb AND
Suitable for BCS & SLNb	<2cm AND
OR	Clear margins AND
Invasive cancer AND	Negative SLNb AND
ER +ve AND	Adjuvant RT and ET AND
HER2 +ve AND	Targetted therapy
>2cm AND	OR
Tagetted therapy AND	ER-ve AND
Axilla normal AND	HER2 -ve AND
Suitable for BCS & SLNb	WLE and SLNb AND
OR	Clear margins AND
Invasive cancer AND	Adjuvant RT
ER-ve AND	OR
HER2 -ve AND	ER +ve AND
<1cm AND	HER2 -ve AND
Axilla normal AND	WLE and SLNb AND
Suitable for BCS & SLNb	>2cm AND
OR	Clear margins AND
Invasive cancer AND	Negative SLNb AND
ER-ve AND	Postmenopausal AND
HER2 -ve AND	Oncotype DX <25
>1cm AND	OR
NACT AND	ER +ve AND
Axilla normal AND	HER2 -ve AND
Suitable for BCS & SLNb	>2cm AND
OR	WLE and SLNb AND
Invasive cancer AND	Negative SLNb AND
ER +ve AND	Premenopausal AND
HER2 -ve AND	Oncotype DX <15
Axilla LNb5 AND	
Postmenopausal AND	
Suitable for BCS & ANC	
OR	
Invasive cancer AND	
ER +ve AND	
HER2 -ve AND	
Axilla LNb5 AND	
Premenopausal AND	
NACT AND	
Suitable for BCS & ANC/TAD	

Methods

This retrospective concordance study compared local best practice breast cancer MDT treatment decisions with treatment decisions made by the Deontics platform; a CDSS. The Deontics platform was populated with local and national guidelines and guidance from the National Comprehensive Cancer Network (NCCN). We analysed 208 MDM retrospective cases between 2017 and 2018 at GSTT. The consensus panel reviewed all cases where Deontics treatment recommendations were discordant with local best practices. Fast and frugal tree (FFT) and manual decision trees were created to identify the variable that can be used to send to CDSS.

Results

Treatment concordance between Deontics and the MDM occurred in 98% of breast cancer cases. Recommendation was discordant in 2% (4 cases). Two cases were due to recurrence, one was special histological type, and one had low grade but T4 cancer (local guidelines). Increasing age was found to have a major impact on concordance. Receptor status was not found to affect concordance. The sensitivity of the decision tree was 38.9% (95% CI: 32.6%-46.3%) and the specificity was 100.0% (95% CI: 100.0%-100.0%).



Conclusion

Treatment recommendations made by Deontics and the MDM were highly concordant for breast cancer cases examined. This study demonstrates that the clinical decision-support systems may be a helpful tool for breast cancer treatment decision making by utilising machine learning applications to streamline the process.

AI CENTRE for Value Based Healthcare

NHS Guy's and St Thomas' NHS Foundation Trust

Deontics Clinical Ai Solutions

NHS Digital Academy