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The size and sources of variation of different general practice 'cancer profile' measures:

Statistical reliability of potential performance comparisons

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Background: Recent public reporting initiatives in England highlight general practice variation in indicators of diagnostic activity related to cancer. Better understanding of the size of variation and the reliability of practice-level estimates can help to optimise how this information is interpreted and used for quality improvement purposes.

Why do we need complex analyses? The variability between practices has a number of sources. Here we are primarily interested in distinguishing **three sources of variation**: that due to **chance**, that due to the **case-mix** of patients, and that remaining which represents **the true underlying variation**. Mixed regression models allow us to infer the magnitude of each of these.

1

Q: How large is the variation?

A: Large enough not to be ignorable

In general, the size of practice variation for different practice profile indicators is moderate (typically up to 2-fold variation between the 75th and the 25th centiles of the distribution of practice scores, and up to 3.5-fold variation between the 90th and 10th centiles).

Diagnostic process indicators	75th/25th centile odds ratio* or rate ratio†	90th/10th centile odds ratio or rate ratio†
Breast screening uptake	1.95*	3.57*
Colonoscopy rate	1.68†	2.7†
TWW referral rate	1.87†	3.32†
Diagnostic outcome indicators		
TWW conversion rate	1.5*	2.16*
TWW detection rate	1.39*	1.87*
Emergency route to diagnosis	1.71*	2.78*

2

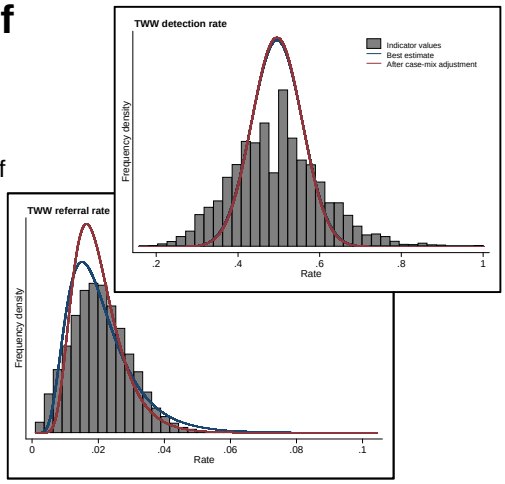
Q: Does chance or case-mix explain much of the apparent variation?

A: Sometimes yes, sometimes no

Diagnostic process indicators relating to broad populations of patients most of whom do not have cancer (e.g. rate of urgent 'two-week-wait referrals' for suspected cancer) generally have large numbers and so chance variation has little impact

In contrast, **diagnostic outcome** indicators relating to incident cancer cases (e.g. two-week-wait conversion and detection rates) involve small numbers of patients per practice and so variation is inflated by chance considerably

The role of case-mix is variable, from explaining most (72%) of the variance (e.g. % of all cancer cases that were detected via emergency presentations) to almost none (2%) of the variance (e.g. two-week-wait detection rate)



3

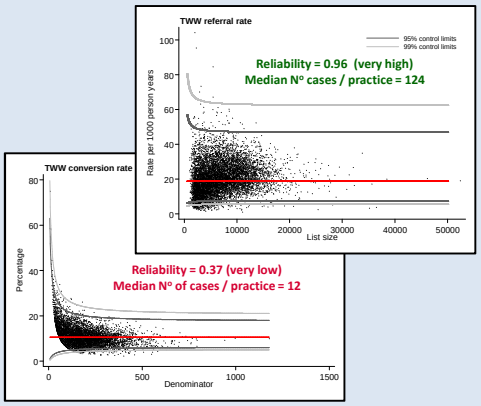
Q: Are indicators reliable / 'fit for reporting'?

A: Sometimes yes, sometimes no

Reliability is a statistical concept which describes how confident we are that practice scores can be used to distinguish between better and worse performance, rather than reflecting chance variation.

As described above, most **diagnostic outcome** indicators are heavily influenced by chance, and thus have reliability well below thresholds required for high stake application (e.g. performance management).

However, where the role of chance is minimal, such as with **diagnostic process** indicators , reliability is high or very high.



Use of indicators of diagnostic activity in general practice should focus on several process indicators with adequate or high reliability (e.g. rate of 'two-week wait' referrals) and not outcome indicators which are unreliably measured at practice level (e.g. 'two-week wait' detection or conversion rates, or rates of other referral 'routes'). These considerations can help to better target scarce quality improvement resources on the aspects of care (and practices) most in need of such efforts

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