

Human-centred design for responsible artificial intelligence in feeding tube qualification on chest radiographs

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Accuracy is necessary, but workflow fit determines real clinical value.

Background

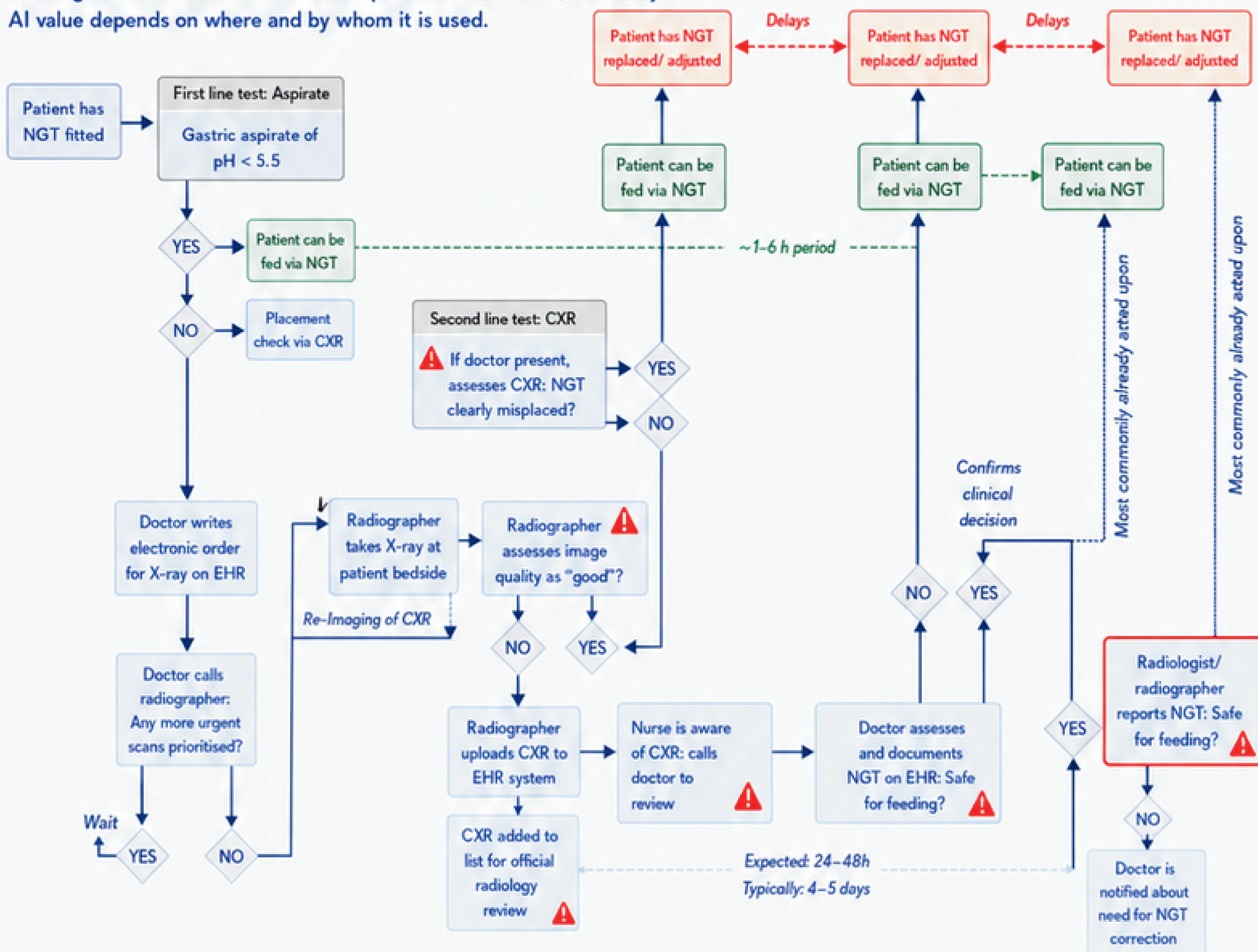
Misplaced nasogastric tubes can cause serious patient harm.

AI has shown strong technical performance for assessing feeding tube position on chest radiographs, but safe clinical integration remains challenging.

The key question is not only whether AI can detect misplacement, but how it should be introduced responsibly within real clinical workflows.

Key finding – Workflow complexity determines utility

Feeding tube verification involves multiple handoffs, checks, and delays. AI value depends on where and by whom it is used.



Research question

How can AI for feeding tube qualification be designed and integrated within real healthcare workflows to achieve clinical utility safely and responsibly?

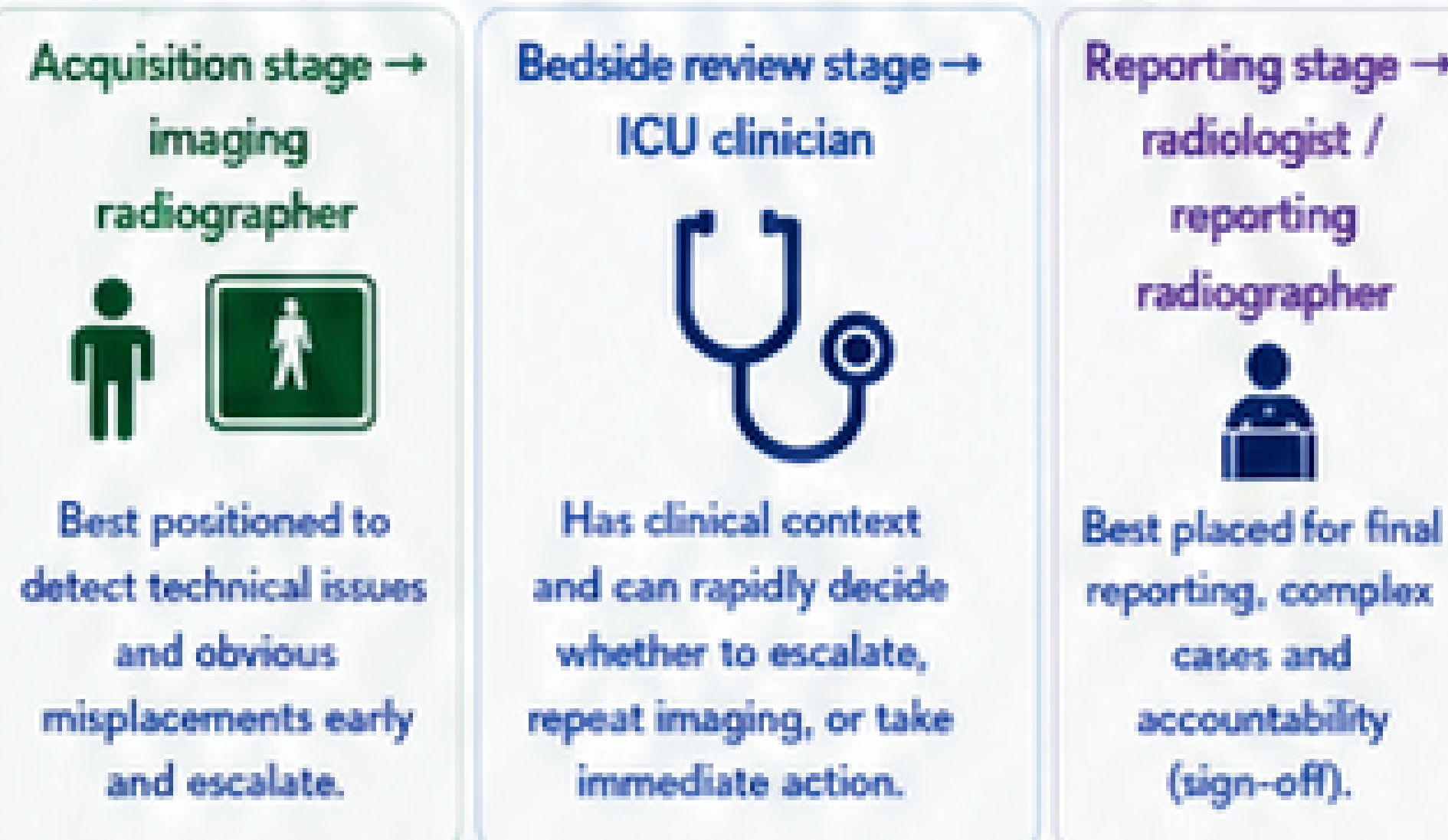
Methods



15 clinical stakeholders: ICU clinicians, nurses, stroke clinicians, and reporting radiographers.

Key finding – Target user and timing

Best use and depends on workflow stage



"Is it worth taking a radiologist time to check or can a clinician, trained looking at NG tubes, just have a quick glance at it before escalating it to a radiologist?"

– DA, Intensive Care Unit

Key finding – Safety, not automation, drives acceptance

Useful AI

- flags critical findings
- supports prioritisation
- strengthens safeguarding

Less acceptable AI

- final "safe to feed" decision
- burdens clinicians with "AI verification"
- clinician remains liable

"If you are just making experts a very, very tiny bit better, that's good, but that's not where the money is. The money is identifying or prioritising those examinations, the critical finding, who need your attention first." – RR1, Imaging Department

False AI outputs can add burden and position clinicians as "blame-takers".

Human-Process Integration of AI: AI should be embedded within existing safeguarding processes, not treated as a separate authority requiring human "verification".

Implications for real-world data and evaluation

AI deployment and evaluation depend on real-world imaging and reporting data.

Confounders

- poor exposure / image quality
- image annotations
- lower resolution
- obesity / artifacts
- chest abnormalities
- altered anatomy / prior surgery
- variable report quality

Data labelling risks

- image → report mismatch
- many-to-one report relationships
- unreliable redundancies
- risk of edge-case exclusion
- biased downstream evaluation

Systematic mapping: one worked example



- **Potential benefit:** enables earlier detection and escalation of misplacements
- **Risk:** over-alerting, alert fatigue, false positives
- **Burden:** additional notifications, potential for workflow interruptions
- **Accountability:** radiographer responsible for follow-up and escalation decision
- **Evaluation focus:** impact on clinical timing, accuracy, workload, safety outcomes

Data labelling risks

Automated data-labelling approaches face practical limitations in this setting.

- Real-world reporting data is noisy, incomplete and variable.
- A clean one-image-to-one-report structure is rarely achieved and may be documented within a single radiology report.
- This creates risk of unreliable labels, edge-case exclusion, and biased downstream evaluation.

Clinical utility is context-dependent. Effective AI depends on workflow stage, target user, and accountability model. Workflow and documentation practices should guide implementation and evaluation.

The challenge is not only detecting a misplaced feeding tube: it is placing AI at the right point in the workflow, for the right user, with the right accountability structure.



Theme: Risk management and compliance



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