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An implementation facilitation intervention to improve the musculoskeletal X-ray reporting by radiographers across London

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Abstract

Background The National Healthcare Service (NHS) radiology service delivery in London is representative of the current pressures and challenges faced in England of Musculoskeletal (MSK) X-ray reporting workforce shortages, and national turnaround time (TATs) targets. The implementation project evaluated facilitation as a strategy to achieve the NHS England 50% target for all MSK X-rays to be reported by radiographers.

Methods The project was an eight-month multi-centre ($n = 5$ London NHS Trusts) study applying the Promoting Action on Research Implementation in Health Services (PARIHS) framework with embedded mixed-methods evaluation. Initial observational data using the Context Assessment Index (CAI) tool and the Workplace Culture Critical Analysis Tool (WCCAT) set the implementation interventions which comprised external facilitation, to support internal facilitators action learning activities. Evaluation data comprised monthly reporting performance, systems mapping, interviews.

Results System mapping allowed a perspective beyond the characteristics of the NHS Trusts involved (small single site hospitals to large multi-sites hospitals) of mixed clinical duties, scope of practice, reporting session allocation, and equipment used. CAI scores for workplace culture demonstrated $\overline{x} = 73.7\%$ (*SD* 6.8; *95%CI* 8.49), leadership scored $\overline{x} = 69.3\%$ (*SD* 7.3; *95% CI* 9.17), and evaluation scored $\overline{x} = 75.5\%$ (*SD* 6.9; *95% CI* 98.63). WCCAT observations provided themes for facilitation focusing on remote reporting, insourcing backlogs, prioritising worklists to reduce breaching TATs, reporting metrics, and reducing auto reporting. The combined reporting of MSK X-rays by London radiographers during this study achieved $\overline{x} = 53.7\%$.

Conclusion This study had an innovative approach using an implementation facilitation framework to improve service delivery. The clinical workplace context in which MSK X-ray reporting by radiographers occurs was key to implementing change. The complexities of sustaining and upscaling MSK X-ray reporting by radiographers to meet the NHS England target of 50% are varied and require local champions to facilitate and drive change at organisational levels. It is recommended that there are dedicated 'resources' to sustain implementations with a community of practice for support. Workplace leadership and stakeholder networks are needed to sustain improved working practices and embrace regular evaluation and monitoring of service delivery performance.

Keywords Reporting radiographers; musculoskeletal; X-rays, Implementation facilitation

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Contributions to the literature

- This study provides quantitative estimations of the effect of implementation facilitation interventions on musculoskeletal X-ray reporting by diagnostic radiographers across a network of NHS Trust hospitals.
- This study applied a pragmatic approach and individually focused implementation strategy delivered to healthcare professionals (radiographers) to improve monthly musculoskeletal X-ray reporting productivity to national targets.
- The study showed that interventions were associated with increased musculoskeletal X-ray reporting productivity.
- Findings will fill a gap in the literature on implementation facilitation interventions and the variables of barriers and enablers in advanced diagnostic radiography practice that influence service delivery and productivity.

Background

The workload of National Healthcare Service (NHS) clinical radiology departments in England continues to increase annually [1], with X-rays being the most common diagnostic imaging examination conducted. The evidence [2–19] for X-ray reporting by radiographers is well established, and its implementation underpins the NHS England target for 50% [20–22] of X-ray reports to be completed by reporting radiographers. However, historical data from 2017/18 [22, 23] of X-rays reported by radiographers across England [23] averaged 28 [23]- 32% [22], with a reported decrease in 2019 to 15.5% (8.3–19.1% variation) across England [23], for London specifically 13.6% of X-ray reports were by radiographers [23].

The NHS radiology service delivery across London (one of seven NHS England regions [24]) is representative of the current pressures and challenges faced nationally of post-COVID imaging demand, healthcare workforce shortages, and requirements to meet national and governmental reporting turnaround time [25] (TATs) targets whilst maintaining quality standards [26–32]. Delivery of healthcare in London is organised into five Integrated Care Systems (ICS), each developing a platform to achieve this target, including establishing a cross-London Radiographer Enhanced and Advanced Clinical Practice Working Group [33] supported by NHS England and NHS Improvement. Variation of the diagnostic radiographer musculoskeletal (MSK) X-ray reporting in London, specifically the workplace culture, context, and leadership provides an opportunity to draw on facilitation strategies to achieve the NHS England 50% target [20–22] for all MSK X-rays to be reported by radiographers across NHS trusts in London.

Facilitation is a complex and multi-faceted role referred to in a wide range of literature, from education to health, social care, and counselling [34–39]. In practice development literature, the role of facilitation is critical to enabling the transformation of practitioners and practices [40, 41]. The Promoting Action on Research Implementation in Health Services (PARIHS) framework [40] argues that successful implementation (in this example, diagnostic radiographer reporting) is a product of the evidence underpinning the role, the associated contexts of change implementation, and how change is facilitated. The concept of facilitation is presented as a continuum; at one end of the continuum is a 'doing for others' task-based approach. At the other end is 'holistic or enabling' facilitation focusing on working with others in practice, using critical and reflective techniques to develop people and practice. The principle of working in ways that are 'enabling' is arguably more likely to foster a commitment to sustainable and ongoing practice change [41].

Implementation facilitation has been used globally within many healthcare professions, predominately nursing [37, 42–44] but also mental health [45], physiotherapy [46], and speech and language therapy [47] for the evaluation of healthcare settings that experience significant implementation barriers [48] in challenging settings [49] to foster service improvement and embedding evidence-based practice (EBP).

Within radiography, facilitation has been underutilised [50] compared to knowledge transfer [51] efforts of locally developed strategies. Published radiography examples that fit within knowledge transfer strategies [52] of embedding EBP interventions have been predominantly to passive audiences and not applying implementation frameworks [53] which reflect contextual features [54–56] of the clinical environment, such as organisational culture, leadership and resource availability.

This study applied the PARIHS framework [57, 58] as the guiding implementation framework for facilitation [54] to reduce the variation in MSK X-ray reporting service by radiographers across London in line with policy targets. The objective of this project was to use evaluation data on MSK X-ray reporting by radiographers through monthly service delivery performance, the context of service delivery within the NHS Trusts, and to draw on facilitation strategies to achieve the NHS England 50% target [20–22] for all MSK X-rays to be reported by radiographers across NHS trusts in London.

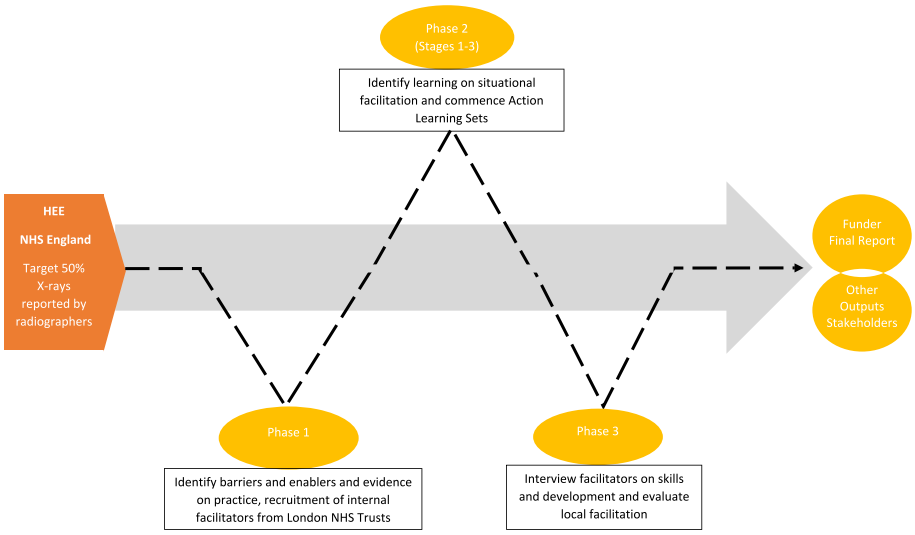

Fig. 1 Project phases

Methods

The project was an eight-month multi-centre pragmatic approach of observation and service evaluation following a three-phase design (Fig. 1). Institutional research ethics committee (REC) approval was provided by Canterbury Christ Church University (ETH2223-0122) in compliance with General Data Protection Regulations (GDPR) [59] and NHS England Data Protection Impact Assessment (DPIA) [60]. No patient identifiable/personal information or special category personal data [59] was recorded in the project.

Variables of interest

The PARIHS framework [40] argues that successful implementation (in this example, diagnostic radiographer reporting MSK X-ray image examinations) is a product of the evidence [61] (research, clinical experience, and patient experience) underpinning the role, the associated contexts of change implementation, and how change is facilitated.

Therefore the evidence (variables of interest) required research of the historic barriers and enablers to radiographer reporting in the NHS. An exploration of the parameters of the local service provision at each NHS hospital site, the workplace clinical environment experience (context, culture, leadership and evaluation) to be receptive to change, the competency of each facilitator to implement change (intervention) at each hospital site [40], and ongoing audit of productivity figures (patient experience) to assess change patterns to the benchmarked 50% target (Table 1).

Outcome measures

To achieve this the following instruments and tools were used. A systematic literature review [62] was conducted to evaluate the historic barriers and enablers (Table 1). Followed by NHS system process mapping [63, 64] to

Table 1 Schema of research measures and analysis

Data Collection	Outcome measures (instruments, tools)	Data analysis (techniques)	Variables of Interest
Phase 1	Systematic Literature Review	JBI Critical appraisal lists, and meta-aggregation	Historic barriers and enablers
Phase 2	System Mapping	Conventional process mapping analysis	Parameters of local service delivery
Phase 2	Context Assessment Index (CAI) 37 questions	4-point Likert scale, with multiplier for each section	Workplace environment (culture, leadership, evaluation)
Phase 2	Workplace Culture Critical Analysis Tool (WCCAT) 17 questions	Traffic light category of thematic findings	Workplace environment (local context)
Phase 2	Monthly Productivity Audits	Number reported from total, benchmarked to 50% target	Monthly MSK X-ray reporting by radiographers (50% target)
Phase 3	Focus group interviews using Ritichie et al. 5 questions	Thematic analysis and coding of qualitative data	Five core competencies of facilitators

record the variables of interest within the reporting radiographer service delivery at the recruited local hospital sites.

Critical observations of the work environment used the Context Assessment Index [65] (CAI) tool to document the variables of interest of workplace culture, leadership and evaluation in phase two. The CAI tool [65] explores the workplace environment using a four-point Likert scale (strongly agree, agree, disagree, strongly disagree) against $n=37$ questions ($n=16$ culture, $n=7$ leadership and $n=14$ evaluation). The CAI tool [65] data collection in phase two allowed the workplace culture 'way things are done around here' [66] to be understood in the clinical practice setting if sustainable change is to be achievable [67]. With a focus on effective leadership and transformational leaders that create a workplace culture to inspire staff through challenging, stimulating, enabling, developing trust and communication [68]. With an aim to alter the culture and create a context conducive to innovation and change.

Observation using the Workplace Culture Critical Analysis Tool [69] (WCCAT) contextually documented each clinical reporting environment at each hospital site. Monthly audits recorded the amount of X-ray MSK examinations per month imaged and the amount reported by radiographers per hospital site to benchmark against the 50% NHS England target [21, 22] were completed. Concluding with an end evaluation focus group of the facilitators using Ritchie et al. [70] five core competencies of facilitators (Table 2) to enable reflection on the interventions, including 'golden moments' and 'stumbling blocks'.

Data collection

The first phase (December 2022; Table 1) commenced with a systematic literature review [62] of implementing diagnostic radiographers' X-ray reporting service in England. The systematic literature review [62] used a PICO framework to identify keywords, along with Boolean logic, truncation, parentheses and wildcards, inclusion/exclusion criteria and a time frame of 1995–2022 [62]. Databases searched included PubMed, Ovid MEDLINE, Embase; CINAHL, and Google Scholar, as well as journals (Scopus, Wiley), healthcare databases (NHS Evidence Database; Cochrane Library) and grey literature databases (OpenGrey, GreyNet International, and the British Library EthOS depository) [62].

Following the systematic literature review [62], the recruitment of the internal facilitators ($n=5$) from the London ICS regions NHS trust hospitals was assisted by the NHS London Diagnostics Programme within the NHS England Transforming Cancer Services Team. The internal facilitators ($n=5$) formed a pan-London community of practice for action learning and peer support with expert external implementation facilitators ($n=3$) to drive through local change based on evidence, observational data, collective experience and knowledge across London NHS Trusts.

The second phase launched with a workshop (January 2023; Table 1) to develop the internal facilitators' knowledge of implementation science [72] and the role of situational facilitation [71, 73–77] in the context of implementing radiographer reporting into practice [40]. Training on completing monthly auditing of MSK X-ray reporting figures, critical observations of the work environment using the CAI [65] tool to assess the variables of interest of workplace culture, leadership and evaluation, and the WCCAT Tool [69] to contextually analyse each clinical reporting environment at each NHS Trust and by delegating tasks to a mix of clinical staff that interact with the reporting radiographers.

The workshop explored the facilitation skills and attributions [41, 78] required, ranging from project management skills and critical reflection to enabling others as internal and external agents for change. Developing the internal facilitators' competence to move away from the 'doing for others' approach, which may seem quicker but less likely to result in permanent changes of practice, to an 'enabling' approach to work with individuals and teams to build relationships, create ownership of issues and to support people to find solutions and promote actions [41]. With specific facilitation self-awareness skills of active listening, giving and receiving feedback, and asking enabling questions [78]. As well as organisational behaviours, the context in which change happens, applying theory [57, 79–82] to logically help structure

Table 2 The five core competencies of facilitators [70]

The five core competencies of facilitators
1. Building relationships and creating a supportive environment for change
2. Changing the system of care and the structure and processes that support it
3. Transferring knowledge and skills and creating infrastructure support for ongoing learning
4. Planning and leading change efforts
5. Assessing people, processes, and outcomes and creating infrastructure for programme monitoring

change at individual and collective levels as an ongoing process. The use of Herons [71, 73] situational facilitation [75–77] directing styles such as supporting, coaching, encouraging or directing [74] were demonstrated to assist the facilitators to be assertive during challenging discussions and the pushback of approaches to defuse confrontational and aggressive conversations around behaviours and sources of issues and values to achieve the broad interventions. Strategies aligned to the facilitations included delegating tasks within the MSK X-ray reporting service leadership, using models such as nudge theory [83] and positive reinforcement of celebrating and promoting what was working well and why, the value and contribution of individuals, and what could be improved.

The second phase included monthly workshops (March to July 2023), which provided continuous opportunities for the internal facilitators to discuss the project data collection using a 'what, so what, now what' approach within the community of practice peer group. Supported by the expert facilitators providing situational facilitation skills [74, 75] and communication approaches [75–77] to adopt when engaging in implementing change in the workplace.

The third phase final workshop included feedback to the internal facilitators and NHS hospital Trusts representing the ICSs on all of the phase two data as well as an end-stage process evaluation collecting qualitative interview data based on Ritchie et al. [70] five questions on skills and core competencies of facilitators (Tables 1 and 2).

Data analysis

The phase one systematic literature review [62] of diagnostic radiographers' X-ray reporting service in England, was assessed against Joanna Briggs Institute's critical appraisal checklists [84], with meta-aggregation to synthesise each paper ($n=241$). The systematic literature review [62] identified, defined and assessed a broad and diverse range of historical barriers and enablers of implementation across micro (organisational levels), meso (professional body organisations), and macro-level (governmental/health service) policies and guidance. The review findings [62] were used to inform the focus of the phase two and three facilitation work, generating 'checklists' for facilitators to reflect on in their planning or review of work.

The phase two system process mapping followed conventional NHS [63, 64] mapping of services following the patient pathway through the department and hospital to identify service delivery and perfromance inefficiencies and areas for interventions.

The phase two CAI tool [65] data scores the clinical setting against characteristics that enhance or hinder service delivery and whether it would be receptive to change, reflecting weak contextual areas. There are set characteristics (weak or strong) for each theme of culture (values, beliefs, task-driven, clarity of boundaries, teamwork, receptiveness to change); leadership (traditional, command and control, clarity of roles, teamwork, didactic/autocratic approaches, authority, decision-making processes); and evaluation (feedback on individuals/teams/systems, information sources, evaluation methods). The CAI [65] tool comes with specific interpretation guidance to calculate the percentage score for each section against a multiplier calculation. The final total score for culture has a multiplier (times 1.5625) to calculate the overall percentage, with individual multipliers for leadership (times 3.57) and evaluation (times 1.78) [65].

The phase two WCCAT [69] observational data were collated and analysed at the monthly workshops (March to July 2023) for patterns, trends, and themes from the 'what works, for who and where'. The WCCAT [69] feedback on the context within each NHS Trust, such as the light, sound, interruptions, stresses, interactions, how communication such as urgent findings are delivered, any disruptive episodes, behaviours, etc., allowed traffic lighting categorisation to identify issues worth addressing for short-term change initiatives during phase two. Green indicated quick fixes and wins. Yellow indicated medium-term problems that are a little more difficult to resolve, but it was beneficial to interact with stakeholders early in phase two to start the process. Longer-term problems that would have been outside the project's scope and timeframe but were on the horizon for future consideration were reflected in red. The WCCAT [69] data provided culture framing provided insights into the local MSK X-ray reporting service delivery for positive affirmations and thematic content for monthly Action Learning Sets to discuss and co-design interventions and situational facilitation of local improvement areas within the NHS sites.

Each internal facilitator was further responsible for collecting the anonymised monthly productivity audit data. The data analysis used descriptive statistics of the number, percentage, sample mean ($\bar{x}$) and variance) of radiographer MSK X-ray reporting productivity data across London throughout the project for any modest early impact of the interventions. The descriptive statistical data is usually collated monthly from the Radiology Information Systems (RIS) coding by radiology administrative staff as routine NHS service audits. It is acknowledged that the data collected is for MSK X-ray reports and does not include coding for chest or abdomen X-ray reporting or other sources of reporting radiographers' scopes of practice such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine (NM), Dual-energy X-ray

Absorptiometry (DEXA), Ultrasound (US), fluoroscopic examinations and interventions or Mammography.

The phase three end evaluation focus group transcripts of the facilitators was analysed using a framework analysis [81, 82, 85] to identify thematic commonalities and differences in the textual data and relationships within the diversity of responses within the convenience sample population and assigned coding [86] framework categories relevant to the data aligned to Ritchie et al. [70] five core competencies of facilitators (Table 2). The qualitative data provided examples of where these attributes had helped when facilitating change and how the skills had enhanced the facilitator's implementation experience.

Results

The following findings section is divided to display the variables of interest (Table 1) drawn upon within this project to evaluate a baseline perspective of the characteristics of the hospitals involved in this study and charting the interventions and service delivery performance. The phase one systematic literature review [62] of diagnostic radiographers' X-ray reporting service in England has previously been published.

Parameters of local service delivery

The system process mapping findings (Table 3) provided data on the context that exacerbates service delivery bottlenecks, inefficiencies and constraints, variations in

Table 3 System mapping context across the NHS Trusts, population, sampling, and scope of practice, and service provision

Context identified from system mapping	Site 1	Site 2	Site 3	Site 4	Site 5
ICS Region	North East	North Central	South East	North Central	South East
Size of NHS Trust	Small	Medium	Large	Medium	Large
Local population size	263,000	1,300,000	2,600,000	1,600,000	4,500,000
Amount of MSK X-ray departments for NHS Trust	1	2	3	5	3
Workforce capacity (MSK X-ray reporting radiographers)	8	12	2	14	18
Coordination of work (amount of radiographers reporting in an MSK X-ray session)	2–3	3–6	2	4	1–5
Productivity (amount of MSK X-rays reported per shift	no KPIs	no KPIs	14 per hour	no KPIs	60 per session
Worklist (MSK X-ray hot/cold reporting, out-of-hours/on-call)	Hot/Cold & Weekends	Hot/Cold	Hot/Cold week days	Hot/Cold & Weekends	Hot/Cold & Insourcing out of hours
Equipment (on-site reporting stations)	6	15	80	40	8
Equipment (off-site reporting computers)	8	1	2	2	8
Scope of practice (MSK X-ray patient ages)	All patient groups	All patients over 2 years	Adult Outpatient Paediatric Trauma	All patient groups	All patients over 16 years
Accountability (MDT attendance)	No	Yes	Yes	Yes	Yes
Accountability (auditing)	10% Daily	Monthly	2% Bi-monthly	50 Bi-monthly	Monthly
Accountability (clinical governance attendance)	Yes	Yes	Yes	No	Yes
Mentor support	Training only	No	Yes	No	Training only
Sustainability of service (trainee reporting radiographers MSK X-ray)	0	0	1	1	3
Continuity of cover (sickness, annual leave, staff shortages)	Yes	No	No	Yes	Yes

clinical practice, demand and capacity flow. They identified contextual areas for improvement that could be facilitated in reporting workforce capacity and reporting sessions allocated weekly of mixed clinical duties as well as diagnostic reporting, inconsistency in scopes of practice, job plans, attendance at Multidisciplinary Team Meetings (MDT), Radiology Education and Learning Meetings (REALM), and clinical governance meetings. The cross cover of reporting sessions, which invariably generates productivity differences between NHS Trusts and the ability to achieve the 50% target effectively [21, 22]. These helped shape the phase three facilitations and provided content for discussion within the community of practice of internal facilitators to support each other and guide situational facilitation skills development approaches.

Workplace environment (culture, leadership, evaluation)

The phase two CAI [65] assessments were based on observational characteristics scored from 'weak = 0%' to 'strong = 100%' outcomes and applying the specific multiplier calculations in the CAI [65] interpretation guidance. The overall CAI [65] scores for the workplace culture (Fig. 2) demonstrated a mean of 73.7% (*min* 70.3–*max* 85.9; *SE* 3.05; *SD* 6.8; *95%CI* 8.49), reflecting high receptiveness and opportunities for change.

The phase two CAI [65] leadership observation centred on workplace openness to optimise skills, abilities, and knowledge to accept and adopt evidence [87] and implement and integrate practice change accordingly. The CAI [65] results for leadership (Fig. 2) scored a mean of 69.3% (*min* 64.3–*max* 82.1; *SE* 3.30; *SD* 7.3; *95% CI* 9.17), reflecting the different leadership styles and familiarity with transformational leadership opportunities that the local facilitators at the individual hospital sites could engage with to support change.

The phase two CAI [65] data for evaluation (Fig. 2) scored a mean of 75.5% (*min* 71.2–*max* 87.2; *SE* 3.11; *SD* 6.9; *95% CI* 98.63), indicating the multiple sources of feedback on individuals, teams and systems performance and experience within the workplace that promoted an effective organisational structure.

Workplace environment (local context)

The internal facilitator phase two observations and delegated observations by other reporting radiographers within the NHS Trusts using the WCCAT [69] provided a critical questioning approach to gain deeper insights into the culture and context of how collaboration between

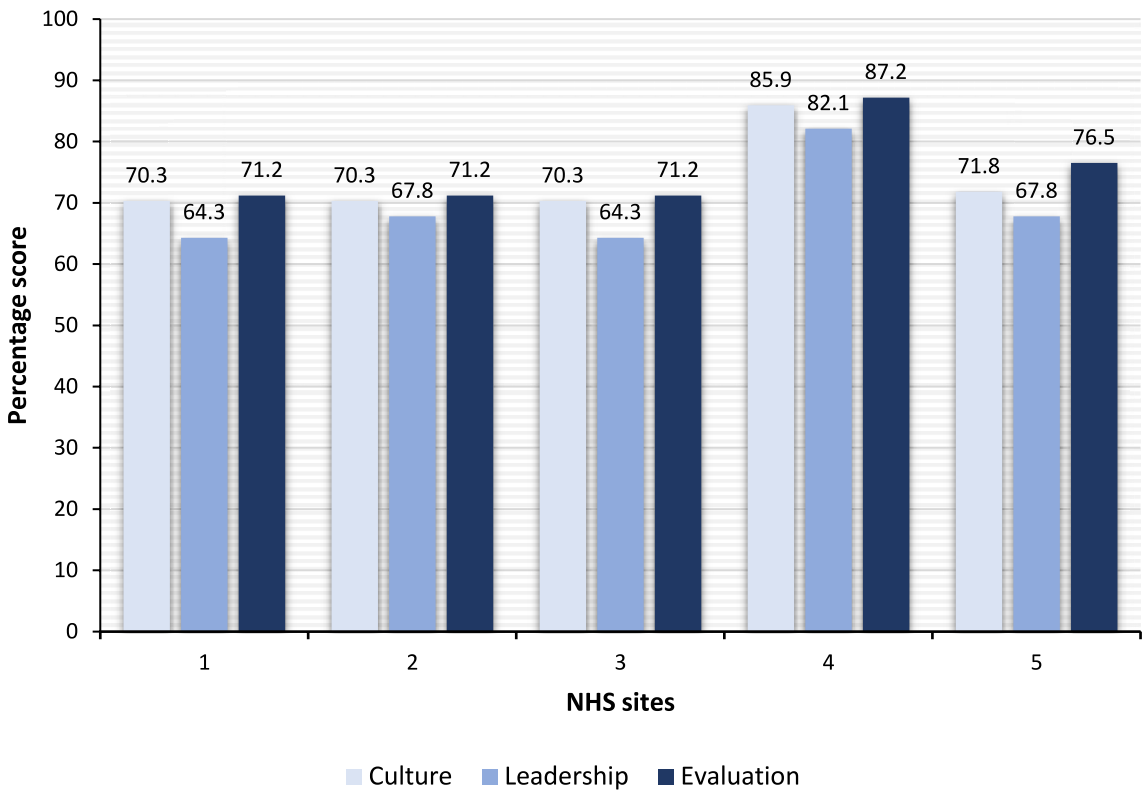

Fig. 2 The CAI observational characteristic scores for workplace culture, leadership and evaluation

Table 4 WCCAT observations translated into action learning set facilitation goals for transformational change and service improvement and categorised using a traffic light system to flag issues as green for possible quick-fix issues, yellow for medium-term, slightly more complicated issues to tackle, red issues that are long-term issues

Category	Theme	Facilitation	Benefits	Site
Green	KPIs	Working together as a team instead of individuals, setting KPIs beyond peer-review audits towards reports per hour and setting expectations of professional behaviours	Benchmarking performance and comparing contrasting workforce productivity, and whether radiologists relative value unit (RVUs) models such as 'Pitman-Jones' and the 'Gishen Ready Reckoner' calculations are restrictive and limiting, or does it increase 'gamification' to meet targets	Sites 1,3,5
Green	Audit	Sharing working practices on 'quality control measures' to introduce a standardised audit target across London	'Stumbling block' debate on the range (2–5%) of images per month to audit, set at individual or team reporting figures. Some systems have an automated tool function of 2% case peer review	All sites
Green	Gap analysis	Review of team and individual reporting radiographers' output performance (amount of X-rays per session reported $n = 14–30$) for 5–6 protected sessions a week (hot/cold) for benchmarking	No set national level in professional policy, levels impact reaching 50% target, identification of interruptions such as checking registrars work, hot or cold sessions, communicating urgent findings, may help standardise practice with KPIs	Site 3
Green	Gap analysis	Local reporting service, skills, roles, job mapping, accreditation	Delivery towards a 'consultant level post' for service lead and development of the radiographer reporting service, protected time for teaching, learning (SPAs/CPD) and research	Site 3
Green	Gap analysis	Costs involved in local reporting service, how many regularly scheduled weekly reporting sessions, how many overtime reporting sessions for backlog reduction occurs, how much is out-sourced to private providers	Where budget overspends occur, where reporting backlogs are, impact on TATs, evidence for reporting radiographer insourcing, directly benefits TATs, improving patient outcomes	Site 3
Green	Remote reporting	Home reporting stations 12 month delays due to hospital IT delays of Virtual Private Network (VPN) set-ups and windowing. Factors that impact productivity, Internet/WiFi speed and 'gamification' of staff 'cherry-picking' easy (young) patients to increase productivity number	Review of root cause of delays and planned resolution timescale, benefiting service efficiency in reporting with remote/home hot/cold reporting sessions with fewer interruptions to increase productivity and reduce backlogs, supports lower NHS cost insourcing	Site 2
Green	Insourcing	Stakeholder agreed short-term solution to reporting backlogs is offering paid overtime reporting (insourcing)	Not a long-term sustainable solution, consideration of how to approach difficult conversations to change stakeholder and management perspectives, thus sharing of practice across the London ICS provides evidence of alternative service delivery practice	Site 3
Green	Priority reporting lists	Reviewing the X-ray reporting delays and potential for breaching (backlogs) daily to set targets of what needs adding to urgent reporting worklists or potential for insourcing/outsourcing	Stops the 'gamification' by staff to cherry-pick young patients (easy reports) rather than going by date and risk of breaching TATs to make a fair reporting system and not skew individual reporter productivity and efficiency metrics	Site 2
Yellow	Job planning	Formalise a set amount of reporting sessions, Supporting Professional Activities (SPAs)/CPD per week (for 'enhanced' level reporting radiographers to progress to 'advanced' level reporting radiographers meeting the four pillars of practice specifications), consistent with Radiologist Direct Clinical Care Programmed Activities (DCC PAs)	Standardise clinical practice across London to reduce variation, stop radiographers from being pulled out of reporting sessions to cover image acquisition in modalities, benefits a sustainable service, reporting productivity, upskilling staff to benefit career pathways, and staff retention (when challenging to recruit too)	All sites
Yellow	Hot & Cold sessions	Exploring opportunities to expand reporting sessions per radiographers by an extra session per week	Impact on MSK X-ray reporting productivity and efficiency (50% target) and reduction of unreported backlog and delays to patient treatment and management	Site 3
Yellow	Gap analysis	Local reporting service, skills, roles, job mapping, accreditation	Delivery towards a 'consultant level post' for service lead and development of the radiographer reporting service, protected time for teaching, learning (SPAs/CPD) and research	Site 3

Table 4 (continued)

Category	Theme	Facilitation	Benefits	Site
Yellow	Gap analysis	Forecasting productivity if an additional reporting radiographer were employed and how many more X-ray reports would be completed to present evidence to senior managers and clinical directors	Benefiting business planning for sustainable future workforce planning and service delivery	Site 3
Yellow	Gap analysis	Costs involved in local reporting service, how many regularly scheduled weekly reporting sessions, how many overtime reporting sessions for backlog reduction occurs, how much is out-sourced to private providers	Where budget overspends occur, where reporting backlogs are, impact on TATs, evidence for reporting radiographer insourcing, directly benefits TATs, improving patient outcomes	Site 3
Yellow	Gap analysis	Review of demand (reporting) and capacity (workforce)	Current reporting team only report 50% of their week, there is no current 'backfill' if staff off sick or on annual leave, increasing staff would reduce reporting backlogs and improve patient delayed outcomes	Site 3
Yellow	Metrics	Discussions with radiology management and leadership to explore what metrics they focus upon gain a perspective to guide and shape discussions to increase the radiographer X-ray reporting service	Metrics used in business cases (workforce, report costs, TATs, GP clinical commissioning, etc.) benefits sustainable service planning	Sites 3,4
Yellow	Multidisciplinary meetings	Reporting radiographer attendance at multi-disciplinary team meetings (MDTMs), departmental radiology events and learning meetings (REALMS), and radiology governance meetings, is it practical for all reporting radiographers to attend versus half the staff, the value versus the risk of not attending, and alignment with CQC inspections	Opportunity to explore networking with interdisciplinary clinical colleagues and stakeholders to understand their perspectives of X-ray image reporting service, where the delays are occurring, what isn't reported but would benefit from reporting, opportunity to foster alliances. Sending out the presentation and action points for staff to respond to so these important learning areas and action points aren't missed to keep the continuity of this peer-support practice and quality standards in reporting	Site 2
Yellow	Environment	WCCAT observations of the culture within the reporting environment of challenging behaviour of consultants	Adjusting room low-level lighting, interruptions of colleagues coming in to chat and some unprofessionalism of swearing out aloud and generally disrupting the shared reporting environment due to no soundproofing or lack of headphone equipment, benefiting concentration, and reducing reporting errors	Site 3
Yellow	Scope of practice	Paediatric imaging reporting review	Expansion of referral of paediatric X-ray examinations as covered by postgraduate training and qualification, benefiting service efficiency and productivity in reporting and patient treatment and management	Site 1,5
Yellow	Leadership	Leadership responsibilities require enforcing in job plans; one such example was the time taken to complete staff appraisals of junior members of the team (up to 25) duality of roles and line management responsibilities overlap	Discussion of using 'Nudge theory' during appraisals to highlight the type of change and facilitate its implementation within departments from the collaboration and networking with staff during appraisal sessions to get them on board with changes at a local level, even with starting auditing of work / KPIs in reporting performance	Site 3
Yellow	Cross cover	Formalisation of cross-cover for annual leave and sickness	Reduction in reporting delays and backlogs, benefiting service efficiency in reporting and patient treatment and management	Sites 1,4,5

Table 4 (continued)

Category	Theme	Facilitation	Benefits	Site
Yellow	Auto reporting	Exploration of reducing auto-reported X-ray examination reports such as outpatient referrals for fracture clinics, rheumatology, medical outpatients, post-operative orthopaedics, etc	Reduction of potential for missed findings and clinical errors (outpatient fracture clinic and outpatients follow-ups) and meeting IR(ME)R, CQC inspections of every imaging examination having a report, will further improve networking and collaborative working alliances with clinical colleagues, and patient outcomes	Site 4
Yellow	Imaging Academies	ICS imaging academies variation of reporting training, CPD, Study day support	Stakeholders can assist with the context of reporting by radiographers beyond existing scenarios of networking opportunities for task specific meeting or CPD training and upskilling activities of clinical practice	All sites
Yellow	Workforce	Review of reasons behind some radiographers who were trained and qualified as MSK X-ray reporters but aren't practising the role in the department	Investment and opportunity made by the department (time, cost, support) and the radiographers (study time and exams), only to lose the opportunity to report, the downstream effects of loss of staff morale and satisfaction and career progression, leading to attrition and retention of experienced staff	Site 4
Yellow	Business case training	Need for formal 'business case' training	Need to present an impact case study for local funding of FTE reporting posts at banding for trainees once qualified	Sites 3,4
Red	Workforce shortages	Impact ability for reporting radiographers to complete reporting sessions as having to backfill cover in imaging modalities to assist patient imaging instead. These are long-term workforce recruitment and retention issues that impact service delivery	Culture of pulling staff from reporting to backfill has implications for backlogs of reporting (hot reporting of A&E, urgent care and walk-in minor injury centres) that affect patient treatment and management outcomes, leading to REALM and discrepancy meetings, this culture leads to increased staff stress over workloads	Site 4
Red	Registrars	Radiology registrars set amount of minimum reporting volumes required during training, some sites include the radiographer verified report numbers in their productivity statistics, other sites do not count this additional work in their productivity numbers	Some larger specialist sites having more registrars training, significantly impact the reporting radiographers worklists to achieve the 50% target on certain months of the year	Sites 2,3
Red	Community Diagnostic Centres	CDC employed its own X-ray reporting radiographers, discussion on insourcing to NHS Trust	Insourcing to the NHS reporting radiographers at the site would benefit quality assurance, MDTs, REALM, urgent findings communication, and governance of service delivery	Site 4

the reporting radiographers and other multidisciplinary healthcare professionals interact and communicate in the reporting space.

The critical part of the 'what' using the phase two CAI, system process mapping, the 'so what' from the WCCAT findings, leading to the 'now what' facilitation (Table 4), assisted the monthly Action Learning Set discussions by the local facilitators in a community of practice group to consider 'what works, for who and where' of the context and culture at each NHS Trust hospital site.

The observations translated into Action Learning Set facilitation goals for transformational change and service improvement. The phase two WCCAT [69] findings were categorised using a traffic light system to flag issues as green for possible quick-fix issues worth engaging for short-term implementations of change. Yellow for medium-term, slightly more complicated issues to tackle, but early work consulting with stakeholders during the project was worthwhile. Red issues were identified and classified, which reflected longer-term issues that were potentially outside the scope and timescale of the project but were on the horizon for future areas to consider (Table 4).

Monthly MSK X-ray reporting by radiographers (50% target)

The monthly audit data of MSK X-ray radiographer reporting Key Performance Indicators (KPIs) provided a variable return per NHS Trust hospital site (Figs. 3 and 4). Modest improvements were observed throughout the data collection period (January baseline to July 2023). The most consistent productivity of radiographers reporting MSK X-ray examinations was demonstrated at hospital site 1 (Figs. 3 and 4). However, this was a single-site hospital with the lowest monthly imaging acquisition. The most improved productivity was seen at hospital site 4; the data for hospital site 5 remained consistent for the length of the project in terms of both patient demand and radiographer reporting.

The overall monthly reporting performance audits (Fig. 3) of the amount of MSK X-rays reported by radiographers displayed seasonal variance in demand in April, with modest progress above the 50% mark (Fig. 4) to sustain the radiographer reporting service at hospital sites 2, 4 and 5.

However, the context in which each NHS hospital Trust performed, such as the workforce number, working environment, shift patterns, scope of practice, etc., was crucial for understanding the variation. Smaller NHS Trusts, such as hospital site 1, had a high productivity rate. However, the context in which hospital site 1 worked involved a small local population and thus, the amount of imaging per month was less (50–75% less) than some of the larger hospital sites in this study (Figs. 3 and 4). Additionally, although the site 1 workforce of reporters was lower (30% less than the larger NHS hospital sites in the study), they had a consistent shift pattern of 50% reporting all the time onsite and off-site (home reporting stations). However, it was noted from the monthly reporting performance audits that hospital site 1 used spare reporting

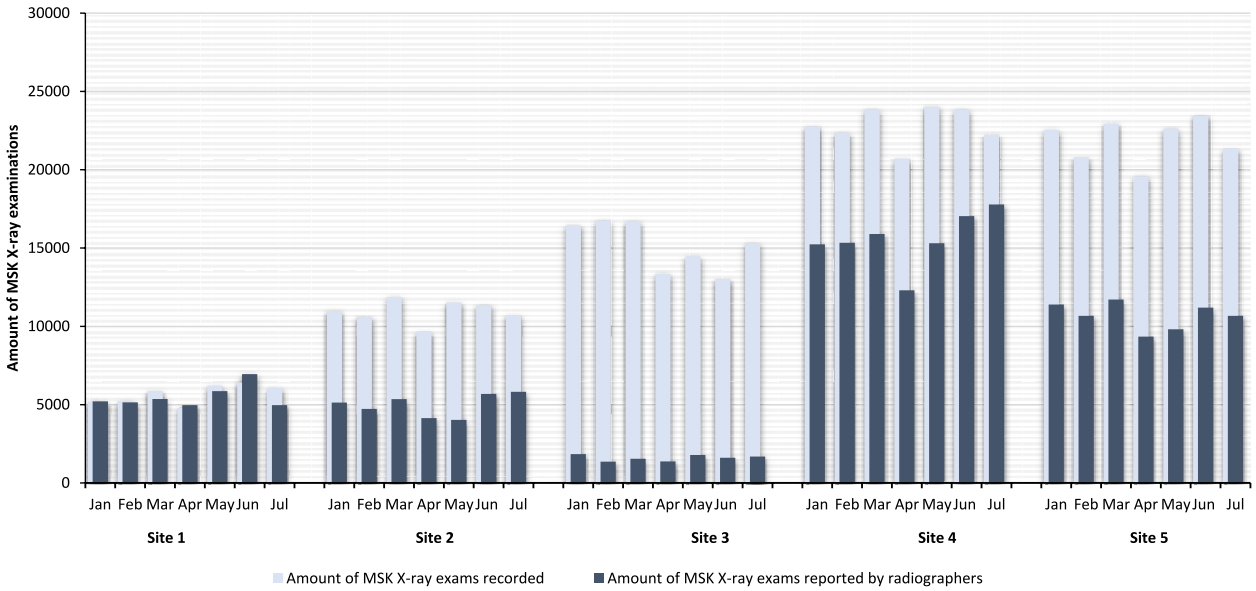

Fig. 3 Overall monthly (January to July 2023) benchmark audit for all NHS Trusts contrasting the amount of X-ray MSK imaging per month against the amount reported by radiographers

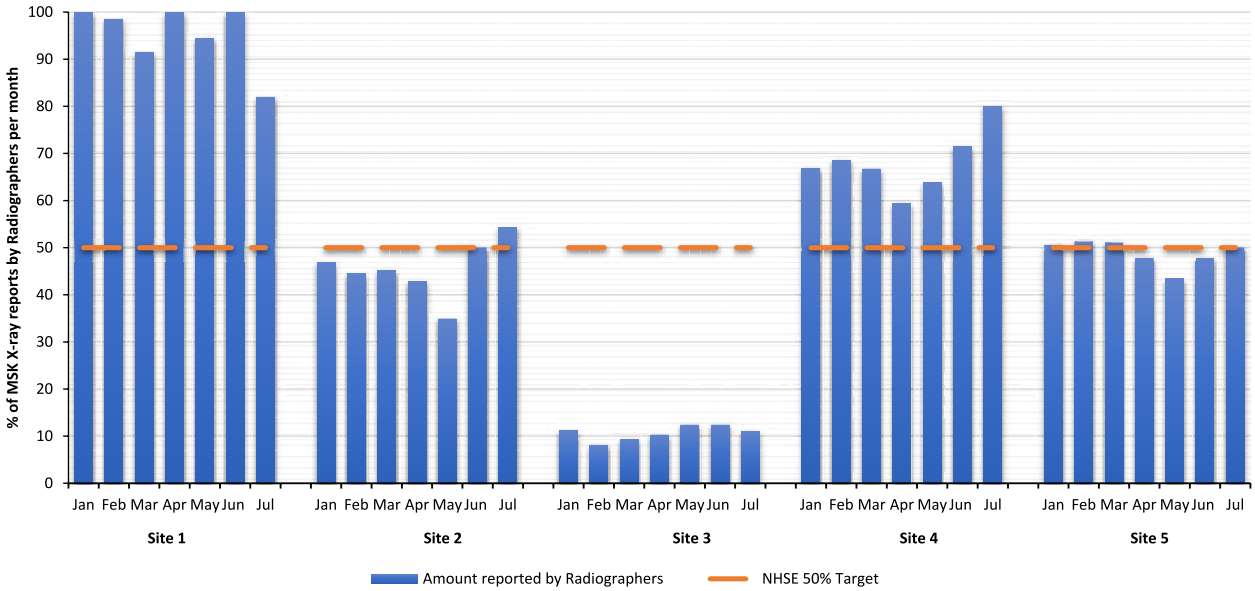

Fig. 4 Overall monthly (January to July 2023) benchmark audit for all NHS Trusts compared to 50% target [21, 22] of all X-rays reported by radiographers

capacity in April and June to decrease the reporting backlog through additional insourcing reporting sessions.

The larger-sized multi-site NHS hospital Trusts (site 2) managed the most growth in service productivity during the facilitation to reach the 50% target. However, the context of the reporting service was variable compared to the other hospital sites. Site 2 was a medium-sized NHS hospital Trust, which the WCCAT [69] observations focused on facilitating increasing remote reporting sessions, prioritising reporting worklists, and attendance at MDT meetings to engage with stakeholders (Table 4). In contrast, a similar large multi-site NHS hospital Trust (site 4) increased its reporting productivity during the study without additional staff members by facilitating small local changes such as reducing auto-reporting and increasing insourcing of backlog reporting by radiographers.

The biggest variation in context was seen in a large-sized multi-site NHS hospital Trust (site 3), which had the lowest reporting shift patterns (Table 3) and radiographers reporting daily, and the lowest amount of reporting workstations (equipment), with no cross-cover for staff annual leave or sickness.

The figure suggests a mixed picture in reporting performance (hospital site 1 $\bar{x} = 95.2\%$; site 2 $\bar{x} = 45.5\%$; site 3 $\bar{x} = 10.6\%$; site 4 $\bar{x} = 68.1\%$; site 5 $\bar{x} = 48.9\%$), with a total mean during this study of 53.7% (range of 10.6—95.2%) of X-rays reported by radiographers. This finding displays moderate growth from the 2017/18 mean of 28 [23]- 32% [22] of X-rays reported by radiographers across England [23] and the 2019 mean of 15.5% (8.3–19.1% variation) across England [23] and the London figures of 13.6% of X-ray reporting by radiographers [23].

Five core competencies of facilitators

The internal facilitator team demographics were $n=4$ females and $n=1$ male reporting radiographers; their post-qualification experience of reporting X-rays ranged from 6–10 + years, with current reporting role employment of 6–10 + years. The end of phase three included a process evaluation of a qualitative semi-structured interview using Ritchie et al. [70] five core competencies (Table 2) to assess what the internal facilitators 'valued' from the facilitation.

Competency 1. Building relationships and creating a supportive environment for change

Evaluating the facilitators' interpersonal and confidence skills when interacting with their local reporting team and the wider stakeholders found building relations helped create a supportive and sustainable environment for the change. The responses provided positive examples, which included:

> *"Using the [facilitation] skills has doubled productivity within the first three months of the project; it gave me that confidence to have those conversations and a direction in terms of how to frame it." Site 3.*

> *"The WCCAT tool observations allowed me to look at the whole picture as a service provider and how*

we can improve this. Also, being aware of what's happening around us gave me the confidence to talk to stakeholders. Also, talking to other reporting groups and working on a different site gave me many different ideas on how to improve my system." Site 4.

Competency 2. Changing the system of care and the structure and processes that support it

The data provided instances where the facilitators learnt how to design and adapt facilitation to meet local needs. Specifically identification of problem areas, bottlenecks in the workflow system, equipment issues, working environments, and job plans. The responses examples included:

"In terms of identifying issues. I think one of the strong points is that we are flexible. We are sort of constantly identifying quite quickly if something's not working and then taking action to try and adapt it." Site 1.

"The WCCAT tool that we used to assess the reporting room environment certainly helped identify some disparities between different reporting rooms, and that's something that I'll keep and use going forward when we set up new rooms beyond the project. We've been able to identify more subtle things that make for more productivity." Site 5.

Competency 3. Transferring knowledge and skills and creating infrastructure support for ongoing learning

Assessing how the internal facilitators learnt to present and discuss change persuasively to stakeholders whilst addressing stakeholders' needs and concerns was the most challenging. Specifically the strategies learnt that filled the gaps in knowledge and skills on building 'communities of practice' to collaborate with the local reporting teams to encourage participation, share solutions, and foster co-development best practices locally. Examples included:

"I would say it's definitely made me want to build on the skills that I have already. I've been using the taught facilitation skills and putting that into practice when trying to get something implemented and off the ground; I've been trying to use those skills as much as I can." Site 1.

"Yes, the situational facilitation skills and different styles were good, and the personality traits helped me think about who I'm presenting to or having a conversation with and how to frame it. How to try and get what you want from someone by framing the way that you conduct that conversation helped me adjust my communication in those situations." Site 3.

"The biggest difference in knowledge translation and getting evidence into practice has been understanding the context of the reporting service. If the context is not supportive or ready for change, it makes it much harder to try and make changes in practice." Site 5.

Competency 4. Planning and leading change efforts

Evaluating the internal facilitator's project management skills, including how they coped when stakeholder talks stalled, communicated under challenging situations, managed conflict and disruptive behaviour, and eventually addressed decisions to pull back and disengage with stakeholders after they assumed responsibility. Examples included:

"For me, it was more of the facilitation training that was helpful. How to apply it to our current issues, but maybe even more so as coaching us in terms of, say, we come to a problem and working together to co-design a plan, make a solution, and work through it." Site 1.

"I think my project management skills were good, to begin with, but I think it's given me the confidence to run with it hearing that other ICS regions are doing similar things. It was more of active reassurance to ensure that what I was doing was right." Site 3.

Competency 5. Assessing people, processes, and outcomes and creating infrastructure for programme monitoring

Lastly, the internal facilitators considered and reflected on how the facilitation had helped them assess people, situations, processes, and outcomes. Considering how information is gathered on all the factors influencing the facilitation, including organisational context, current practices, leadership, structure, policies and procedures, stakeholders, and reporting teams' interpersonal and group dynamics. Finally, as the project wound down, consideration of their plans to sustain changes, champion future interventions, actively facilitate re-engaging stakeholders for follow-up discussions and identify measures for assessing and monitoring future productivity. Examples included:

"The importance of getting stakeholders involved and co-designing, getting input from others, and I think I will carry it forward. I'm definitely inspired as well by the other sites and to continue building the radiographer reporting service." Site 1.

"The project has given me momentum to look at things differently. Obviously, we want quality over quantity, but perhaps assigning performance metrics and discussing in an open way to meet their personalities and facilitating changes so that you're much more likely to be successful. We're going to have regular huddles every week for feedback on different changes because I think change always goes both ways, doesn't it? Keeping people informed so everyone takes the burden, as it were, rather than just one person always picking it up." Site 2.

"It's been a networking opportunity, so continuing as the project winds down, I know if we get a bit stuck locally, we can draw on that, and we can look back over the project and think it's all been useful and it will help us continue as a community of practice. So certainly continuing it and hopefully showing more improvements over time is something I'd like to take forward and take away from this." Site 5.

Discussion

The objective of this project was to use evaluation data on MSK X-ray reporting by radiographers through monthly service delivery performance (KPIs of 50% reporting by radiographers) and the local context (and variations of it) within the NHS Trusts and to draw on facilitation strategies to achieve the NHS England 50% target [20–22] for all MSK X-rays to be reported by radiographers across NHS trusts in London. A deeper analysis of the local context through CAI [65] and WCCAT [69] data provided significant insight into the key variables of leadership, daily working practices, workplace environmental factors and resources, which impacted the broader context of radiographer reporting performance across London.

Facilitation was noted to be a complex task within this project, with the changing nature of leadership roles moving from being a reporting radiographer to leading the reporting team, assisting with understanding leadership styles (hierarchical or collaborative) and delegating responsibility for tasks. The key to these activities was understanding leadership styles commonly used in the NHS, moving from command-and-control styles to collective [88] and compassionate leadership [89, 90].

The phase three CAI [65] tool provided observational data on the three elements of culture, leadership, and evaluation context being receptive to change [61]. The organisational culture of structure, systems, and behaviour [91, 92] was unique to each NHS Trust's reporting service and environment. As such, the willingness towards change, adaption, and responsiveness at all levels to empower and develop transformational culture [93] is important to establish. These results were further reflected in the individual hospital sites' acceptance of facilitation activities by the local facilitators at the peer, managerial, and stakeholder engagement levels.

From the WCCAT [69] observations, the volume of interruptions in the reporting environment often affected productivity. Likewise, from the system process mapping exercise, staffing levels and the difference between hot and cold reporting sessions (productivity due to different tasks) were noted to affect a sustainable working model during industrial action such as the doctor's strikes of July [94] (Fig. 3) which had downstream clinical consequences on reporting TATs and increasing backlogs.

Towards the end of the study, the NHS, in collaboration with the Royal College of Radiologists and the Society of Radiographers published guidance on reporting TATs [25]. Key areas were the expectation to reduce auto-reporting and replace it with formal written reports and the greater expectation to reduce outsourcing to private non-NHS providers with a preference for NHS insourcing of reporting. The ring-fencing of reporting sessions for all professions (including radiographers), the optimisation of digital connectivity (including remote off-site reporting equipment), and reasonable steps to resolve and increase the workforce capacity (reporters and trainees) [25]. As well as setting standard operating procedures (SOPs) for routine monitoring of reporting performance [25]. All of these points were identified within the WCCAT [69] observations in this studies findings and the implemented facilitations to meet the 50% [21, 22] target of MSK X-rays reported by radiographers.

The debate around using formal or informal KPIs for the number of reports per session to set productivity goals was multi-faceted and often interpreted by radiographers as a 'carrot or stick' approach. KPIs can have positive and negative effects; positive effects result when all team members 'buy-in' to its use and reasoning and increase productivity per reporting session. Adverse effects such as 'gamification' can be a consequence of KPI implementation when reporters purposefully 'cherry pick' quick and easy MSK X-ray examinations to increase individual KPIs. Examples would be the purposeful selection of imaging examinations from young age groups (18–30), specific referral pathways such as General Practitioner versus Trauma, or minor clinical symptoms, leaving more complex and time-consuming examinations within the reporting worklist for other reporting colleagues, affecting team morale and working relations.

The monthly team meetings repeatedly broached the subject of outsourcing to private providers to reduce backlog reporting. The reliance on outsourcing has a negative impact on NHS budgets, of which £223 million was spent in 2022 [95]; the equivalent to 2,309 full-time equivalent (FTE) NHS consultant radiologists [95] or 5,098 FTE Band 7 NHS reporting radiographers [96]. The

expansion of radiographer MSK X-ray reporting insourcing sessions was an important implementation within the project as it both supported the decrease in delays (TATs) impacting patient treatment and management [97–100] but also reduced costs, as insourcing to radiographers was charged at a much lower cost [16] than outsourcing to private (non-NHS) providers [95].

An area where facilitation improved service delivery was the availability of equipment resources. Some of the small NHS Trusts, such as hospital site 1, already had off-site remote working stations to allow out-of-hours (evenings and weekends) insourcing of X-ray reporting to boost productivity and efficiency. Whereas larger NHS hospital Trusts such as site 2 (Tables 3 and 4), through implementing discussions with stakeholders in this study, achieved releasing remote working stations for radiographers from NHS Trust IT departments to improve insourcing availability.

The current clinical practice within NHS England reflects the same pressures of increased demand in patient imaging and limited capacity of the reporting workforce (radiographers and radiologists) as in the 1990s at the inception of radiographer reporting [62]. There is evidence [62] of a shift in culturally entrenched legacy perspectives within and between different meso-level (professional body organisations) and macro-level (governmental/health service) policies and guidance around skills mix acceptance of reporting radiographer that has shaped change at micro-level NHS Trust organisational levels. Supported by macro-level initiatives driven by the 'Nicholson Challenge' within the Quality, Innovation, Productivity and Prevention (QIPP) [101] programme that focused on quality in improving productivity, and the preceding 'Stevens Challenge' of the Five Year Forward [102–104] and the NHS England Long Term Plan [105, 106] to transform service delivery within NHS [107]. Aligning the current reporting service delivery to NHS England policies and priorities, such as 50% of X-rays reported by reporting radiographers [21, 22], decreasing reporting TATs [25] and improving pathways to diagnostic and cancer services [21, 23, 105, 108–110] are important. Future challenges for the reporting radiographer service include the Hewitt Review [111] to support effective ICS working, MDT collaboration, shared priorities, supporting local leaders, accountability and timely high-quality data reporting. Future Care Quality Commission (CQC) [112, 113] inspections of advanced practice within the NHS will include reporting radiographers against the new single assessment framework [112] for safe and effective care that is responsive to meet local needs, including lines of enquiry on MDT working; leadership; sustainability of service; workplace culture and governance, reporting performance and TATs, and continuous improvement plans [114]. Aligned to the Health and Social Care Act [115] and the Action on Major Conditions and Diseases [116] of clinical strategies for early detection and diagnosis, building from the NHS England Long Term Plan [106].

The phase three end-project process evaluation provided a deeper dive into the complex and overlapping skills the facilitators had developed and examples of where they had used these to implement local service delivery change. There were clear examples where communication and interactions with stakeholders had resulted in positive results but also fostered confidence when engaging stakeholders and motivating and supporting colleagues within their reporting teams. Implementing change by navigating the various stakeholder dynamics and politics and fostering participation in designing, adapting, and planning implementation processes and strategies resulted in improved working environments and practices, increased self-efficacy skills, and improved problem-solving self-confidence. Key examples provided by the facilitators revolved around learning situational management, especially in dealing with conflict and managing team expectations through sharing ideas, affirming outcome goals, fostering teamwork and strategically leading change.

Limitations

The variance in performance by each NHS Trust hospital site was multi-faceted, not just by workforce differences (size and scope) at each hospital site but by the context. For any process evaluation of an intervention (outcome measure), there needs to be time for the facilitation to embed, evolve, and become the norm before the long-term effectiveness and correlation of reporting performance to implemented local service delivery changes can be accurately assessed. Therefore, the data collected (monthly performance) during the project was expected to show only modest changes.

Conclusion

This implementation facilitation process developed within the study has potential to improve local (London) and national (England) MSK X-ray reporting by radiographers within the NHS. The findings on culture ($\bar{x}$= 73.7%), leadership ($\bar{x}$= 69.3%) and evaluation ($\bar{x}$=75.5%) displayed high scores for receptiveness to change within the NHS Trusts of this study. The contextual issues identified from the workplace environment of interruptions, stresses, interactions, communication, staff behaviours, shift patterns, and scope of practice provided were critical to understanding the variations of interest in working practices and the implementation facilitation strategies

employed. The results within this study of reporting performance showed variation in reporting output by NHS Trust ($n=5$) across London, with MSK X-ray reporting by radiographers at $\bar{x}$ 53.7%.

Abbreviations

A&E	Accident and Emergency
CAI	Context Assessment Index
CDC	Community Diagnostic Centre
CPD	Continuing Professional Development
CT	Computed Tomography
CQC	Care Quality Commission
DCC	Direct Clinical Care
DEXA	Dual-energy X-ray Absorptiometry
DGH	District General Hospital
DPIA	Data Protection Impact Assessment
EBP	Evidence-based Practice
FTE	Full-time Equivalent
GDPR	General Data Protection Regulations
GP	General Practitioner
ICS	Integrated Care System
IR(ME)R	Ionising Radiation (Medical Exposure) Regulations
KPI	Key Performance Indicator
MDT	Multidisciplinary Team Meetings
MRI	Magnetic Resonance Imaging
MSK	Musculoskeletal
NHS	National Healthcare Service
NM	Nuclear Medicine
PARIHS	Promoting Action on Research Implementation in Health Services
QIPP	Quality, Innovation, Productivity and Prevention
REALM	Radiology Education and Learning Meetings
REC	Research Ethics Committee
RVU	Relative Value Unit
SOP	Standard Operating Procedures
SPA	Supporting Professional Activity
TAT	Turnaround Time
US	Ultrasound
VPN	Virtual Private Network
WCCAT	Workplace Culture Critical Analysis Tool

Supplementary Information

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Supplementary Material 1.

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PL, CB, TS and NW conceptualised and designed the research, PL, CB, and TS designed the data collection. PL, CB, and TS conducted the facilitation, PL and CB undertook the analysis. PL wrote the main manuscript text, CB assisted proof reviewing the manuscript, PL prepared figures and tables, and all authors (PL, CB, TS, NW, EC, HG, NH, UM, AOB, SP) reviewed the manuscript and approved the final version.

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Data availability
All data generated or analysed during this study are included in the published article. The datasets used and/or analysed are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approval was provided by Canterbury Christ Chruch University (ETH2223-0122). All authors adhered to the guidelines for authorship that are applicable in the "Ethical Responsibilities of Authors" recommendation of the BMC Implementation Science. All authors adhered to Good Clinical Practice (GCP) guidance for people supporting clinical research delivery in NHS England, UK universities and other publicly funded organisations in this study.

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The authors declare no competing interests.

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