ORIGINAL PAPER

Development of theoretically informed audit and feedback: An exemplar from a complex implementation strategy to improve asthma self-management in UK primary care

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Abstract

Rationale: Audit and feedback is an evidence-based implementation strategy, but studies reporting the use of theory to guide design elements are limited.

Aims and Objectives: Within the context of a programme of research aiming to improve the implementation of supported asthma self-management in UK primary care (IMPlementing IMProved Asthma self-management as RouTine [IMP[2]ART]), we aimed to design and develop theoretically-informed audit and feedback that highlighted supported asthma self-management provision and areas for improvement in primary care general practices.

Method: Aligned with the Medical Research Council (MRC) complex intervention framework, the audit and feedback was developed in three phases: (1) Development: literature and theory exploration, and prototype audit and feedback design; (2) Feasibility: eliciting feedback on the audit and feedback from general practice staff (n = 9); (3) Prepiloting: delivering the audit and feedback within the IMP[2]ART implementation strategy (incorporating patient and professional resources and an asthma review template) and eliciting clinician feedback (n = 9).

Results: Audit and feedback design was guided by and mapped to existing literature suggestions and theory (e.g., Theoretical Domains Framework, Behaviour Change Technique Taxonomy). Feedback on the prototype audit and feedback confirmed feasibility but identified some refinements (a need to highlight supporting self-management and importance of asthma action plans). Prepiloting informed integration with other IMP[2]ART programme strategies (e.g., patient resources and professional education).

Conclusion: We conclude that a multistage development process including theory exploration and mapping, contributed to the design and delivery of the audit and

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feedback. Aligned with the MRC framework, the IMP²ART strategy (incorporating the audit and feedback) is now being tested in a UK-wide cluster randomised controlled trial.

KEYWORDS
asthma, audit and feedback, clinical audit, primary care, self-management

1 | INTRODUCTION

Audit and feedback can be defined as 'a strategy that intends to encourage professionals to change their clinical practice'.[1] Professionals working either in a team, or individually, can receive feedback on their performance by reflecting on data collected from routine practice. It is a widely used component of quality improvement, included in around 60 national clinical audit programmes in the United Kingdom (UK),[2] and can improve professional practice and quality outcomes.[3,4] A recent overview of reviews evaluating the evidence of behaviour change interventions directed at healthcare professionals working in primary care found that multifaceted interventions, which included audit and feedback, were effective in influencing health professional practice.[5]

While evidence exists that audit and feedback are effective, there is limited reporting of design features and theory used in its development. Less than 10% of audit and feedback interventions report any theory guiding the design of the intervention.[6] A more recent systematic review exploring the use of theory in electronic audit and feedback similarly identified poor reporting[7] and recommended that studies should employ explicit use of theory to improve the understanding of mechanisms of action.[7]

Asthma affects approximately 5.4 million people in the UK.[8] Supported self-management for asthma, which includes patient education, regular review and provision of a personalised asthma action plan, has been recommended by guidelines for 30 years.[9] A recent meta-review confirmed that supported asthma self-management can reduce hospitalisations, accident and emergency attendances and unscheduled care consultations.[10] However, despite the 'overwhelming' evidence, supported self-management is poorly implemented in primary care. For example, in the UK only a third of respondents to an Asthma UK survey reported receiving basic asthma care (defined as an annual review with a healthcare professional including provision of an asthma action plan, and an inhaler technique check).[8]

The IMPlementing IMProved Asthma self-management as RouTine (IMP²ART) programme aims to improve the implementation of supported asthma self-management in primary care by developing a theoretically-informed whole-systems implementation strategy comprising of resources for patients, professional training and organisational components (Figure 1). As a core component of the IMP²ART organisational strategies, we have designed and developed theoretically-informed audit and feedback that highlighted supported asthma self-management provision and areas for improvement in primary care practice. Aligned with the recommendations of Colquhoun et al.,[6] and Tuti et al.[7] we here report use of theory in the design and development of the IMP²ART programme audit and feedback.

2 | METHODS

Our programme of work follows the development and feasibility stages of the Medical Research Council (MRC) framework for developing and evaluating complex interventions,[11] guidance on developing complex interventions to improve health and healthcare,[12] and follows the guidance for reporting intervention development studies in health research (GUIDED).[13] The IMP²ART research team consists of academics and healthcare professionals (nurses, general practitioners (GPs), health psychologists) based within the Asthma UK Centre for Applied Research. In addition, Optimum Patient Care (OPC), a not-for-profit, social enterprise, which aims to improve the diagnosis, treatment and management of chronic diseases within primary care, assisted with the development of the audit and feedback. OPC extract routine clinical data from general practices signed up to their quality improvement service, and use the data to generate audit and feedback reports. Finally, we established a multidiscipline Professional Advisory Group of GPs and nurses (n = 10) from the Primary Care Respiratory Society (PCRS) to advise on audit and feedback content. They met twice (by video-conference) during the development, and advised on the audit and feedback design. Figure 2 displays the overarching audit and feedback development phases, aligned to the MRC framework development and feasibility stages.

2.1 | MRC framework

2.1.1 | Development phase

Preliminary work included exploring relevant theory and literature relating to the use of audit and feedback in primary care to improve practice and patient outcomes. Building on the expertise of the research team, OPC and the Professional Advisory Group, we developed a prototype audit and feedback process, which was clinical system agnostic and presented in pdf format for feasibility testing.

2.1.2 | Assessing feasibility

We purposively recruited general practice staff (GPs, nurses, pharmacists, practice managers or other administrative staff) from five UK general practices. We included both clinical and administrative staff to ensure relevance of the audit and feedback to all practice staff. We provided participants with the prototype pdf versions of audit and feedback using 'dummy data'. We used semistructured qualitative
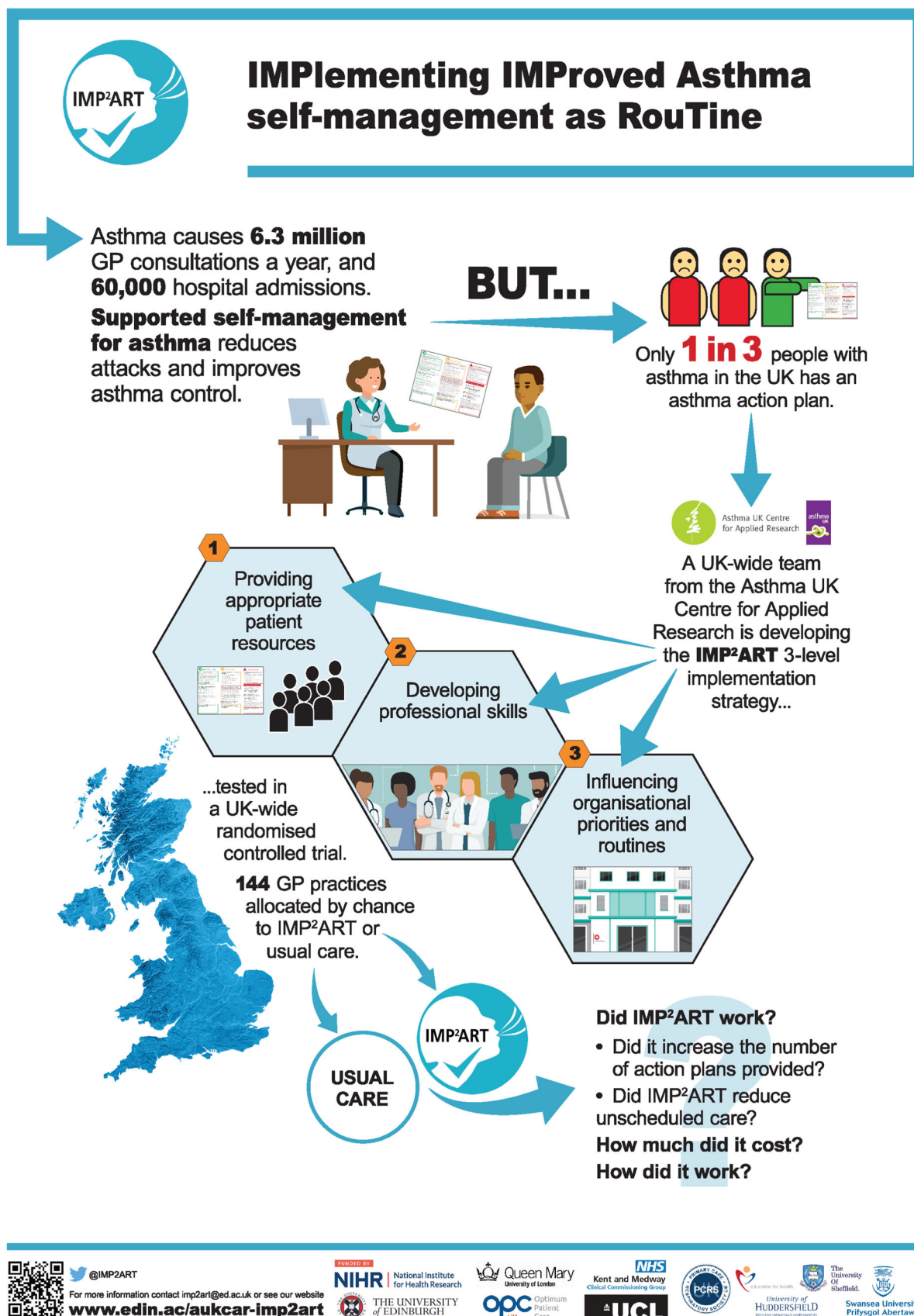
FIGURE 1 The IMPlementing IMProved Asthma self-management as RouTine (IMP²ART) programme infographic.

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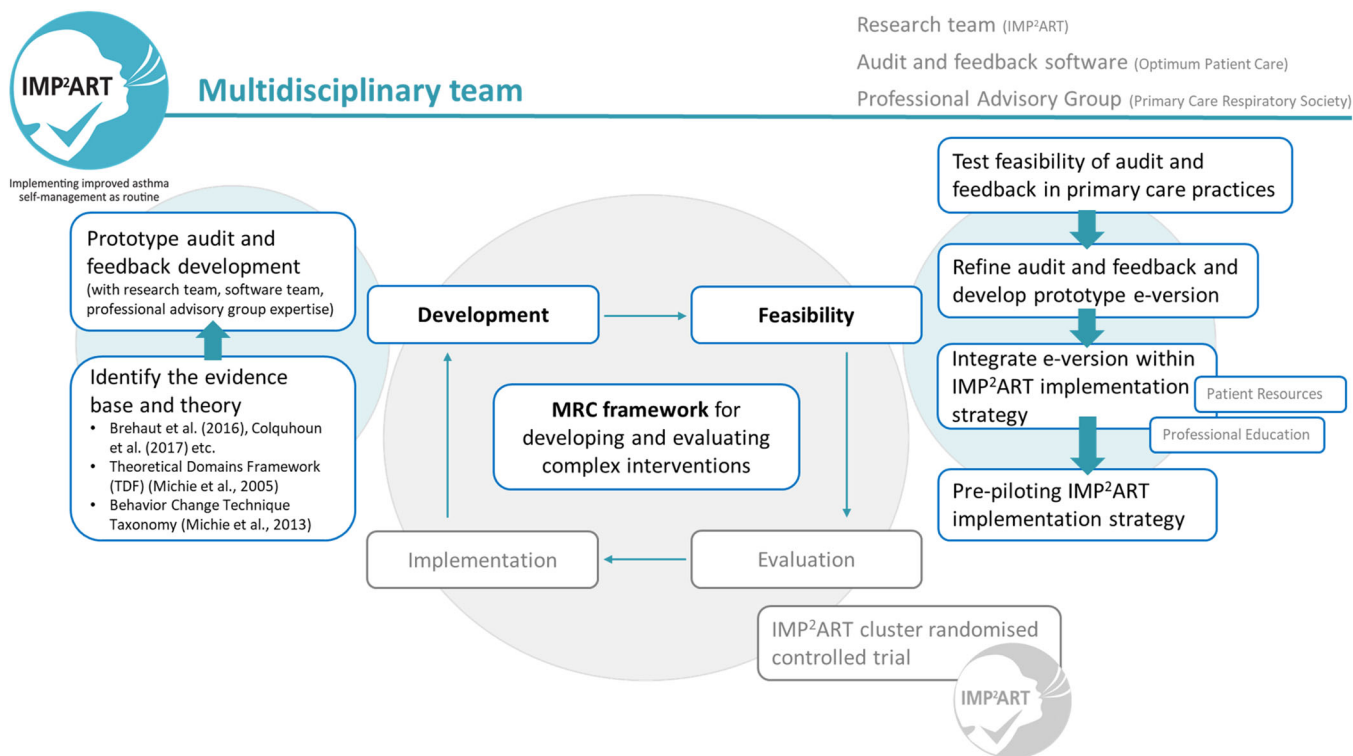McCLATCHEY ET AL.

FIGURE 2 Audit and feedback development phases aligned with the Medical Research Council (MRC) framework for developing and evaluating complex interventions.

interviews to explore their thoughts and recommendations for the audit and feedback reports and process. The interviews were carried out by A. S. and K. M. both face-to-face and by telephone between February–May 2019, and were audio-recorded, transcribed verbatim and analysed using Framework Analysis[14] in NVivo 11.

2.1.3 | Prepiloting the audit and feedback within the IMP²ART implementation strategy

Following refinement, an electronic online (Chrome HTML Document) version of the audit and feedback was integrated with the patient resources, professional training and other organisational components (a patient-centred asthma review template) of the IMP²ART implementation strategy for prepiloting in four general practices. The IMP²ART strategy is designed to be promoted by a trained nurse facilitator in a team workshop for the clinical and administrative staff in the general practice at the start of their participation in the IMP²ART programme. Additionally, IMP²ART practices receive 12 months of facilitator support (out of their 24 months in the programme) to help embed supported asthma self-management in the practice, and this includes regular audit and feedback reports. This prepilot stage allowed us to make any necessary changes before commencing a formal pilot for the cluster randomised controlled trial (RCT). The electronic prototype utilised real practice data, extracted by OPC from the clinical system of participating practices. The audit and feedback report was emailed to

practices and discussed in facilitation workshops, as would be the process in the cluster RCT.

A sample of practice staff (purposively sampled clinicians and administrative staff) from each of the four prepilot practices were interviewed via telephone by K. M. between October–November 2019, using semistructured interviews, to explore experiences of the IMP²ART strategy (including the audit and feedback). Interviews were audio-recorded, transcribed verbatim and analysed using Framework Analysis[14] supported by NVivo 11. Following the outbreak of the COVID-19 pandemic, we reviewed the audit and feedback to explore relevant inclusions with regard to COVID-19 and asthma. The refined audit and feedback was then incorporated into the IMP²ART implementation strategy for evaluation in a cluster RCT from 2021 [ref: ISRCTN15448074] (Figure 3).

3 | RESULTS

3.1 | Development phase

During the development phase, we explored the relevant theory and literature relating to the use of audit and feedback. We identified and followed Colquhoun et al.'s[15] 17 elements to be considered when designing an audit and feedback intervention (Table 1), and Brehaut et al.'s[17] 15 suggestions for optimising effective feedback interventions (Table 2). We mapped existing literature and theory using the Theoretical Domains Framework)[18] and the Behaviour Change

IMP²ART Monthly Asthma Report

Real Life Practice - Dec 2022

In December, **67.7%** of your active asthma population aged 5 years or older had a current **asthma action plan**.

Monthly Statistics · Patients with Unscheduled Care · Patients with Unscheduled Care and Review on the same day

Active Asthma Population	Real Life Practice	Comparison to 366 OPC Practices
	December	Yearly Average
All ages (n = number of patients)	n = 434	n = 229,034
Unscheduled Care in the month	23 (5%)	2%
Of these:		
No follow-up Asthma Review since the attack	21 (91%)	
No Asthma Review in the last 12 months	7 (30%)	
No Asthma Action Plan in the last 12 months	6 (26%)	
5 years or older		
Number of patients (n)	n = 433	n = 228,360
Asthma Reviews in the last 12 months	298 (68.7%)	58%
Asthma Action Plans in the last 12 months	293 (67.7%)	38%

Note:
This report covers the period until the end of Dec 2022. Any reviews and action plans provided since 31 December 2022 will not have been detected.

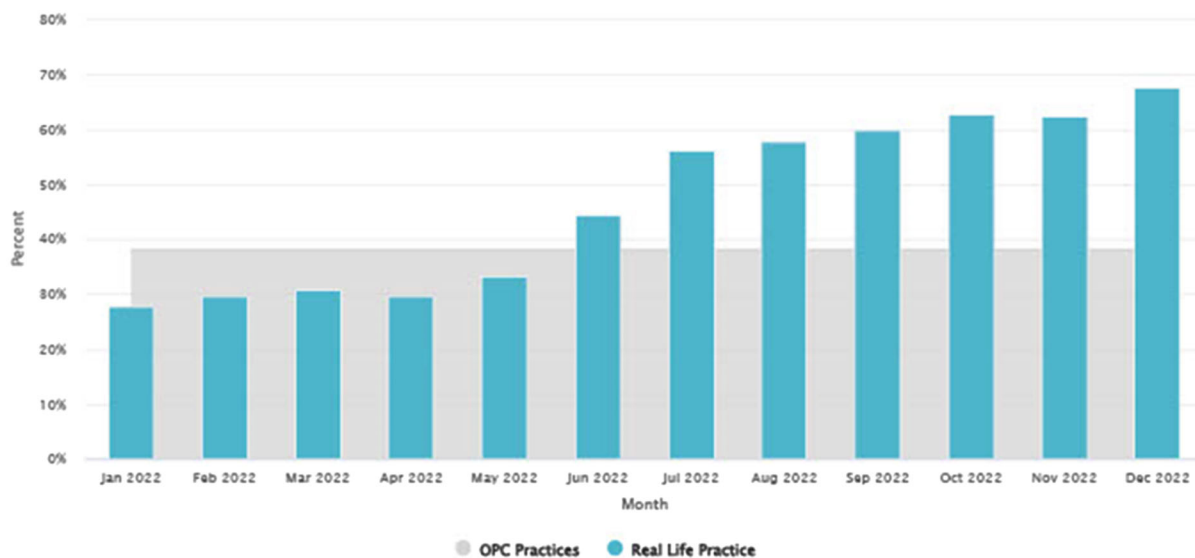### Proportion of patients with an action plan provided/reviewed in the last 12 months

FIGURE 3 Example monthly audit and feedback report.

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TABLE 1 Final audit and feedback design elements mapped to the design elements of Colquhoun et al.[15]

Design element (Colquhoun et al.)[15]	Annual audit and feedback report elements[a]	Monthly audit and feedback report elements
Who		
1. Was the feedback given to an individual, a group or both	Emailed to both individuals and the practice.	Emailed to both individuals and the practice.
2. Was it given to the person in whom the practice change was desired	Yes, provided to all practice staff.	Yes, provided to all practice staff.
What		
3. Was there feedback about the processes of care	Yes, e.g., *n*/% of asthma reviews, *n*/% of asthma action plans etc.	Yes, e.g., *n*/% of asthma reviews, *n*/% of asthma action plans etc.
4. Was there feedback about patient outcomes	Yes, e.g., *n*/% of patients with unscheduled care.	Yes, e.g., *n*/% of patients with unscheduled care.
5. Was there feedback about something other than processes of care or patient outcomes	Yes, e.g., patient demographic information, *n*/% of patients listed as current smokers etc.	No.
6. Was the feedback about individual provider performance	No.	No.
7. Was the feedback about the performance of the provider group	Yes, performance of the whole practice is provided.	Yes, performance of the whole practice is provided.
8. Was the feedback about individual patient cases	No, however, practices will be able to identify individual patients for follow-up.	No, however, practices will be able to identify individual patients for follow-up.
9. Was the feedback about an aggregate of patient cases	Yes, *n*/% of all relevant patients at the practice provided.	Yes, *n*/% of all relevant patients at the practice provided.
10. Did the feedback identify a specific behaviour(s) to be changed	Yes, e.g., following up patients with unscheduled care.	No, however, the email that delivers the report suggests reviewing patients with unscheduled care.
11. What was the comparison provided in the feedback (specified)	Comparisons to the average performance of all other OPC practices provided.	Comparisons to the average performance of all other OPC practices provided.
12. Were graphical elements included in the feedback	Yes.	Yes.
When		
13. What was the lag between the time of the audit and the delivery of the feedback	Annual.	Monthly.
Why		
14. What rationale was given for using A&F (specified)	To monitor and improve key elements of asthma self-management.	To monitor and improve key elements of asthma self-management.
How		
15. Was the feedback given face to face	No, via email, however, the report will be discussed with the practice by a trained facilitator both verbally and via email. This aligns to the following upper-level classes of the Mode of Delivery Ontology[16]: informational mode of delivery, group-based mode of delivery, asynchronous mode of delivery and push mode of delivery.	No, via email, however, on some months the report can be discussed with the practice by a trained facilitator both verbally or via email. This aligns to the following upper-level classes of the Mode of Delivery Ontology[16]: informational mode of delivery, group-based mode of delivery, asynchronous mode of delivery and push mode of delivery.
16. Were providers explicitly asked to consider the implications the A&F had for their practice	Yes.	Yes.

TABLE 1 (Continued)

Design element (Colquhoun et al.)[15]	Annual audit and feedback report elements[a]	Monthly audit and feedback report elements
How much		
17. What was the total number of times the feedback was given (specified)	Three, at the beginning, after a year, and at two years.	24 times (monthly for 24 months).

Note: n/% = number/percentage.

Abbreviation: A&F, audit and feedback; OPC, Optimum Patient Care.

[a]There are two versions of the annual report, one for adults and one for children. The child report is provided separately due to differences in standards of care, and also excludes, for example, smoking data and information.

Technique Taxonomy,[19] and used the mapping to develop the IMP²ART audit and feedback (Table 2). Guided by the theory and literature, key elements of the audit and feedback included developing both an annual full report and a brief monthly report focussed on progress with delivering action plans, with the aim that regular reports would keep supported asthma self-management on the practice agenda throughout the trial; providing specific actions to be considered (e.g., following up patients with unscheduled care); providing comparisons of performance to 366 general practices in the OPC database.

The annual audit and feedback report was designed to provide a comprehensive overview of practice asthma care including the number/percentage (n/%) of asthma patients in the practice, the number who had received unscheduled care and the number of asthma reviews and action plans that had been delivered. These data would be provided both in a numerical format and in bar charts. The charts would illustrate the comparison to the average performance of practices in the OPC database. Additional patient demographic, diagnosis, control, management, risk and exacerbations and adherence information would also be provided. Finally, the report was designed to provide asthma-related recommendations for the practice.

The monthly audit and feedback report was designed to provide a one-page overview of the practice's previous month's performance which included, the n/% of patients identified as high-risk, the n/% who received unscheduled care, the n/% of asthma reviews that had taken place and the n/% of action plans that had been provided. To highlight and promote supported self-management, action plan provision would also be displayed visually, and provide a comparison to the average of other OPC general practices. Both annual and monthly reports were designed so that data could be de-anonymised by the practices, enabling 'at-risk' patients to be identified and invited for review. It is anticipated that practices would use this information to follow up patients with unscheduled care, to review 'at-risk' patients and to ensure all patients have an asthma action plan.

The PCRS Professional Advisory Group recommended that all staff members in practices should be sent the reports, as this allows everyone to see practice progress which aligns to the IMP²ART approach of supported asthma self-management being a whole-team role. Therefore, reports would be emailed to all general practice staff and the IMP²ART-trained nurse facilitator for the practice, who could provide supportive personalised feedback if required. Further, it was suggested that when reports were sent to practices, that a final positive comment should be added to the report email (e.g., if action plans are reviewed, this can reduce unscheduled care).

Utilising the evidence base and following professional advice, prototype IMP²ART annual and monthly audit and feedback reports were produced by OPC using dummy data. The prototype monthly report had four versions, each with different visualisations of action plan provision (e.g., either bar chart or line graphs), which could be used to elicit feedback on preferred presentation.

3.2 | Assessing feasibility

3.2.1 | Qualitative feedback results

A total of nine staff from five general practices across the UK participated in the semistructured interviews. Participants included nurses (n = 4), GPs (n = 2), administrative staff (n = 2) and a practice pharmacist (n = 1). All participants in the sample were female. Five themes were identified and are outlined below.

3.2.2 | Experiences of audit and feedback

Audit and feedback was acceptable to participants, as they often used audit data in their practice. It was suggested that it could fit well within practice, particularly to identify patients who are not well-controlled and check whether they were attending annual reviews.

> "… it is quite helpful just to see what's happening and make sure that we're, you know, keeping things up-to-date and things like that." (Nurse 4, female).

3.2.3 | Views of the IMP²ART audit and feedback

Most participants were unsure of the word 'service' which was used throughout the prototype audit and feedback reports to describe the average data from other practices within the OPC quality improvement service. Participants suggested the name should include the word 'average'. There was a mix of views as to whether comparison should be made to other practices nationally or locally. Two participants felt that

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TABLE 2 Final inclusions and delivery of the annual and monthly audit and feedback reports related to theory and research.

Suggestions for optimising effectiveness (Brehaut et al.)[17]	Relation to prior research	Annual audit and feedback report inclusions[a]	Monthly audit and feedback report inclusions	Relevant TDF domains[18] and BCT Taxonomy[19] techniques (number)
1. Recommend actions that are consistent with established goals and priorities	• Feedback that is consistent with established goals and priorities is more likely to be effective.[4]	• Highlights the National Review of Asthma Deaths report.[20] • Aligns with BTS/SIGN,[21] NICE[22] and GINA[23] global guidelines on the management of asthma and NHS QOF standards.[24]	• Aligns with BTS/SIGN,[21] NICE[22] and GINA[23] global guidelines on the management of asthma and NHS QOF standards.[24]	**Social Influences** • *Information about others' approval (6.3)* • *Credible source (9.1)*
2. Recommended actions that can improve and are under the recipient's control	• Feedback is more effective when it includes both explicit targets and an action plan.[4]	• Actions that are recommended by the report (e.g., following up patients with unscheduled care) can be carried out by practice staff.	• Actions that are recommended in the email that delivers the report include reviewing patients with unscheduled care to discuss their management and update/provide an asthma action plan. This can be carried out by practice staff.	**Goals** • *Goal setting (behaviour) (1.1)* • *Action planning (1.4)*
3. Recommend specific actions	• Feedback is more effective when it includes both explicit targets and an action plan.[4]	• Suggests targeting patients with unscheduled care for an asthma review and action plan provision/update. • Highlights resources that can be used to motivate patients to attend review (e.g., asthma review invitation letter template). • Recommends following BTS/SIGN Steps.[21] • Asks practices to consider flu vaccine provision for at-risk groups; smoking cessation support; increasing ICS in smokers; rhinitis therapy; lung function testing; reviewing ICS adherence; review oral steroid use; reviewing inhaler technique; osteoporosis prophylaxis/monitoring; diet/weight loss support; referral for specialist care.	• The report enables the practice to identify patients who have had unscheduled care in the last month, and the n/% of these who have been followed-up, had a review in the last 12 months, and had an action plan provided in the last 12 months. • The email that delivers the report recommends reviewing patients with unscheduled care to discuss their management and update/provide an asthma action plan.	**Goals** • *Goal setting (behaviour) (1.1)*
4. Provide multiple instances of feedback	• Feedback is more effective when the feedback is frequent.[4,25]	• A comprehensive audit and feedback report will be provided annually.	• A succinct (one-page) audit and feedback report will be provided monthly.	**Knowledge** • *Feedback on behaviour (2.2)* • *Feedback on outcome(s) of behaviour (2.7)*
5. Provide feedback as soon as possible and at a frequency informed by the number of new patient cases	• Feedback is more effective when the feedback is frequent.[4,25]	• Not applicable for the annual audit and feedback report.	• A succinct (one-page) audit and feedback report will be provided monthly.	**Knowledge** • *Feedback on behaviour (2.2)* • *Feedback on outcome(s) of behaviour (2.7)*

TABLE 2 (Continued)

Suggestions for optimising effectiveness (Brehaut et al.)[17]	Relation to prior research	Annual audit and feedback report inclusions[a]	Monthly audit and feedback report inclusions	Relevant TDF domains[18] and BCT Taxonomy techniques[19] (number)
6. Provide individual rather than general data	• Although individual feedback is suggested as more useful than team feedback, this type of small group feedback (e.g., the general practice) is still preferable over larger groups (such as geographic regions).[17] • Ensure data matters to recipients.[26]	• The annual report will be delivered to the whole general practice team, to highlight the whole practice role in supporting self-management. However, practices will be able to identify specific patients with unscheduled care for follow-up.	• The monthly report will be delivered to the whole general practice team, to highlight the whole practice role in supporting self-management. However, practices will be able to identify specific patients with unscheduled care for follow-up.	• **Knowledge** • *Feedback on behaviour (2.2)* • *Feedback on outcome(s) of behaviour (2.7)*
7. Choose comparators that reinforce desired behaviour change	• Unclear evidence on the efficacy of comparisons of performance against that of other health professionals or peers.[27]	• Comparisons to the average performance of all other OPC practices will be provided in the report for unscheduled care; asthma reviews; asthma action plans; asthma control by RCP3 questions[28]; reliever use (number of SABA prescriptions); BTS-SIGN Steps[21]; lung function assessment; REG asthma risk score[29]; smoking status; adherence; exacerbations; OCS use; inhaler technique; flu vaccinations. • The report also suggests how other practices use the reports to make improvements, e.g., by reviewing the care of patients identified in the reports to improve their management or treatment; identifying/reviewing patients who may potentially have a disease for diagnosis; identifying areas for optimising medication prescribing; undertaking clinical audits to aid quality improvement, e.g., in practice quality improvement meetings and discussions; supporting healthcare professional appraisals, revalidation and education.	• Comparisons to the average performance of all other OPC practices will be provided in the report for the percentage of asthma reviews in the last 12 months; the percentage of asthma action plans provided in the last 12 months (this will also be provided visually in a bar chart, which includes n/%).	• **Social Influences** • *Social Comparison (6.2)*
8. Closely link the visual display and summary message	• Feedback should include a verbal summary message and can often be effectively supported by visual or graphical elements.[25]	• The annual report includes text information supplemented with visual charts and diagrams.	• The monthly report includes text information supplemented with a chart displaying the n/% of asthma action plans provided in the last 12 months.	• **Knowledge** • *Salience of consequences (5.2)*
9. Provide feedback in more than one way	• Feedback is more effective when delivered in both verbal and written formats.[4]	• The report will include text information and visual charts and diagrams. The report will also be discussed with the practice by a trained facilitator both verbally and via email.	• The report will include text information and a chart. Some months, the report will also be discussed with the practice by a trained facilitator both verbally and via email.	• **Knowledge** • *Problem solving (1.2)* • *Feedback on behaviour (2.2)*

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TABLE 2 (Continued)

Suggestions for optimising effectiveness (Brehaut et al.)[17]	Relation to prior research	Annual audit and feedback report inclusions[a]	Monthly audit and feedback report inclusions	Relevant TDF domains[18] and BCT Taxonomy techniques[19] (number)
10. Minimise extraneous cognitive load for feedback recipients	• Overly complex information is often misunderstood, incompletely understood or entirely ignored by busy providers.[30]	• Not applicable for the annual audit and feedback report which is a comprehensive document.	• The monthly report will provide key indicators on one-page, reducing cognitive load.	• **Memory, attention and decision processes** • *Conserving mental resources (11.3)*
11. Address barriers to feedback use	• Delivering feedback to a practitioner's inbox does not guarantee that the information will be read.[17] • Provide access to someone to assist with interpretation.[26]	• The report will be emailed to all practice staff whose email addresses we have been given permission to use. In addition, it will be discussed with the practice by a trained facilitator both verbally and via email.	• The report will be emailed to all practice staff whose email addresses we have been given permission to use. In addition, it will be discussed with the practice by a trained facilitator both verbally and via email.	• **Knowledge** • *Problem solving (1.2)* • *Feedback on behaviour (2.2)* • *Review behaviour goal (s) (1.5)*
12. Provide short, actionable messages followed by optional detail	• Feedback is more effective when it includes both explicit targets and an action plan.[4]	• The annual audit and feedback report provides short actions that can be implemented by the practice to improve care. However, it includes comprehensive data, as the report is designed for only annual delivery.	• The monthly report highlights patients who have had unscheduled care in the last month, and the n/% of these who have been followed-up, had a review in the last 12 months, and had an action plan provided in the last 12 months. The email that delivers the report recommends to review patients with unscheduled care to discuss their management and update/provide an asthma action plan.	• **Goals** • *Goal setting (behaviour) (1.1)*
13. Address credibility of the information	• Delivery of audit and feedback with the presence of facilitators may improve the adoption of correct practices.[31]	• The reports will be provided by OPC (a not-for-profit, social enterprise, improving the diagnosis, treatment and management of chronic diseases within primary care), for the National Institute for Health and Care Research IMP²ART trial, led by researchers from The University of Edinburgh and Queen Mary University of London. In addition, the report will be discussed with the practice by a trained facilitator.	• The reports will be provided by OPC (a not-for-profit, social enterprise, improving the diagnosis, treatment and management of chronic diseases within primary care), for the National Institute for Health and Care Research IMP²ART trial, led by researchers from The University of Edinburgh and Queen Mary University of London. In addition, some months the report will be discussed with the practice by a trained facilitator.	• **Social influences** • *Credible source (9.1)*
14. Prevent defensive reactions to feedback	• Designers should consider the circumstances under which negative reactions to feedback might reduce motivation to change behaviour.[17]	• The report will provide practice data delivered to the whole practice team, as opposed to individual data, which may reduce defensive reactions.	• The report will provide practice data delivered to the whole practice team, as opposed to individual data, which may reduce defensive reactions.	• **Emotion** • *Framing/ reframing (13.2)*

TABLE 2 (Continued)

Suggestions for optimising effectiveness (Brehaut et al.)[17]	Relation to prior research	Annual audit and feedback report inclusions[a]	Monthly audit and feedback report inclusions	Relevant TDF domains[18] and BCT Taxonomy techniques[19] (number)
15. Construct feedback through social interaction	• Delivery of audit and feedback with the presence of facilitators may improve the adoption of correct practices.[31]	• Feedback will be motivating, as it will suggest actions that can be taken to improve practice, which may also reduce defensive reactions. • The report is also delivered to a trained facilitator for each general practice, who can provide support and advice to improve performance.	• Feedback will be motivating, as it will suggest actions that can be taken to improve practice, which may also reduce defensive reactions. • The report is also delivered to a trained facilitator for each general practice, who can provide support and advice to improve performance.	• Social influences • Social support (practical) (3.2)

Note: n/% = number/percentage.

Abbreviations: BCT, behaviour change technique; BTS/SIGN, British Thoracic Society/Scottish Intercollegiate Guidelines Network; ICS, inhaled corticosteroids; NHS, National Health Service; OCS, oral corticosteroid; OPC, Optimum Patient Care; QOF, quality outcome framework; REG, respiratory effectiveness group; SABA, short-acting beta-agonists; TDF, Theoretical domains framework.

[a]There are two versions of the annual report, one for adults and one for children. The child report is provided separately due to differences in standards of care, and also excludes, for example, smoking data and information.

displaying a comparator to local as well as national practices would be of benefit; others felt that national comparison was most important.

> "… we should be all working to the same standards across the whole country" (Administrator 1, female).

Most participants felt that the most efficient way to disseminate audit and feedback reports was to email reports to the practice manager, who could then disseminate to relevant staff members, for example, the nurses conducting asthma reviews.

3.2.4 | Views of the IMP²ART annual audit and feedback report

In general, the annual and monthly feedback report were viewed positively. For example, participants welcomed the bar charts included in the reports, as well as the simplicity of the design. Further, participants discussed how they would use the report in practice, for example, by using the information to improve services.

> "I'm very proactive about any kind of quality improvement in my practice and I think it was a very useful report. I thought that kind of data would be great for us … regarding tailoring our chronic disease management for the asthmatic population." (General Practitioner 2, female)

Some participants described which aspects of the annual report would be particularly useful (such as unscheduled care and the number of asthma action plans provided). Although some of the participants thought that the annual report was 'good' and useful for quality improvement, one participant described it as 'a little bit tick-box' and that 'supported self-management' as an entity was not clearly displayed.

3.2.5 | Views of the IMP²ART monthly audit and feedback report

Participants felt that the monthly audit and feedback were clear, straightforward and could be used for quality improvement purposes. There was a preference for bar charts over line graphs. Some participants suggested that they could use the report to assess attendance, for example, during flu vaccination season when it may be more difficult to get an appointment, though others felt that they would not have time to look at it every month, or would prefer to use the annual report.

> "I'm quite interested in looking for outlying things to work on in terms of quality improvement activities, so I think that this stimulates that." (General Practitioner 2, female).

Positive aspects of the report included being able to identify high-risk patients, those who had unscheduled care, and patients

who did not have action plans. One clinical participant felt the monthly report was limited.

3.2.6 | Recommendations for the IMP²ART audit and feedback

Recommendations for the annual report included highlighting the importance of action plan provision.

> "… a quick line showing a percentage of effectiveness would be great." (Administrator 1, female).

Smoking status, inhaler technique and prescribing data (e.g., reduced salbutamol use) were also recommended to be included in the annual audit and feedback, as well as providing more information about those who have had unscheduled care.

> "You could maybe even do "smoking status" with all your asthmatics and whether you could target that, because that's the biggest difference you're going to make for some of your asthmatics." (General Practitioner 1, female)

A further recommendation was to include the audit and feedback data on the NHS primary care dashboard.[32]

Finally, participants were asked whether they thought adding a 'top tip' each month would be helpful. Participants generally liked the idea, and suggested relating tips to guidelines and also to highlight points to consider, and not to deliver tips in a negative way. There was a mixture of views on the optimal frequency of the report. Some felt that monthly audit and feedback may be too frequent, as it may not show meaningful change, and there was also concern that there would not be enough time to look at it each month.

3.2.7 | Refining after assessing feasibility

Following the interviews we refined the reports, for example, the terminology 'service' was changed to 'OPC practices' or 'OPC Quality Improvement Database'. To highlight supported self-management and the importance of asthma action plans in the annual audit and feedback, the report was amended to include an 'IMP²ART Focus' which highlighted British Thoracic Society/Scottish Intercollegiate Guidelines Network (BTS/SIGN)[21] asthma guidelines and focused on key indicators of unscheduled care, asthma reviews and self-management plans (n/%). Information on smoking status, inhaler technique and prescribing data were added to the annual report. Further, the n/% of patients who had unscheduled care in the last year who have not had a review in the last year was added to the report. Monthly reports were amended to provide additional detail about patients with unscheduled care (e.g., the n/% without an asthma review in the last 12 months), and were designed to include

bar charts (as opposed to line graphs), following the preference from participants.

Although it was suggested to include the audit and feedback data on the NHS primary care dashboard,[32] it would have been difficult to gain access to this for the trial, therefore was not developed further. Finally, although the PCRS Professional Advisory Group recommended that all staff members in practices should be sent the reports, following the views of participants that the most efficient way to disseminate audit and feedback reports was to email them to the practice manager, we compromised and restricted the mailing to key members of the general practice team (practice managers, lead GPs and nurses) in the prepilot.

3.3 | Prepiloting the audit and feedback within the IMP²ART implementation strategy

Electronic online (Chrome HTML Document) prototypes of the refined audit and feedback reports (annual and monthly) were integrated with the patient resources and professional training components of the IMP²ART implementation strategy and introduced during the team workshops (delivered by a trained nurse facilitator) for whole-system prepiloting in four general practices. The electronic prototype used real practice data, extracted by OPC from each practice's clinical system. A total of nine staff provided feedback on the IMP²ART implementation strategy in the prepilot semistructured interviews. Participants included nurses (n = 2, female), general practitioners (n = 4, 2 male, 2 female) and administrative staff (n = 3, female).

Of the nine participants, only three had viewed the audit and feedback reports before the interview. Those who had viewed the reports described them as clear and easy to view. It was apparent, however, that participants were unaware that practices could de-anonymise the report and identify their patients who had received unscheduled care so they could prioritise appropriate follow-up asthma reviews.

3.3.1 | Refining after the prepilot interviews

Following the prepilot interviews, minor amendments were made to the annual report, which included providing an 'IMP²ART Focus' at the very start of the report and adding in additional information into various sections. Further, a section was added to make practices aware that they could de-anonymise the report and identify individuals with an episode of unscheduled care who could be targeted for a follow-up review. Detail on the monthly reports for patients with unscheduled care was changed to show the n/% who had had an asthma review and action plan in the last 12 months, and also the n/% of those patients who had been followed-up since the asthma attack.

Finally, as only a small number of prepilot interview participants had viewed the reports within the IMP²ART strategy delivery, it was decided that for the cluster RCT as many general staff members as

possible in the practice would be emailed the audit and feedback reports by the researchers (rather than relying on cascading within the practice), to ensure that all staff who are potentially interested in viewing the reports are able to do so. This aligned with the PCRS Professional Advisory Group recommendations in the development phase.

3.4 | Final IMP²ART annual and monthly audit and feedback and adaptations for COVID

The final IMP²ART annual audit and feedback report that is being used in the trial has an 'IMP²ART Focus' which highlights BTS/SIGN asthma guidelines and prioritises the key indicators of unscheduled care, asthma reviews and asthma action plans. It also includes a guide of how to use the report; patient demographics (including comorbidities); asthma management (e.g., control, reliever use, BTS-SIGN Steps, lung function assessment); risk factors (e.g., smoking, adherence, inhaler technique) and exacerbations and considerations for the practice (e.g., flu vaccinations, asthma management considerations such as reviewing oral steroid use).

The final IMP²ART monthly audit and feedback includes the number of the asthma population with a current asthma action plan (this is also provided in a chart); the number of patients with unscheduled care in the last month, and of those, the number who have had a review since the asthma attack, the number who have had a review in the last 12 months and the number who have had an asthma action plan in the last 12 months. An example of a monthly audit and feedback report using dummy data can be found in Figure 3. Final IMP²ART audit and feedback design elements and relation to theory and literature can be found in Tables 1 and 2, respectively.

The development, feasibility pilot and prepilot phase took place before the outbreak of the COVID-19 pandemic. With the onset of the pandemic, and in discussion with the multidisciplinary team, we made further adaptations to the annual audit and feedback report. For example, we added the n/% of asthma patients considered at high-risk of complications due to COVID-19; COVID-19 history (the n/% of asthma patients with a confirmed or suspected case); and COVID-19 vaccination status (n/%).

4 | DISCUSSION

We have described the theoretically- and evidence-based development of audit and feedback to promote implementation of supported asthma self-management within an implementation research programme. Aligned to the MRC framework,[11] the process included a development phase drawing on existing literature, a feasibility phase to explore healthcare professional views of the prototype process and reports, and a prepilot incorporating the audit and feedback as a component of the whole systems. IMP²ART implementation strategy. Following the feasibility and prepilot

testing of the audit and feedback, recommendations were considered and changes were made. We reviewed all suggested changes but opinions on ideal content varied, and at times conflicted. The IMP²ART team took final decisions on content to ensure adherence to guideline recommendations, and to meet majority preferences within any practical constraints of the data extraction process. Defining elements of the IMP²ART audit and feedback include the two types of reports (1) an annual report that provides in-depth data related to asthma management (2) a brief one-page report to be delivered monthly, highlighting supported asthma self-management delivery.

5 | STRENGTHS AND LIMITATIONS

The IMP²ART audit and feedback were developed rigorously in-line with existing literature and theory. In response to evidence that the reporting of the use of theory in studies of audit and feedback is limited,[6,7] we provide an in-depth and explicit description of the literature and theory used to guide the development of the audit and feedback, which strengthens its reporting, and gives the potential to act as an exemplar for future audit and feedback development. Additionally, the IMP²ART audit and feedback were developed with the multidisciplinary IMP²ART team, a number of whom currently work in primary care and current general practice staff in the feasibility and prepilot stages. This strengthens its applicability to real-world practice, and ensures that it is acceptable to current general practice teams. The relatively small number of people interviewed at each stage is a limitation, though nine different practices from across the UK were recruited for the feasibility and prepilot testing providing perspectives from a total of six GPs, six nurses, five administrative staff and one pharmacist increasing the number of views heard. In addition, we engaged with a PCRS Professional Advisory Group of 10 primary care colleagues able to provide further views and a broader context.

6 | CONCLUSION

We conclude that a multistage development process, aligned with the MRC complex intervention framework, contributed to the design and delivery of the audit and feedback. Theoretical considerations, multidisciplinary team discussions and professional advisory group consultation, informed the initial development; and in-practice testing and prepilot stages enabled refinement. This audit and feedback development process can be used as a framework to inform the future development of audit and feedback strategies for use in healthcare settings to encourage a change to clinical practice. The IMP²ART strategy (incorporating the audit and feedback, as well as patient resources and professional education) is now being tested in a UK-wide cluster RCT [ref: ISRCTN15448074], evaluating implementation (action plan ownership) and health outcomes (unscheduled care).

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AUTHOR CONTRIBUTIONS

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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