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Title: Increasing Podiatry Referrals for Patients with Inflammatory Arthritis at a Tertiary Hospital in Singapore: A Quality Improvement Project

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Increasing Podiatry Referrals for Patients with Inflammatory Arthritis at a Tertiary Hospital in Singapore: A Quality Improvement Project

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HIGHLIGHTS / BRIEF SUMMARY

WHAT IS ALREADY KNOWN

- Inflammatory arthritis is a common cause of foot pain and deformity.
- Barriers preventing people with inflammatory arthritis from accessing podiatry services have been reported in previous studies from the UK, Australia and New Zealand.
- Improving access for people with inflammatory arthritis to podiatry services can ensure the prevention and timely management of inflammatory arthritis-related foot problems.

WHAT THIS STUDY ADDS

- A structured quality improvement program can successfully improve rates of referral to podiatry for people with inflammatory arthritis and foot pain.
- This study found that there was low uptake of podiatry services due to its poor integration into mainstream care for people with inflammatory arthritis.
- Quality improvement methods used in this study can be applied to other centers globally to attenuate the unmet need for podiatry in rheumatic conditions and the underuse of podiatry services.

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Abstract

Background Foot disease is highly prevalent in people with inflammatory arthritis and is often under-recognized. Podiatry intervention can significantly reduce foot pain and disability, with timely access being the key factor. The aim of this study was to plan and implement a quality improvement project to identify the barriers to, and improve, uptake of podiatry services among patients with inflammatory arthritis-related foot problems seen at a tertiary hospital in Singapore.

Method A 6-month quality improvement program was conducted by a team of key stakeholders using quality improvement tools to identify, implement and test several interventions designed to improve uptake of podiatry services. The number of patients referred for podiatry assessment was recorded on a weekly basis by an experienced podiatrist. The criterion for appropriate referral to podiatry was those patients with current or previous foot problems such as foot pain, swelling and deformity.

Results Interventions included education initiatives, revised workflow, development of national guidelines for inflammatory arthritis, local podiatry guidelines for the management of foot and ankle problems, routine use of outcome measures, and introduction of a fully integrated rheumatology-podiatry service with reduced cost package. Referral rates increased from 8% to 11%, and were sustained beyond the study period. Complete incorporation of podiatry into the rheumatology consultation as part of the multidisciplinary team package further increased referrals to achieve the target of full uptake of the podiatry service.

Conclusion Through a structured quality improvement program, referrals to podiatry increased and improved the uptake and acceptance of rheumatology-podiatry services.

List of abbreviations:

Inflammatory arthritis	IA
Multidisciplinary team	MDT
Rheumatoid arthritis	RA
Quality improvement project	QIP
Patient reported outcomes	PRO
Plan-Do-Study-Act	PDSA

Keywords:
Healthcare improvement
Quality improvement
Podiatry
Inflammatory arthritis

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INTRODUCTION

Foot deformity and its associated symptoms of pain and stiffness are common in people with inflammatory arthritis (IA), with 48 -100% reporting foot pain at some point during the disease course [1- 7]. It is known that for people with IA, the involvement of the feet, even to a mild degree, is a significant marker for future impaired mobility, functional incapacity and negative psychosocial impact [8,9].

The role of the podiatrist in the rheumatology team is becoming recognized as a vital component in the delivery of integrated care by a multidisciplinary team (MDT) [9,10]. International guidelines recommend patients with Rheumatoid arthritis (RA) should be referred to podiatry with emphasis on access and timely non-surgical interventions [11]. There is evidence that early intervention for existing or potential foot problems can improve long-term outcomes [11,12].

Despite widespread recognition of the importance of foot care for people with IA, studies have reported multiple barriers to accessing adequate foot care [9,13,14]. In Singapore, two key contextual challenges preventing uptake of podiatry services appear to be cost and attitude to healthcare. Firstly, even with a government subsidy for healthcare expenses, out-of-pocket payment at the point of care can vary considerably for each service and for each patient, and therefore the cost to the patient plays a major role in healthcare decisions. Secondly, Asian cultures tend to adopt a doctor-centred care delivery. Consequently, patients have poor general awareness of allied health services and give low priority to therapy-based interventions, especially older patients who have experienced doctor-led consultations through most of their lives [15]. Patients mainly access podiatry services by referral from a doctor with most referrals coming from within the hospital. A referral by internal doctor affords a government subsidy for the patient, which reduces their treatment charges by 50%. Therefore, referral to podiatry is more dependent on the doctor's initiative and knowledge of allied health care.

The primary objective was to increase referrals of patients with IA-related foot problems to podiatry at a tertiary university hospital in Singapore over a 6-month period. The aim of the study was to plan and implement a quality improvement project to identify the barriers to, and improve, uptake of podiatry services among patients with IA-related foot problems.

MATERIAL AND METHODS

The study population comprised of participants with a rheumatologist-diagnosis of IA, attending the MDT clinic and who were identified to have IA-related foot problems. Participants were recruited from a tertiary hospital in Singapore. Ethics committee approval was waived. In order to identify appropriate intervention strategies to improve uptake of podiatry services in these patients, a QIP framework was applied.

QI Methodology

The QIP framework is commonly used to improve quality in healthcare delivery. It provides a structure consisting of systematic and continuous evaluation of systems and processes that leads to measurable and sustained improvement in healthcare service delivery [16]. An effective QIP results in a balance of quality, efficiency and profitability in its achievement of the team goals [16]. Table 1 describes the five recognized stages in the improvement process.

RESULTS

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Phase 1: The project

Firstly, the productivity of the podiatrist in the MDT clinic was reviewed. This clinic was established 12-months prior to the study with the aim of improving same-day access to podiatry care for patients with IA foot pain, swelling and deformity identified during their consultation with the rheumatologist. A 3-month case note review of the MDT clinic, completed prior to commencing the QIP, demonstrated that foot problems were common in patients with IA, and revealed a shortfall in referrals of patients who should have been reviewed by podiatry. An average of only 2.5 patients per clinic session was referred for podiatry assessment (8% of total identified patients with IA foot problems). This supporting data was used to verify the existence of the problem, and a review of international best practice was used to identify the gaps in our current practice. Subsequently, a focus group comprising of stakeholders were formed.

Phase 2: Diagnostic phase

The operational and clinical workflow of care delivery to IA patients attending the MDT clinic was reviewed during the focus group. It highlighted two bottlenecks causing inefficiency in the system and under-use of services at the clinic. The first bottleneck was during patient health screening before the doctor's appointment, involving a number of tests performed in different rooms, with different waiting times and areas, coordinated by different staff, leading to poor communication, time wasted and resources under-utilized. The second bottleneck followed the doctors consult when the patient was referred to the podiatrist, multiple steps in the process led to poor coordination and unnecessary interruptions.

A root cause analysis was conducted and barriers to uptake of services were identified as patient, doctor, podiatrist and system factors. A convenience sample of 10 patients attending the MDT clinic was used to conduct a small-scale patient survey to inform the patient category of the root cause analysis. The findings demonstrated the barriers preventing uptake of podiatry services were lack of patient awareness and understanding of the role of podiatry, low priority given to therapy services, lack of time and financial constraints (Supplementary File 1). The root causes for the doctor, podiatrist and the system are detailed in Figure 1. Multi-voting and the Pareto chart (Figure 2) was used and the 3 identified areas for intervention were: lack of patient awareness of podiatry, no formal workflow at the MDT clinic, and no formal IA-related podiatry guidelines in use.

Phase 3: Intervention phase

Based on the root cause analysis and Pareto chart four interventions were implemented to address the identified root causes (Table 2).

Intervention 1: Patient information (Root Cause: Lack of patient awareness)

Two patient information leaflets were designed and then implemented by the key stakeholders. The information was based on international guidelines [8, 20-23] and contemporary arthritis guides for patients [24]. The first contained information on the MDT and the management of IA, while the second focused specifically on the role of the podiatrist in managing IA patients with foot problems. The leaflets were given to patients by the rheumatologists and podiatrist at the MDT clinic over a two week period. Patients were surveyed and their views were sought on leaflet content, format and their ability to understand and retain the information. The findings demonstrated 100% agreed the information was beneficial, though 40% found the information difficult to retain and 80% felt the content was too much. Patient feedback led to the reduction of text heavy sections in the leaflets and also to the provision of information in various other formats including posters, foot care

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checklist, patient individualized treatment plan, bulletins on social media and a video documenting a patient's journey with IA. Subsequently, the leaflets were professionally printed and distributed on a larger scale, and the posters and video were prominently displayed in the clinic waiting area and used to supplement verbal information during patient consultations. A newspaper interview in one of the local languages (Mandarin Chinese) on how IA affects the feet was also published at this time.

Intervention 2: Revision of workflows (Root cause: No formal workflow)

A revised workflow re-allocated staff to different work areas. The nurse assistants, previously working inside the doctor consult rooms, were moved to work in a central space connected to 4 doctors' consult rooms. Other members of the MDT, previously floating between clinics, were also given designated consult rooms next to the central connecting space. This improved the efficiency and accessibility of the nurse assistants and allowed better coordination and patient flow. Additionally, a checklist was created for the rheumatologists to complete for each patient, to mark required MDT referrals, as well as blood tests and appointments – thus acting as a visual reminder to refer patients. A second PDSA cycle was conducted to evaluate the new workflow. Staff were surveyed on the workflow usability, and its effect on productivity and efficiency. Improved signposting and clear designation of roles were implemented as a result.

Intervention 3: Patient empowerment (Root cause: Lack of patient awareness)

A patient self-screening initiative was implemented to increase patient engagement and empower patients as participants in their care. Patients used automated instruments to measure their own blood pressure, height and weight, followed by the use of tablet computers to complete patient reported outcome (PRO) questionnaires whilst waiting to see the doctor. The PROs included measurement of quality of life by the European Quality of Life 5 Dimensions 3 Level (EQ-5D) [25], physical function measured using the modified Health Assessment Questionnaire (mHAQ) [26], self-efficacy using the Rheumatoid Arthritis Self Efficacy (RASE) questionnaire [27], pain measured using a 100mm Visual Analogue Scale (VAS), and medication adherence using the Medication Adherence Rating Scale (MARS) [28]. Current foot pain was inserted into the PRO questionnaire. A positive response triggered an auto-referral to the podiatrist by the nurse-assistant so that the patient could be seen before the rheumatologist consultation.

Intervention 4: Clinical practice guidelines (Root cause: Lack of formal guidelines)

The Singapore rheumatology-podiatry special interest group was established in October 2014 and includes members from the podiatry departments of all the 6 public hospitals in Singapore. This group formulated and launched local guidelines for the assessment and management of foot and ankle problems associated with IA to each podiatry department leading to permanent change in practice, a first and unique development for podiatry in Singapore. Clear referral criteria and information on podiatry interventions were provided in the guidelines to enable appropriate referral. Routine use of outcome measures for the assessment of baseline foot pain, deformity, impairment and quality of life in patients with IA and the impact of podiatry interventions were also agreed by the special interest group. Additionally, the lead author (KC) contributed to the Singapore national RA clinical practice guidelines incorporating evidence-based recommendations for podiatry, including the role of podiatry in early and established RA, and podiatry assessment and management within a MDT.

Phase 4: Impact phase

A total of 655 patients with IA were seen during the 6-month study period, of which 248 patients (38%) were identified with IA-related foot problems. Of the eligible patients, 72 were referred to podiatry (11% of total) (Figure 3). There was an improvement over 6-months in referral rates to an average of 3.6 patients per session.

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Phase 5: Sustain improvement phase

A third PDSA cycle was conducted to on 8 participants to determine patient satisfaction with the MDT service. All participants were satisfied/very satisfied with the podiatry assessment and treatment, and 7 were satisfied/very satisfied with the convenience of the walk-in service. However, 6 of 8 were neutral or unsatisfied with the cost of the podiatry consultation. Based on the findings, the MDT clinic was re-designed from being a walk-in service to a fully integrated rheumatology-podiatry consultation with bundled payment. The bundled payment was designed to be lower than the cost of seeing each healthcare professional separately. The total number of patients assessed by the podiatrist increased from 2.5 to 8 patients per weekly clinic session after the study period, fully utilising the podiatry consult times.

DISCUSSION

Through a structured QI programme we successfully improved rates of referral to podiatry for patients with IA and foot pain. This study is the first to describe a QIP in podiatric rheumatology, showing implementation of pragmatic and low-cost interventions that can be sustained by the measures outlined; patient engagement, efficient workflow, compliance to best practice guidelines and full integration of rheumatology-multidisciplinary services.

The location and population of this study may not be representative of the healthcare setting in other countries. However, similar barriers preventing people with IA from accessing podiatry services have been reported in previous studies from the UK, Australia and New Zealand [9,13,14,29]. Awareness of the barriers preventing uptake of podiatry services has the potential to improve patient care and long term outcomes [29]. There is a widespread lack of knowledge of what causes foot problems associated with IA and the role of the podiatrist [8,30]. Written educational materials are frequently used in clinical settings and are an effective means of increasing knowledge amongst patients with IA [8,31]. It is particularly important in the context of IA where adequate knowledge may influence patient's decisions regarding treatment options, compliance and performance of self-care [8,31]. The results from this study also found this small-scale low-cost intervention helpful to increase patient's awareness of podiatry, and demonstrate compliance with standards on provision of educational material in rheumatology [8,22]. The study also actively engaged patients to contribute to the planning and development of this particular health service improvement initiative. The involvement of patients has become an integral part of improving the quality of health care. It has previously been shown that involving patients leads to more accessible and acceptable services and improves the health and quality of life of patients [32].

This study found that there was low uptake of podiatry services due to its poor integration into mainstream care for people with IA. The strongest barriers preventing patients from accessing the podiatry service were lack of patient awareness of podiatry, low priority given to therapy services, lack of time and financial constraints. Lack of such integration suggests a shortfall in foot care provision [14], and lack of targeted management that meets the complex needs of people with IA-related foot problems. Standards of care guidelines and expert-led recommendations advocate the integration of specialist podiatry within rheumatology MDT to allow rapid access to foot care [8,20,21,23,33]. There is evidence that such care paradigms are being implemented [11], although there is also research from the UK, New Zealand and Australia that suggests the provision of dedicated podiatry services within rheumatology departments varies significantly by region [4,13,14, 33]. Key workflow changes and the re-design of the clinic to a fully integrated rheumatology-podiatry consultation with reduced cost payment, ensures our compliance with quality standards. The current findings suggest early success has come from careful planning of the logistics and organization of the clinic, along with full and equal participation of all stakeholders who share the same egalitarian values, thus avoiding conflict. The MDT concept is increasingly gaining popularity

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and traction, and has been shown that holistic review by the MDT improves outcomes in complex cancer care [34-36]. However, it is unclear whether the allocation of resources indeed transfers to a tangible benefit in terms of quality of life and disability prevention. Further data collection beyond the QIP is proposed at the integrated rheumatology-MDT clinic to determine if the referral rate of patients with IA to podiatry can be sustained. Future study initiatives will also include the analysis of outcomes of patients attending the integrated MDT clinic to determine whether it will achieve better disease control, less impairment and improved quality of life, and will result in better value care despite the initial increased cost.

The project team identified and prioritized the lack of locally agreed guidelines as an important problem contributing to the under-use of the podiatry service. A previous study has shown the absence of nationally agreed guidelines and poor awareness of local standards appears to be detrimental to care in this patient group [13]. However, it is also well recognized that adherence to guidelines is low and is not sufficient alone to change medical practice. Implementation strategies are planned to improve the podiatrist and rheumatologist's level of engagement with the use of guidelines and to sustain quality care, such as peer support, audit and training [37].

There are limitations to the study. A number of interventions were implemented in rapid succession and hence it was difficult to determine which intervention was most important in increasing referral rates towards the target. It was also difficult to infer whether the improvements were solely attributable to the interventions due to the study design and having no comparator group. An alternative explanation may be improved staff knowledge and awareness ("Hawthorne effect") [38]. Convenience samples in surveys, both pre-intervention and during the PDSAs were used with the risk of selection and inclusion bias.

Despite the limitations, this study reflects the real-world setting of podiatry care for patients with IA. The processes used in our QIP could be replicated in other locations in Singapore and internationally as existing literature from other countries also report unmet need for podiatry in rheumatic conditions and an underuse of podiatry services [29,39]. Quality improvement is considered a vital part of healthcare and relevant to both clinicians and managers [16]. By presenting this study and spreading improvement strategies this MDT model may be adopted by other Hospitals and healthcare systems.

CONCLUSION

Redesigning care at the system level is necessary to close the gaps in improving medical practice. This study has shown that by applying QI methodology, problems with access and uptake of podiatry services can be attenuated. The same methods can also be applied to other centers globally. Improving access for patients with IA to podiatry services will ensure the prevention and timely management of IA-related foot problems. This was achieved by defining targets and using multi-step feasible low-cost interventions and by involving patients, nurses, doctors and allied-health professionals in the improvement process.

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ML, KR and KC conceived the study. AS, PC, ML and KC participated in the QI methods, KC designed and implemented the study interventions. KC conducted the PDSA cycles, AS and KC analyzed the data. ML and KC drafted the manuscript with input from PC, AS and KR. All authors have read and approved the final manuscript.

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Figure Captions:

Figure 1. Cause-and-effect diagram of potential patient, doctor, podiatrist and system factors associated with low referrals of patients with IA to podiatry. Text in bold shows the factors deemed more important during group multi-voting to low referral rates. The 3 factors with asterisks were identified as the main foci for the attention of the study.

BASE ARTICLE

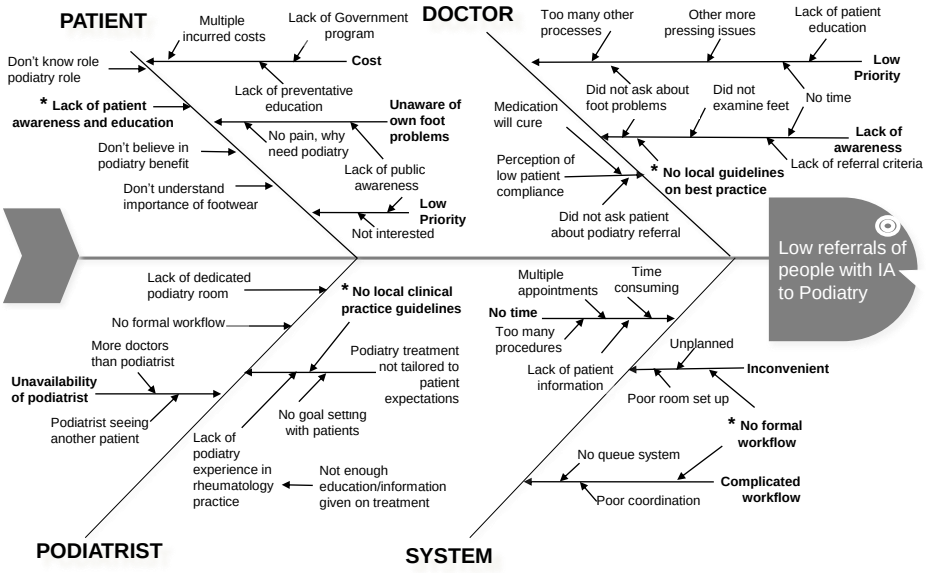

Figure 2. Pareto chart showing root causes for low referral rate of patients with IA to podiatry.

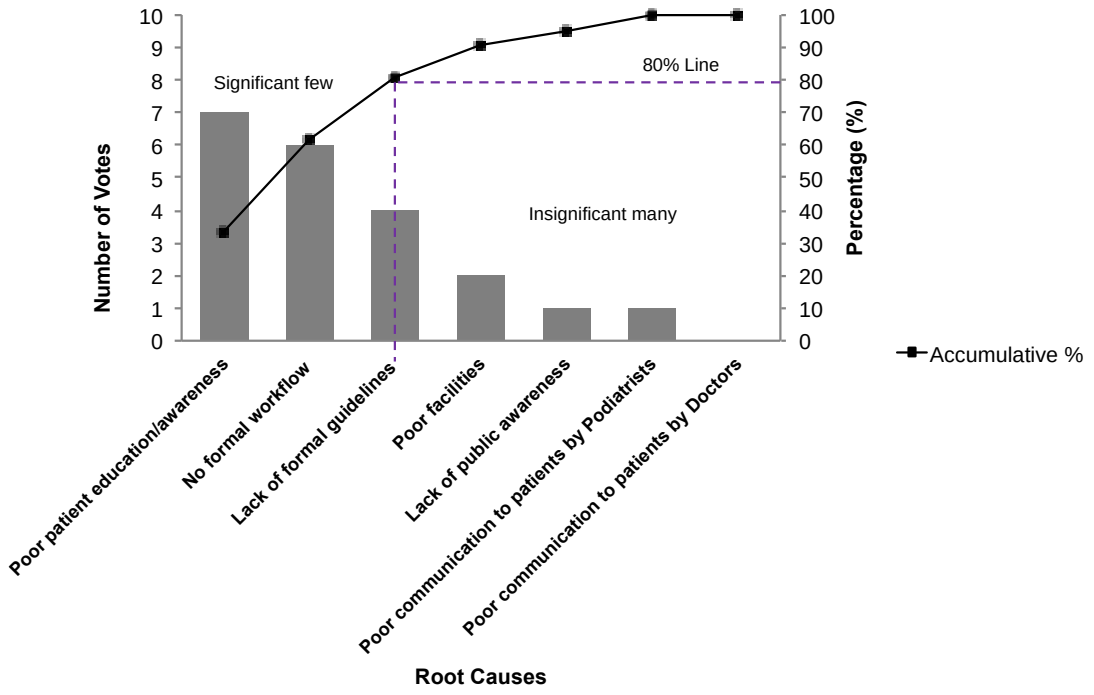

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Figure 3. Run chart of referral rates of patients with IA to podiatry over 6-months of the quality improvement study.

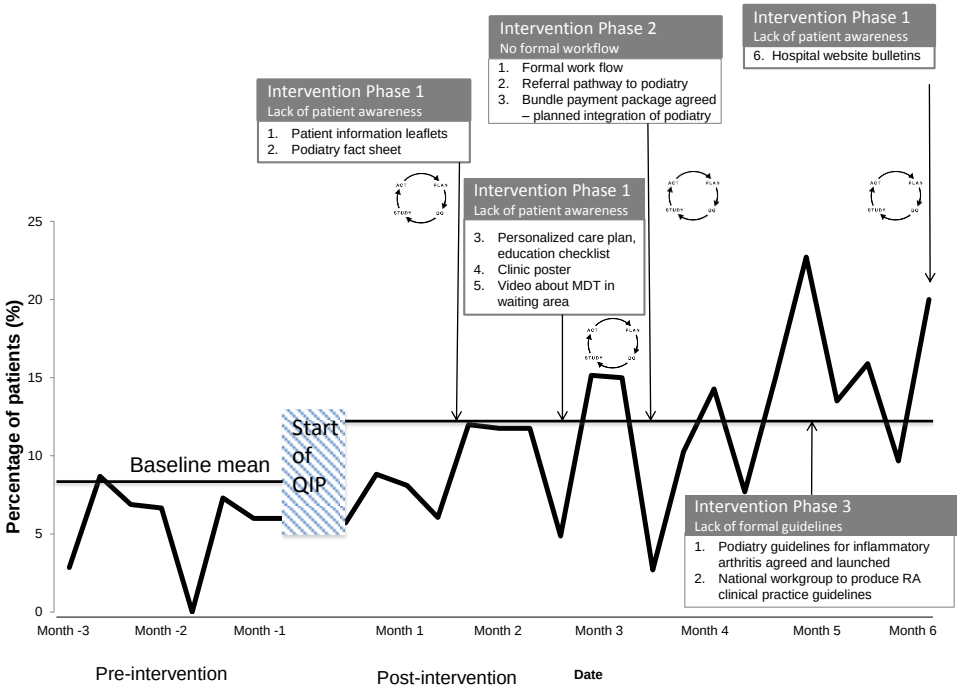

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Table 1. The 5 phases of quality improvement methods applied to increase referrals of patients with IA to podiatry.

No	Phase of QI	QI method
1	**Project phase**	The problem of low referrals to podiatry from rheumatology was identified by reviewing the productivity of the podiatrist at the MDT clinic. A small team of key stakeholders, including three rheumatologists, three podiatrists, a physiotherapist, an occupational therapist and a rheumatology nurse educator were invited to form a project team to undertake a 6-month QIP.
2	**Diagnostic phase**	The stakeholders carried out a workflow and root cause analysis to fully understand the process being examined, to evaluate the problem and to identify and prioritize the causes. A multi-voting method and Pareto chart were used to identify root causes that were deemed to be the main contributors to the issue and for which interventions were needed. A Pareto chart presents the prioritized list of root causes, highlighting those likely to have the greatest impact and those that should be addressed first. The Pareto principle states that in any group of factors that contribute to a common effect, 80% of the consequences stem from 20% of the causes [17,18]. In this study the top 3 root causes and areas for intervention were identified using this method.
3	**Intervention phase**	The team identified interventions that may reduce the high priority problems established in the diagnostic phase, implemented a series of small scale changes and undertook small Plan-Do-Study-Act (PDSA) cycles [19]. The PDSA cycle is a framework for testing a change, and is an efficient trial-and-learn methodology that provides the basis for incremental improvement [16].
4	**Impact phase**	The impact of the changes was evaluated to ascertain whether the interventions had resulted in an improvement. Date collection involved recording the number of patients referred for podiatry assessment at the weekly MDT clinic during the study period. A retrospective 6-month case note review of the MDT clinic was also conducted to record the number of patients with IA-related foot problems appropriate for referral to podiatry services, but who were not referred. The criteria for appropriate patient referral were those with current or previous foot pain, swelling and deformity.
5	**Sustaining improvement phase**	Once improvements had been implemented, mechanisms to establish a sustained improvement involved standardization, documentation, measurement and training.

Table 2. Interventions in the quality improvement study.

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Root causes	Interventions
Lack of patient awareness	1.Patient information leaflets 2.Podiatry fact sheet 3. Personalized care plan and education checklist 4. Clinic poster 5. Local Chinese newspaper article 6. Hospital website bulletins 7. Video about MDT in waiting area
No formal workflow	1. Formal work flow (tap onto ongoing project studying patient reported outcomes) 2. Referral pathway to podiatry 3. Bundled payment package agreed – planned integration of podiatry service
Lack of formal guidelines	1. Podiatry guidelines for IA agreed 2. National workgroup to produce RA clinical practice guideline 3. Podiatry guideline for IA launched 4. Podiatry recommendations to MDT disseminated 5. Regular clinical audit of guideline use and share results 6. Continued training for members of the MDT