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Process improvement of a paediatric feeding clinic

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ABSTRACT

Purpose: The purpose of this study is to identify opportunities to improve processes within a paediatric feeding clinic to enhance timely patient access to healthcare through effective and efficient resource use.
Design/methodology/approach: The study involved three interrelated methods. First, de-identified feeding clinic data, collected over seven years, were analysed to understand patient appointments. Second, clinician workshops and the swim lane method were used to map feeding clinic processes. Third, root cause analysis was conducted to identify bottlenecks and identify improvement opportunities.
Findings: The results revealed three, poorly connected sub-processes within the feeding clinic – namely: the patient triaging and appointment scheduling or allocation process; the clinic reporting process; and the cancellation and rescheduling process. These sub-processes were poorly connected because of inadequate resources, few standardised processes, and limited co-ordination between the different processes. Consequently, patient appointments were typically delayed, and patient reports were not always completed in a timely manner. Processes within the paediatric feeding clinic could therefore be improved by using digital tools, patient portals and telehealth, online interventions, an automated appointment confirmation system, and/or an automated transcription of each appointment.
Originality/value: This is the first published study to apply business process management to a paediatric feeding clinic. By using three methods to clarify opportunities to improve clinic processes, it highlights the potential value of health information technology in this context. This evidence will enable health service managers to ensure that children with feeding difficulties have timely access to appropriate care.

1. Introduction

Managing healthcare operations is complex and challenging for many health services, particularly those in the public sector. In this sector, health services face a rising demand for healthcare, increasing costs, and changing (if not heightened) patient expectations [1]. Such strain was exacerbated by the COVID-19 pandemic [2,3].

While process improvement methods can improve what health services do and how they do it [4], their application is varied. This is indicated by: context (e.g., emergency department); focus (e.g., diagnosis, patient flow); aim (e.g., improved service performance,

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improved patient outcomes); and method (e.g., value stream mapping, six sigma, lean management, total quality management, balanced scorecard) [5–8].

Although the need for effective and efficient public health services is well-recognised, with few exceptions [9], seldom does an investigation of healthcare bottlenecks – or blockages – and their root causes involve a consideration of the different stakeholders involved – these include clinicians of a multidisciplinary team and carers. Managing healthcare operations typically prioritises internal performance, emphasising the interests of managers and the policymakers who guide (if not direct) their efforts [10]. This can be a problem because a failure to integrate the perspectives of those who deliver and receive healthcare can diminish opportunities to improve performance [11–13]. This is recognised by guidelines and scholarship on consumer and community involvement [14,15]. As such, process improvement within health services requires a holistic view that encompasses those who deliver and receive healthcare [16].

Despite the application of process improvement methods to myriad health services, including (but not limited to) emergency, radiology, and surgical departments [17–19], there is limited research on their application to paediatric services, including feeding clinics. This represents a missed opportunity to improve care for the many children who experience a feeding disorder and their carers.

From the literature on paediatric feeding disorders, four key points are apparent. First, they are common [20–22]. '[A]pproximately 20–50 % of typically developing children … and 40–70 % of children born preterm … experience … feeding problem(s)' [23]. This prevalence is partly due to the broad spectrum of feeding disorders, encompassing medical, behavioural, and/or psychosocial causes [24,25]. Although feeding difficulties can be part of normal child development, a feeding disorder is typically indicated by impaired oral intake that is not age appropriate. Furthermore, it is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction [24]. As such, some children who cannot maintain adequate nutrition, orally, require tube-feeding [26]. This might involve: a nasogastric tube, which is inserted into the nose and through to the stomach; an orogastric tube, which is inserted into the mouth and through to the stomach; or a percutaneous endoscopic gastrostomy tube, which is surgically inserted into the stomach.

Second, regardless of cause, feeding disorders among children can have personal, social, and economic implications. Respectively, they can: compromise child wellbeing; generate carer anxiety and family strain [27]; and warrant greater access to health and mental health services, adding to rising healthcare costs [28–34]. This is because carers are often poorly prepared for, and supported to manage their child's feeding disorder [35]. This might explain why many children with feeding disorders present to emergency departments and/or are admitted to hospital for acute care [36,37]. It can be difficult to definitively quantify these presentations and admissions, given the varied ways in which feeding disorders and their aetiologies are documented [38]. However, following their analysis of a paediatric inpatient database, Horton and colleagues [37] found the prevalence of 'pediatric dysphagia' among children in the United States of America increased significantly between 1997 and 2012. Furthermore, there were considerable changes in their demographics, including: age (from a mean age of 7.33 years in 1997 to a mean age of 6.99 in 2012); and race (with significantly more children of minority groups admitted to hospital).

Third, children with feeding disorders do not always have access to timely or appropriate care. This is due to myriad reasons, including: a mismatch between the supply of, and the demand for services [39]; the limited availability of the multidisciplinary expertise required to support the child and their carer towards shared goals [40,41] – relevant disciplines can include (but are not limited to) medicine, nursing, physiotherapy, dietetics, speech pathology (otherwise known as speech therapy), occupational therapy, social work, and psychology; barriers that hinder access to services among children and their carers, like geographical divides, financial cost, and carers' competing responsibilities [42]; as well as poor clinician recognition of carer concerns [43,44]. For instances, researchers have noted that, 'Most … primary caregivers … found it difficult to coordinate care and obtain support when needed' [45] and 'parents could benefit not only from sensitive, respectful collaboration, but also from anticipatory guidance' [46].

Fourth, despite the prevalence of feeding disorders and the associated implications, there is limited, if any research that has applied process improvement methods to improve timely patient access to a paediatric feeding clinic. For two reasons, this represents an important opportunity. First, improvements in child health represent a sound investment, enabling children to develop into healthy adults who can contribute to society and the economy [47,48]. Second, given the growing costs of hospital services [49,50] and increasing government interest in healthcare beyond hospitals, the lessons garnered from the application of process improvement methods in a paediatric feeding clinic can inform such improvements within other outpatient clinics and community healthcare services.

As such, this study aims to improve processes within a paediatric feeding clinic to enhance timely patient access to healthcare through effective and efficient resource use. Towards this aim, the following objectives are addressed: analyse de-identified feeding clinic data to understand typical patient appointments; use the swim lane method to map a 'sequence of activities with a clear role definition by arranging activities according to responsibilities' [51]; and conduct root cause analysis, which serves to 'determine the systemic causes and prevent recurrences of adverse events' [52]. Thus, the purpose of this article is not to demonstrate how processes within a paediatric feeding clinic were actually improved – but rather, to demonstrate how improvement opportunities were empirically identified. Before presenting the study, the research context is described – specifically, feeding care for children with a feeding disorder.

2. Methods

Given the four aforesaid points, this study identified opportunities to improve timely patient access to healthcare through effective and efficient resource use. This is realised by applying process improvement methods to a public paediatric feeding clinic. Located in New South Wales, Australia, this clinic is one of ten public paediatric feeding clinics in this state. Established in 2005 as a paediatric gastroenterology clinic, the clinic was relaunched in 2014 to offer an assessment and follow-up service to children aged 0–15 years,

inclusive, within the local health district it is part of. The clinic is available on Mondays and Wednesdays for approximately six hours in total. This tertiary service is delivered by a multidisciplinary team, comprised of a paediatrician, a dietician, and a speech pathologist. To access this service, a paediatrician referral is required. Additionally, the team offers clinical advice to a child's treating clinician when a child's situation is complex or urgent and they are yet to be assessed by a paediatrician. Initial appointments are approximately sixty minutes in duration to assess medical issues, medications, nutrition, growth, as well as oromotor skills – that is, the functioning of the lips, cheeks, jaw, and tongue. During subsequent consultations, the team works with the patient and carer to develop and work towards a treatment plan to address issues that contribute to the feeding disorder – this might include feeding therapy and carer education. Following patient consultations, the clinicians convene to devise a management plan and discuss this with the relevant child and/or their carer. Following this overview of the research context, a description of how data were collected and analysed is presented.

Following clearance from the relevant ethics committee (reference number: 2020/ETH02965), three methods were used to develop a comprehensive understanding of the public paediatric feeding clinic examined in this study. First, the researchers sourced de-identified patient data from the clinicians about each planned consultation. This dataset included patient codes, patient gender, patient age, referral receipt date, tube-feeding status, clinic date, each clinician's report completion date, the patient report date, and clinician comments on each appointment. Given the dataset identified each patient (via a code), the researchers calculated descriptive statistics to ascertain: the number of patients and appointments; the average waiting time from when a referral was received by the clinic to the first appointment; the number of appointment cancellations; and the number of patients who did not present for their appointment. Second, the researchers facilitated two workshops with the feeding clinic clinicians to map clinic processes with reference to how patients accessed the feeding clinic, what occurred within the clinic, how these activities occurred, what and who were involved, and associated effects, including bottlenecks. Specifically, the researchers asked questions about these processes and documented the clinician responses via process maps. Informed by the workshop discussions, the swim lane method [53] was used to illustrate feeding care and the associated flow of relevant information, as operationalised within this feeding clinic. Widely used to improve business performance, the swim lane method illustrates process flow [54]. Specifically:

[It] delineates who does what in a process. Using the metaphor of lanes in a pool, a swimlane diagram provides clarity and accountability by placing process steps within the horizontal or vertical "swimlanes" of a particular employee, work group or department. It shows connections, communication and handoffs between these lanes, and it can serve to highlight waste, redundancy and inefficiency in a process [55].

The responsibilities of key functions associated with the process are allocated using swim lanes (e.g., dietitian, speech pathologist, paediatrician). This method was used given its demonstrated capacity to identify bottlenecks, inefficiencies, and system-related issues – this is particularly the case when multiple individuals are involved in a process to achieve a desired goal, regardless of whether they are internal or external to the process [56].

Third, root cause analysis was conducted to ascertain the primary reasons for these bottlenecks and identify opportunities to improve timely patient access to healthcare. This involved determining: the immediate cause(s) that directly led to a problem; the reason(s) the immediate cause(s) happened; and the factor(s) that contributed to its occurrence. This iterative process of seeking reasons served to clarify the root cause(s). These were then visually presented using diagrams.

Routinely collected, de-identified patient data were sourced for a seven-year period – specifically, May 12, 2014, to April 14, 2021, inclusive. Data were cleaned for analysis, whereby incomplete records were removed as was the record that was beyond the study period. The dataset included detail on each appointment, including date and time of referral, the date and time of clinic appointment, whether the child was tube-fed, and the report completion time by each clinician.

3. Results

The results presented in this section serve to reveal avenues to refine procedures within a paediatric feeding clinic to ultimately improve processes to enhance timely patient access to healthcare through effective and efficient resource use. These results are categorised into three pivotal domains – namely: patient; process; and resource. Within the patient realm, a detailed examination of appointments and patient interactions/presentations was conducted. The interconnectedness of these aspects is highlighted to enhance patient-centric outcomes. In the realm of process improvement, process was analysed through clinical processes and by mapping feeding clinic processes to identify bottlenecks. These bottlenecks were subjected to a thorough root cause analysis, unravelling their underlying reasons. Additionally, implications on resource allocation and use are explicated.

3.1. Patient appointments

The dataset included 1,048 records for 364 patients of the feeding clinic. Of the patients whose gender was specified, slightly more were male (54.0 %), and most had not been tube-fed (83.0 %). A total of 62 patients had more than one appointment – these patients accounted for 139 appointments to address tube-feeding; this suggests an average of more than two appointments per patient. Conversely, on average, there were a little over three appointments per patient for patients who were not tube-fed. This represents about a 50 % increase of appointments for patients who were not tube-fed, relative to those who were.

The data were analysed to determine the waiting time from referral to the initial appointment and therefore gauge the timeliness of healthcare. New patients referred to this clinic waited an average 59 days for their first appointment. Patients who were tube-fed and were thus likely to experience a complex feeding disorder, waited 55 days for their initial appointment – only four days less. Patients who were not tube-fed waited an average of 60 for their initial appointment, post referral. The maximum waiting period for patients who were and were not tube-fed were 171 and 235 days, respectively.

To determine the extent to which appointments were used, the appointment records were categorised as: 'cancelled', where the appointment was cancelled; 'did not attend', where the patient did not present for their appointment; and 'away', where one or more clinical members of the feeding clinic team were absent, but the appointment proceeded. Given the appointments that were cancelled (4.7 %) and given those that patients did not attend (10.5 %), 15.2 % of all appointments did not proceed. Additionally, 2.1 % of all appointments proceeded in the absence of one or more clinicians. With the World Health Organization declaring COVID-19 a public health emergency of international concern on January 30, 2020 [57], from 2020, there was a decreasing trend of appointments that did not proceed because of a cancellation or the patient did not attend the clinic (see Table 1). However, given the dataset period, firm conclusions about the effect of the global pandemic on the feeding clinic cannot be drawn. Nevertheless, the analysis of the dataset suggests a significant proportion of clinic capacity was underused, impacting its performance, and potentially exacerbating waiting times for other patients.

3.2. Clinic processes

The flow of information into, within, and beyond the feeding clinic commenced on the date a referral was received by the feeding clinic and concluded when a patient report was dispatched. Each team member was required to complete patient reports, accessible via a shared drive – this could occur simultaneously or consecutively (in any order), pending clinician availability.

Of 1,048 appointment records within the dataset, only 534 (51 %) noted the date on which the patient report was issued. Of these, 127 (23.8 %) patient reports were not completed by all three clinicians. Of the 534 appointment records, 174 (32.6 %) patient reports were initially completed by the dietitian, followed by the speech pathologist, and then the paediatrician; while 103 (19.3 %) were initially completed by the dietitian, followed by the paediatrician, and then the speech pathologist. This might be partly attributed to a report completion system that does not prompt clinicians to complete their contribution.

It took an average of 61 days from the date the referral was received until the patient's appointment was scheduled (see Fig. 1). Following this, the dietitian, speech pathologist, and paediatrician took an average of 16.7, 30, and 26.9 days, respectively, to complete the patient report. Furthermore, it took an average of 3.2 days for the clinic coordinator to check the report and 0.6 days to dispatch the report.

The speech pathologist typically required the longest time to complete the reports (average days = 30.0), relative to their fellow team members (dietitian average days = 16.6; paediatrician average days = 26.9). This might be partly explained by the few outlying patient records that took the speech pathologist over one hundred days to complete.

Not all patient appointments culminated with a report, completed by all three clinicians. Of the 888 appointments that proceeded, 354 did not culminate with a dispatched report. Of the 534 patient reports that were dispatched, 127 were not completed by all three clinicians.

The dietician completed 78.1 % of the patient reports within ten days after the appointment. In contrast, the speech pathologist and paediatrician completed approximately 55.2 % and 54.6 % of the patient reports within ten days after the appointment, respectively. The time the paediatrician required to complete patient reports was more positively skewed than that of the speech pathologist. For example, on 53 occasions, the speech pathologist's contribution to a patient report was delayed by over 100 days, while, for the paediatrician, this occurred on only 32 occasions. These findings on the reporting process and the time required to complete this process are noteworthy – this is because they reveal: delays within the paediatric feeding clinic; as well as opportunities to enhance timely patient access to healthcare, as per the study aim.

The 42 patients who had attended the clinic on more than five occasions had slightly reduced timeframes at each step of the information flow (see Fig. 1). For instance, they typically waited 56 days for their initial appointment – this compares with 61 days for patients who had attended the clinic on five or less occasions. Similarly, the clinicians typically required less time to complete the reports for these 42 patients. The only exception to this was the time required by the clinic coordinator to check the reports, as this timeframe increased from 3.2 to 4.2 days. These findings warrant mention because they demonstrate variation among patient appointments and in the reporting process and in doing so, they highlight opportunities to enhance timely patient access to healthcare, reflecting the study aim.

3.3. Patient presentations

Of 1,048 appointment records, 888 appointments proceeded with 336 patients, while 160 appointments for 122 patients did not proceed. Of these 122 patients, 28 did not visit the clinic on another occasion. On average, each of the 336 patients who presented at the clinic had 2.6 appointments (range: 1–16; median: 1). Of all patients, 228 had only one scheduled appointment, while 34 had two.

From 2014 to 2016, the number of first-time patients gradually increased; however, since 2016, the number of first-time patients decreased (see Fig. 2). Thus, while the clinic supported fewer new patients, it supported them on multiple occasions. Since this study was based on data from May 12, 2014, to April 14, 2021, inclusive, all 44 patients of 2014 were assumed to be new patients for the purpose of the analysis. From 2015 to 2021, new and continuing patients were combined. For example, of the 68 patients in 2015, 11 patients continued from 2014.

The average time between appointments for patients who had more than one appointment was 91 days (see Fig. 3). Although this average fluctuated, the time between appointments decreased over the study period. Once again, this suggests the clinic supported fewer patients on more occasions.

The dataset included 39 patients who presented at an emergency department. Of these, 38 attended the feeding clinic during the study period – however, there was no correlation between the number of presentations to the feeding clinic and the number of

Table 1
Appointments that did and did not proceed (2014–2021).

	2014	2015	2016	2017	2018	2019	2020	2021
Appointment proceeded	96.5 %	93.4 %	90.7 %	84.1 %	75.3 %	78.2 %	83.4 %	75.0 %
Appointment cancelled or patient did not attend clinic	3.5 %	6.6 %	9.3 %	15.9 %	24.7 %	21.8 %	16.6 %	25.0 %

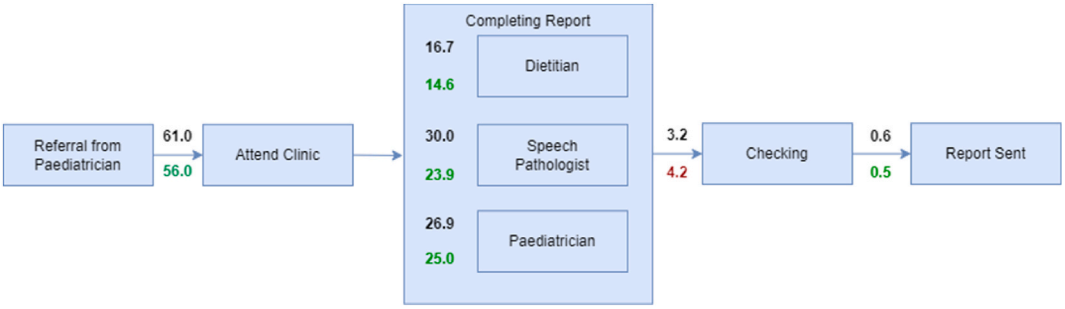

Fig. 1. Average number of days required for information flow for patients who attended the clinic on more than five Occasions.[1].

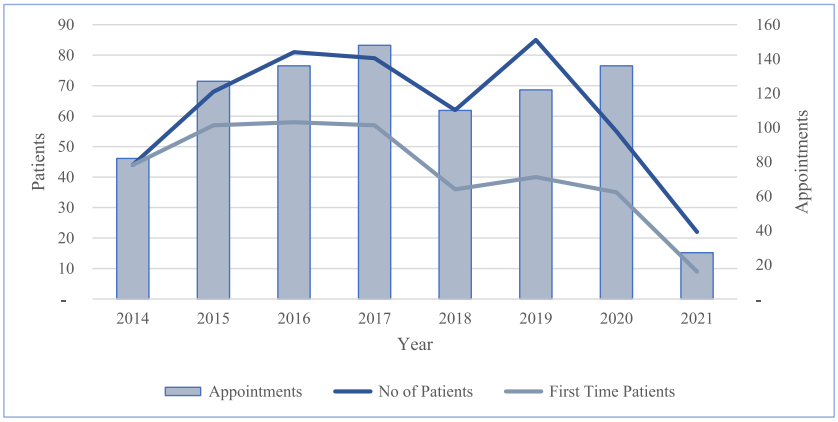

Fig. 2. Unique patients and appointments per year.

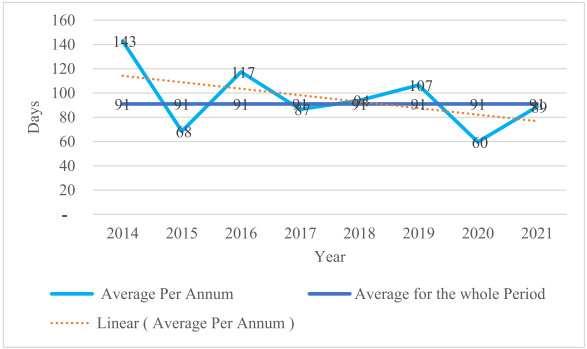

Fig. 3. Average days between appointments for patients with more than one appointment.

presentations to an emergency department. The exception to this was indicated by some patients who attended the feeding clinic within a few days of presenting at an emergency department. For instance, on six occasions, one patient presented to the feeding clinic within a few days of their presentation to an emergency department.

[1] Black figures denote clinic information flow with average wait time for patients; and the green and red figures denote the average number of days required for information flow for patients who attended the clinic on more than five occasions.

3.4. Mapping feeding clinic processes

The researchers facilitated a workshop with the clinicians to map the processes into, within, and beyond the feeding clinic. Specifically, the discussion focused on: how patients were referred to the clinic; how referrals were triaged; how appointments were (re) scheduled; what and who were involved in the aforesaid activities; what helped or hindered these activities; and the associated effects, including bottlenecks. This workshop served to clarify three feeding clinic processes; namely: the triaging and appointment scheduling processes; the clinic reporting processes; and the cancellation and rescheduling processes. Key categories within these processes included: events (e.g., referrals received, clinic appointments completed, reports completed, etc.); decisions (e.g., whether the patient referral was complete, whether the referral was appropriate, etc.); documents (e.g., referrals, patient records, appointment details, etc.); process steps or functions (e.g., scheduled appointments, informing patients and carers of appointment dates and times, complete the patient reports, check the patient reports, etc.); and actors (e.g., different clinicians, etc.).

Informed by the clinicians' contributions to the workshop, three maps were formulated, depicting three sub-processes within the feeding clinic. The maps were developed using the swim lane method [53] – the preferred method to map core clinic processes. These included key events and functions positioned under the respective lane, directly linked to key decisions and documents using the information flow. The first map pertained to the triaging and appointment scheduling processes. It included referrals, scheduled to be triaged within seven working days, with the appointment date scheduled an average of 59 days from the date the referral was received (see Fig. 4). The second pertained to the clinic reporting processes. It included: the completion of patient reports by the dietitian (within 16.7 days), the speech pathologist (within 30 days), and the paediatrician (within 26.9 days); the checking of patient reports (within 3.2 days); and the dispatching of patient reports (within 0.6 days; see Fig. 5). The third pertained to the cancellation and rescheduling processes, with 15.2 % of appointments not proceeding (see Fig. 6).

Each sub-process can enable the clinicians and clinic coordinator to visualise current practices and recognise issues, bottlenecks, and improvement areas. Specifically, they illustrate process steps and functions, which the actors complete (individuals and/or teams); and they clarify the decisions made when documents become available.

To identify issues and bottlenecks, each map was analysed. Since each sub-process involved several actors and documents, which were connected through the information flow, each sub-process was analysed with respect to the primary triggers and decisions. In the case of the triaging and appointment scheduling processes, the process step – review referral documents – was identified as a potential issue, triggered by the receipt of referrals from different sources, some of which provided incomplete or inappropriate referrals. Through this sub-process, whether the referral required an urgent or a routine appointment was determined. Thus, the main output of this sub-process was a scheduled appointment, communicated to the patient and carer via written correspondence. However, the current process did not incorporate a step to confirm whether the patient and carer received the correspondence.

The second sub-process – the clinic reporting processes – was triggered by the process step, confirm attendance with patients and carers, one week before the appointment. Patients and carers receive appointment advice via telephone and/or a short messaging service (SMS). When an appointment was not confirmed with a patient or carer, it was unclear whether the appointment was cancelled or rescheduled. This represents an area for improvement given the opportunity to stipulate the actions required to reschedule appointments, thereby minimising wasted time. The main output associated with this sub-process was a patient report, comprised of contributions from attending clinicians. The report was issued to the patient and carer as well as the referrer – furthermore, continuing patients received advice on their next appointment. As such, the key decision during this sub-process was whether to discharge the patient or continue with a subsequent appointment. Akin to the triaging and appointment scheduling processes, this sub-process did not incorporate a step to confirm whether the patient and carer received correspondence. Given the patient and carer typically received their report after receiving advice on their next appointment (if required), this represents an area for improvement. Another area for improvement was the key bottleneck – namely, the length of time typically required to complete patient reports, post appointment.

The third sub-process – the cancellation and rescheduling processes – should ideally be avoided by ensuring there are no cancellations. Yet, 15.2 % of appointments were cancelled during the study period. This sub-process was triggered when a scheduled appointment was cancelled because of a patient's or carer's request, or the patient did not present to the clinic, as scheduled. This represents an area for improvement, given the opportunity to identify and address potential cancellations in advance. Doing so can prevent subsequent, related issues, including the additional time required to contact the patient or carer via telephone and written correspondence, as well as the administration required to process and reschedule cancelled appointments, as well as gauge the availability of the patient and carer. Collectively, these issues can contribute to the ineffective and inefficient use of resources, including time, and thus extend the time that children with a feeding disorder and their carer wait for an appointment. The main output associated with this sub-process was a rescheduled appointment, which was communicated to the patient and carer. Akin to the first and second sub-processes, this sub-process did not incorporate a step to confirm whether the patient and carer received correspondence about their rescheduled appointment.

To validate each sub-process map regarding key elements, connections, and information flow, the researchers facilitated a second workshop with the clinicians. They were invited to review and critique the maps and consider whether and how they reflected current clinic practices. The clinicians confirmed the accuracy of the three maps; hence, no revisions were required. The clinicians were then invited to elucidate the implications or bottlenecks associated with each sub-process (see Table 2).

To improve the feeding clinic processes, it is important to examine the key issues to isolate the primary reasons for the bottlenecks. This was achieved using root cause analysis.

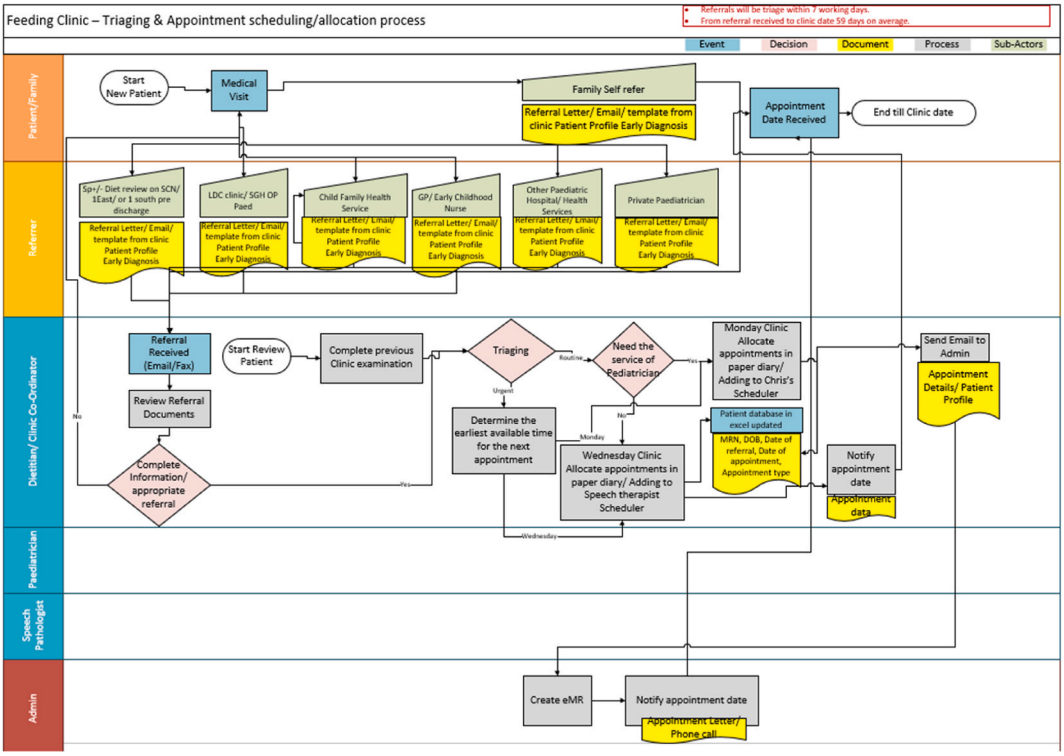

Fig. 4. Triaging and appointment scheduling processes.

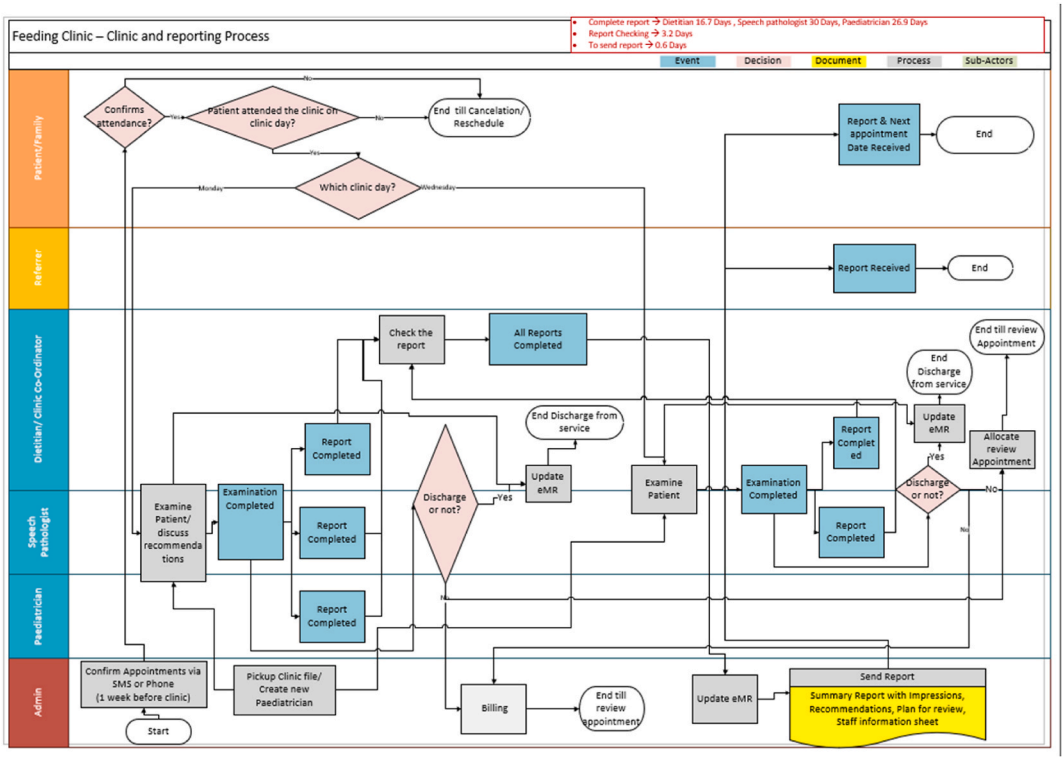

Fig. 5. Clinic reporting processes.

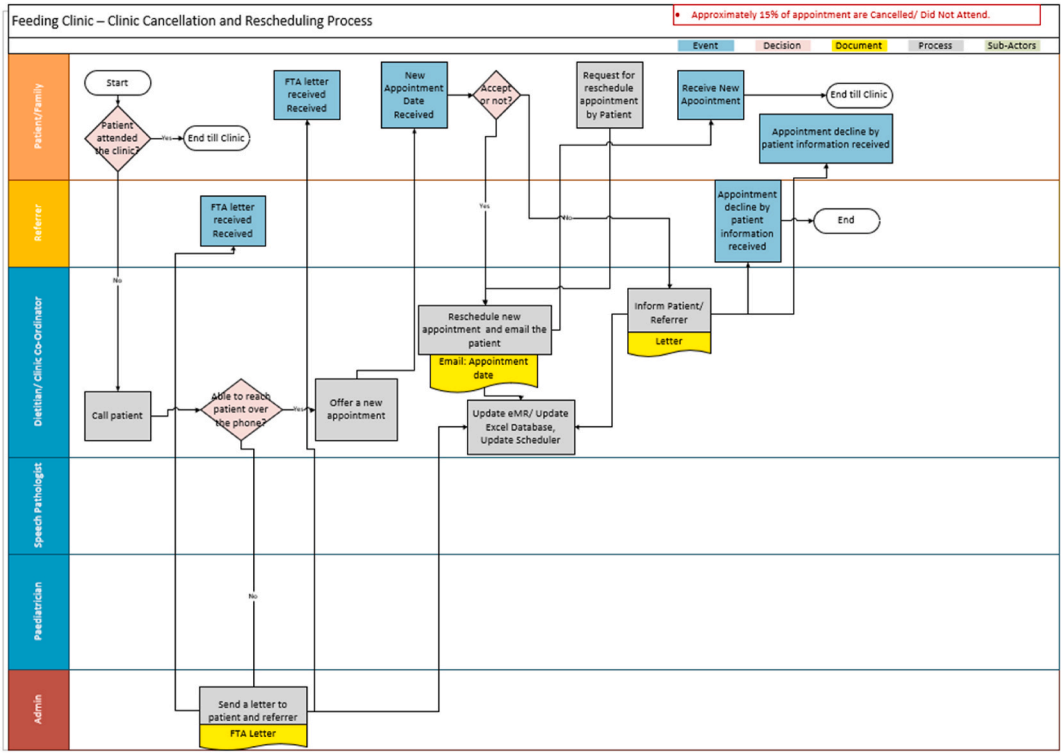

Fig. 6. Cancellation and rescheduling processes.

Table 2
Bottlenecks associated with the three sub-processes.

Triaging and Appointment Scheduling/Allocation Process	Clinic Reporting Process	Cancellation and Rescheduling Process
• There was often miscommunication about appointment dates with patients' carers due to irregular communication • The team had a limited capacity to deliver urgent care or care that was required • There was limited administrative support (particularly for the Wednesday clinic), despite the high level of administrative time required to manage the clinic • In addition to clinical duties, one clinician assumed many administrative tasks • The team often received inappropriate referrals or referrals (e.g., the patient was out of the area, the referral was not issued by a paediatrician) or included limited patient information (e.g., the absence of a diagnosis), thereby delaying appointments • Different approaches were used to record appointments and cancellations (e.g., a manual diary and an Excel database), rather than integrated scheduling system	• There was limited administrative support (particularly for the Wednesday clinic), despite the high level of administrative time required to manage the clinic • In addition to clinical duties, one clinician assumed many administrative tasks • Although patients and carers typically experienced considerable psychosocial distress, the absence of a social worker and a psychologist within the team limited the support available to them • There were delays with the timely completion of patient reports • It took on average 16.7 days for the dietitian, 30 days for speech pathologist, and 26.9 days for paediatrician to complete the report, while it took only 3.2 days for the clinic coordinator to check the report • There was no standardised template to document patient reports	• Appointments that did not proceed caused delay in scheduling appointments (on average, 15 % of the appointments were cancelled) • There was often miscommunication about appointment dates with patients' carers due to irregular communication • There were limited resources, including staff, reducing appointment availability • Different approaches were used to record appointments and cancellations (e.g., a manual diary and an Excel database), rather than integrated scheduling system

3.5. Root cause analysis

To identify opportunities to readily address the three aforesaid bottlenecks, a key issue within the first two sub-processes was selected as the basis for root cause analysis – namely: the long waiting time for a clinic appointment and the delay in finalising the patient reports (see Figs. 7 and 8). Focus was awarded to the first two sub-processes because of: the significant involvement of the clinicians in each process step; and the potential dependencies of the selected issues.

Both issues had several causes, exacerbating the bottlenecks and inefficiencies. To explore these further, the root causes were

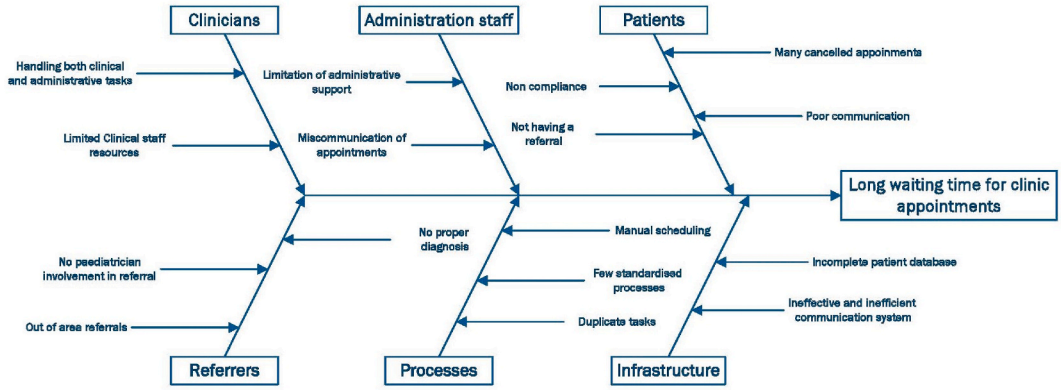

Fig. 7. Root cause analysis of long waiting time for a clinic appointment.

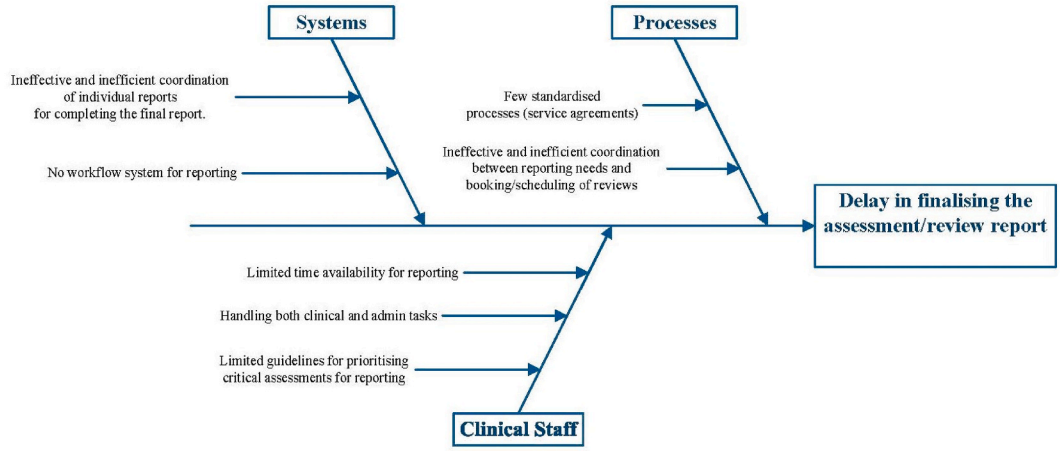

Fig. 8. Root cause analysis of delay in finalising the patient report.

prioritised based on discussion with the clinicians. They were then investigated to determine dependencies and causal relationships. This served to identify opportunities to improve current processes to enhance patient access to healthcare.

4. Research findings

Although the three sub-processes form part of the same feeding clinic and are thus connected, the connections are weak given the ineffective and inefficient communication system. For instance, each sub-process is devoid of a step to confirm whether patients and carers received correspondence from the feeding clinic. Instead, patients and carers were simply contacted via telephone and/or SMS, one week before the appointment. Additionally, there was limited use of an electronic scheduling system to ensure the currency of the appointments, as the clinic coordinator also used a paper-based schedule. Furthermore, when determining when appointments were available, the clinic coordinator largely relied on electronic mail and telephone calls from clinicians about their availability and workload.

An analysis of the root causes of each issue revealed several contributing factors. These included: inadequate resources; few standardised processes; and limited coordination between the different processes. Clinic processes would be bolstered if the sub-processes were connected. This is likely to have resource implications. For example, if the process was extended by including a step to monitor appointment status (including confirmation that patients and carers received correspondence), this would require an integrated communication system, capable of readily responding to changing priorities. For the patients and carers, the main bottleneck was the extended wait for the patient report, following their appointment. For the clinicians, it was the proportion of cancelled appointments, sometimes due to poor communication. It is therefore important to prioritise these bottlenecks before they are considered as part of process improvement initiatives. In this case, the priority is to address the cancellations, given their impact on the patients, carers, and clinicians.

Based on the findings of this study, there are several opportunities to improve processes within the feeding clinic. For instance, given extant research, the weak connection between the triaging and appointment scheduling processes and the clinic reporting

processes could be improved by using health information technology. This includes (but is not limited to): digital tools, like a 'a semi-automatized messaging system running on smartphones' [58], to encourage patients and carers to proactively report symptoms – this is because this can 'increase … the accuracy of collected data, improve … health outcomes, and increase … patients' satisfaction with the treatment as well as patient-provider communication' [59]; patient portals and telehealth, which can offer 'continuous communication beyond the walls of the clinic between provider and patient … just-in-time access … [and] communication … even in pandemic conditions' [59]; online interventions to optimise shared decision-making between patients, carers, and clinicians; an automated appointment confirmation system [60]; and an automated transcription of each appointment to enable the clinicians to readily source the relevant text required for their patient reports [61]. This is not to suggest that the use of health information technology is problem-free [62–64] – but rather, with due consideration of lessons from previous research, it has the potential to ensure that children with feeding difficulties and their carers have timely access to the quality care they need and want.

5. Discussion

Given the prevalence of paediatric feeding disorders [23], the associated implications [28–32], and limited patient access to care [39], this study identified opportunities to improve timely patient access to healthcare through effective and efficient resource use. This was achieved by applying process improvement methods – namely, the swim lane method [53] and root cause analysis – to a public paediatric feeding clinic. These methods served to: disentangle complex clinic processes into three sub-processes – specifically, triaging and appointment scheduling processes, clinic reporting processes, as well as cancellation and rescheduling processes; identify key bottlenecks within these sub-processes; and isolate their root causes.

The descriptive analysis of records of the feeding clinic appointments and patients, supported by the process mapping using the swim lane method, identified two key problems within the clinic processes – namely, the long waiting times for clinic appointments, and the delays in finalising patient reports. Well-known in the literature [11,17], long waiting times in health services can cause a range of issues, including emergency department overcrowding, increased length of hospital stays, and compromised wellbeing [65]. Root cause analysis of these problems suggests that clinic processes were largely hindered by limited communication, within and beyond the clinic. For instance, there was no routine way for the clinicians or clinic coordinator to: ensure that appointments were current; clarify whether the clinicians were available for these appointments; and reschedule appointments in real-time, as required. Beyond the clinic, there was also no routine way for the clinicians or clinic coordinator to confirm whether patients and carers received appointment details. Collectively, these (and other) issues delayed patient appointments and clinician completion of patient reports. Ineffective and inefficient communication can lengthen waiting times and instigate subsequent issues in health service operations [11]. The need for effective communication in health services is further supported by the evidence of many clinical errors caused by communication problems with regard to patient status and care plans [66].

6. Conclusion and implications

Despite emerging literature to improve healthcare using process improvement methods [17–19], these methods were yet to be extended to paediatric services, like feeding clinics. As such, this study offers a novel contribution to scholarship on business process management.

Notwithstanding this contribution, two methodological limitations warrant mention. First, the swim lane method provides a limited understanding of an overall process [51] – for instance, it draws attention to discrete segments of what might otherwise be a very complex situation; furthermore, while it elucidates what is happening and who (or what) is involved, it fails to clarify how the activities are completed. As such, future research is likely to be strengthened by using additional methods, like value stream mapping [17].

Second, patients who require feeding care and their carers were not involved in this study – as such, their needs and preferences might not be reflected in the findings. This represents an opportunity for future research to actively engage patients and carers to clarify their perceptions of, and experiences with feeding clinics and the process improvements they deem to be worthwhile. Such scholarship would benefit from participatory research methods that serve to award primacy to the voices of children and their carers, encouraging them to exercise agency [67].

Despite these limitations, this study represents an important step to improve timely patient access to healthcare from a paediatric feeding clinic. Having unravelled complex clinic processes, identified key bottlenecks, isolating their root causes, and prioritising the bottlenecks, there is now opportunity to improve processes within a paediatric feeding clinic by using health information technology. Specifically, this could be used to strengthen the connection between the triaging and appointment scheduling processes and the clinic reporting processes. This is likely to require organisational commitment, including an investment of resources, lest these process improvement efforts [68,69].

Ethics statement

This study was approved by South Eastern Sydney Local Health District Human Research Ethics Committee (reference number: 2020/ETH02965).

Data availability statement

Has data associated with your study been deposited into a publicly available repository?	No
Why?	The data that has been used are confidential

CRediT authorship contribution statement

Ann Dadich: Writing – review & editing, Writing – original draft, Validation, Supervision. **Premaratne Samaranayake:** Writing – review & editing. **Hilal Hurriyet:** Writing – review & editing, Investigation. **Chris Elliot:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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