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Patients' journeys through multi-level diagnostic imaging referrals

Makanjee CR¹ PhD | Bergh A-M² PhD | Hoffmann WA³ DEd

¹ Department of Radiography, University of Pretoria

² MRC Unit for Maternal and Infant Health Care Strategies, University of Pretoria

³ Department of Biomedical Sciences, Tshwane University of Technology, Pretoria

Abstract

Background: Diagnostic imaging plays an integral role in disease diagnosis and patient treatment. The challenge in the context of diagnostic imaging referrals is how to collectively navigate patients through these services, intra- and inter-institutionally.

Objective: To map the referral processes and procedures that lead to access to diagnostic imaging services within the embedded multi-level medico-clinical pathways up to the point of an ultimate diagnosis as part of a patient's treatment and management plan.

Methods: This study was part of a larger qualitative study conducted at a district hospital situated in an academic hospital complex. A total of 24 conveniently selected patients were 'shadowed' from entry until discharge. Data collection methods included observations of the various types of consultations and individual and focus group interviews with multiple healthcare providers.

Findings: Two main themes pertaining to referrals for diagnostic imaging were identified. The first relates to the decisions that a medical officer or specialist has to make about the sequence of activities and procedures related to each patient's condition. The second theme refers to the multi-level routing of patients.

Conclusion: The informational interactions between providers that takes place during a patient's journey inform the mapping approach to referral pathways for diagnostic imaging investigations from a systemic point of view. This process can also enhance the strategic management of the system.

Keywords

pathways of referral, service provision, levels of healthcare.

Introduction

The daily task of radiographers entails executing certain imaging procedures on receiving a completed request form emanating from a doctor-patient consultation. Radiographers focus mostly on providing a safe service of quality to both patients and providers. They render services according to where they are needed: in the department; in the wards; or in the operating theatre. Imaging services are distributed in the health service organisation. Although radiographers are very seldom involved in the referral itself, it is important for them to understand what happens behind the scenes. A referral for an imaging investigation entails an interconnected and interdependent process involving multiple providers.

Diagnostic imaging plays an integral role in disease diagnosis and patient treatment^[1] and is embedded in and intertwined with other clinical pathways of referral and treatment. The notion of integration is central to the effective access to continuous and comprehensive quality diagnostic imaging services. The challenge of integrating the results of

diagnostic imaging referrals into the ultimate diagnosis and individual treatment and management plan is how to navigate the patient through accessible intra- and inter-institutional services. Put differently, multiple healthcare providers are involved in ensuring the safety of a patient who is 'journeying' through the health system.^[2-5]

A patient's journey entails moving across a continuum of care requiring several types of communication and interactions in order to receive appropriate care and services. The coordination of information is highly dependent on the interactions between healthcare providers. In the context of diagnostic imaging the process of care could be defined as a set of activities that (a) occur within and between different types of care and services across different levels, and (b) require interactions with diverse healthcare providers.^[6] A service and care perspective emphasises safe, effective, efficient and timely provision of quality professional service. In the imaging context 'safety' refers to the appropriateness of an imaging investigation in terms of benefit versus risk and the equitable and effective use of diagnostic equipment and modality of choice.

The aim of this paper is to map the referral processes and procedures for accessing diagnostic imaging services in an urban South African public health system complex.

Study design and methodology

This qualitative study was part of a larger exploratory study conducted at a public district hospital linked with a primary healthcare clinic on the same premises, and a tertiary hospital on adjacent premises. All these institutions belong to a larger academic complex that includes a provincial tertiary (previously a regional) hospital. The study was approved by the Research Ethics Committee of the Faculty of Health Sciences, University of Pretoria. Permission was obtained from the respective institutional chief executive officers and heads of the respective departments. All participants gave written informed consent before participating.

Three different hospital levels existed at the time of the study: a district hospital providing basic imaging services for x-ray investigations and sometimes obstetric sonography; a regional (currently

provincial tertiary) hospital for diagnostic sonography, fluoroscopy and computed tomography (CT); and a tertiary, central hospital for the full range of diagnostic imaging services, including magnetic resonance imaging (MRI) and mammography.^[7] This distinction is important because the district hospital in this study referred to the two other hospitals to access specialised imaging services and medical care.

As this was an exploratory study, a convenient sample^[8] of 24 patients was identified at reception in the casualty or outpatient department of the district hospital, based on the availability of patients and medical practitioners and their willingness to participate. The sample size was determined by the point at which data saturation was reached. This sampling strategy enabled the 'shadowing' of patients from consultation with a medical practitioner at the district hospital to the point of discharge, admission and/or upward or downward referral.

Data collection methods included observations of the various consultations with medical officers, radiologists, radiology registrars, specialists, radiographers and nurses, and individual interviews (n=53) with most of the providers involved in initial consultations and communicating results. Reflective commentaries and comprehensive observational field notes were made at various points throughout the shadowing process with each patient participant to document basic patient information, provider-patient and provider-provider interactions, and the way referrals took place. Three focus group interviews were subsequently conducted with a purposive sample^[8] of medical officers and family physicians, who were familiar with the imaging referral processes between hospitals. Individual and focus group interviews were audio-recorded and transcribed.

Data analysis was done independently in phases by two of the researchers. It started out with an analysis of all the data sources for each patient case following a thematic content analysis approach,^[8] after which cross-cutting categories were identified and further compared. The provisional interpretations from this analysis informed the interview guide for the focus group interviews. The transcripts of the focus groups were also analysed in a similar way to identify new categories

and to complement the interpretation of already existing categories. Thereafter the three researchers sought for similarities and differences in the findings of the two independent analyses and reached consensus on the final categories, from which the broad themes and sub-themes ultimately emerged.

Specific measures were taken to enhance the trustworthiness^[9] of the study. To ensure credibility, two researchers analysed the data independently and the third researcher gave input into the process of reaching consensus on the interpretations. Further, two peers from radiology and family medicine acted as critical readers of the interpretations. Confirmability was established by means of triangulation of different data collection methods (observations, individual and focus group interviews) and different sources of data (field notes, transcriptions of providers' individual and group interviews). The fact that readers can evaluate and identify with the imaging referral pathways illustrated by means of diagrams and supported by "thick descriptions"^[8] contributes to transferability and dependability.

Codes for direct quotations in this paper have the following meanings: CS = medical practitioner's consultation and patient participant number; MP = individual interview with a medical officer, specialist or registrar related to a specific patient participant; and FG = focus group with medical officers and family physicians. Direct quotations are presented in italics.

Findings

Our study identified two main themes with subthemes pertaining to referrals for diagnostic imaging (see Table 1).

- Decisions by medical officers or specialists regarding the sequence of activities and procedures related to each patient's condition.
- Multi-level referral routes and how patients find themselves in an "in-between space".^[10]

Decision making for diagnostic imaging referrals

Decision making for diagnostic imaging referrals entails a sequential approach that may require an intra-and/or inter-institutional referral to access the appropriate diagnostic imaging services. The following sub-themes emerged: the step-wise approach of the medical practitioner; uncertainty about upward referral requirements; and "ceremonial"^[11] referral processes associated with adherence to specific institutional and/or professional regulatory requirements.

• "To know what is exactly happening, you have to do it in a step-wise manner"

We observed that medical practitioners made referral decisions for diagnostic imaging investigation by means of a step-wise approach (Figure 1). At the district hospital level (Figure 1, panel A) this approach is illustrated in the example involving Patient 15, who was seen at the outpatients department presenting with lower abdominal pain, nausea and dysuria. Although the patient had had a laparoscopy four years before at the tertiary hospital, her records file was missing. A subsequent ultrasound report from a private radiologist indicated possible gall stones. According to the patient, ovarian cysts, but not the gall stones, were removed five months earlier at a private hospital. The family medicine registrar analysed the urine results [step A1], and gave the patient a detailed explanation about the various steps and the realities of the system's referral pathway for further management at a higher level of care (Figure 1).

"First step ... we did your blood test today [step A2a]. You come back for the results in a week's time. Depending on what the blood results say, then we will probably [be] able to book you for another ultrasound [step B3], ... and decide from there what to do [step A3]. ... No operations can be done here. ... So whatever happens, you will be seen here. Then we will phone the surgeons and ask if they can see you [step B1]."

Table 1. Themes and subthemes

THEME	SUBTHEMES
Decision making for diagnostic imaging referrals	<ul style="list-style-type: none"> • Step-wise decision-making approach • Uncertainty around upward referrals • 'Ceremonial' referral processes
Multi-level routing of patients	<ul style="list-style-type: none"> • Referral routes • Patients in 'in-between' spaces

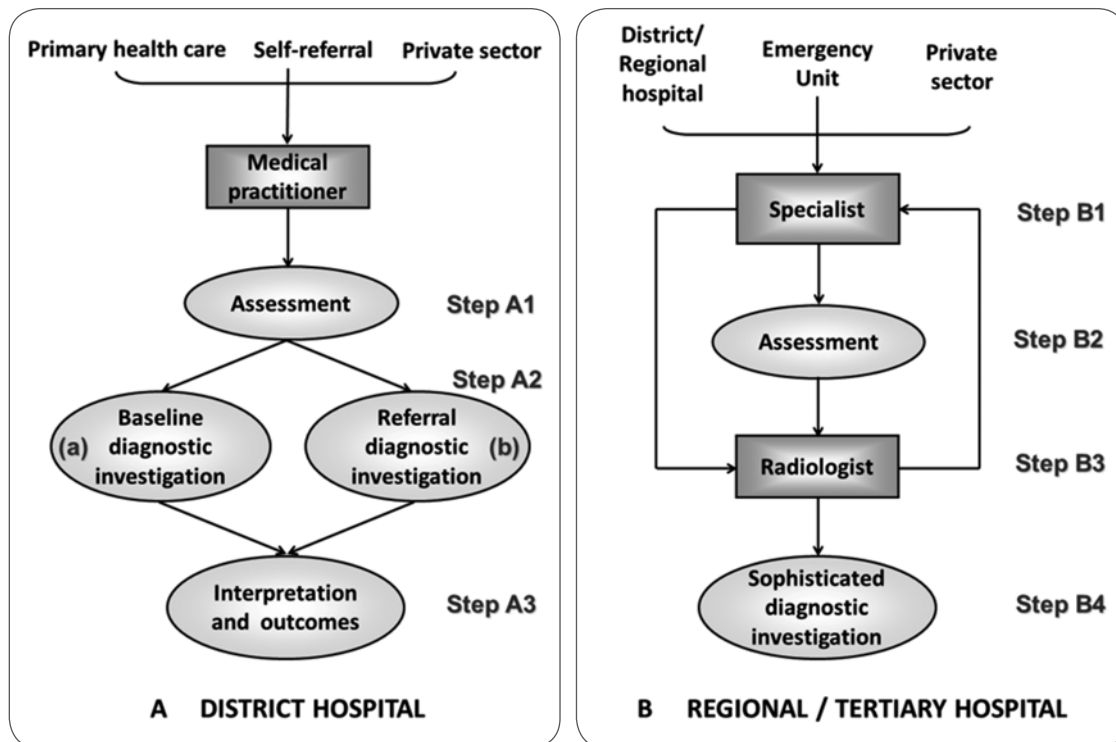


Figure 1. The decision-making process for diagnostic investigation referrals.

... They want all these tests done first" [CS15].

The registrar, with previous employment at a regional hospital, explained the system's protocol for a referral to a specialist (Figure 1, panel B):

"When we screen the patient, we do x-rays [step A2] before they go to a specialist department [step B1]. ... Here our job is to make some kind of diagnosis [step A3]. ... If it is the thyroid, then it is our duty to get the ultrasound done of the thyroid to prove what is wrong" [MP15].

Primary care medical practitioners frequently need to decide between requesting a diagnostic test and adopting a period of 'watchful waiting'.^[12] With a second option patients are requested to return later for follow-up monitoring of their symptoms. This was the case for Patient 16 with a history of right-side lower chest pain radiating to the upper abdomen and shoulder:

"So let's ... try Brufen and see how you do with it and then review in about a month. ... If it is worse, x-rays will be taken" [CS16].

• "What you're allowed to and what you're not allowed to refer" – uncertainties around referral

In the focus groups, medical providers at

the district hospital referred to prevailing uncertainties regarding the types of conditions that may be referred to the regional or tertiary hospital, especially in the case of cervical trauma patients. Referring practitioners were sometimes confronted with uncertainty regarding who should or would accept a patient, especially where conflicting professional boundaries existed between specialties: "Should it be a cardiothoracic? Is it an internal medicinal case? They fight" [FG3].

In informal conversations radiologists and radiology registrars confirmed the absence of appropriate referral guidelines regarding the context-specific referral process. This had a bearing on the quality of the request for diagnostic imaging investigations or examinations. Unreliable request forms often resulted in over-requesting of imaging investigations and/or examinations, as well as in re-referrals.

• 'Ceremonial' referral processes

Medical practitioners at the district hospital were unable to directly refer patients for specialised radiographic examinations in the same manner as their counterparts in the private sector. They had to go through the system's prescribed sequential process – "It's just not straight mammogram. It is first a physical examination, fine needle aspiration, a biopsy and then a mammogram" [FG2]. Even at the re-

gional and the tertiary hospital level adherence to the unwritten but prescribed ways of behaviour dictated the access to certain modalities. This could be likened to 'ceremonies' that had to be performed in a particular order.^[11]

An orthopaedic registrar shared the following about the referral route for Patient 17 with chronic back pain:

"You're wondering why we are not doing a CT scan. CT scan and MRIs are specialised investigations. It's quite expensive. Our protocol is to start off with basic examinations [step B2] [Figure 1, panel B]. If anything, in private, I would have liked to do an MRI on this guy, just to visualise the nerve roots and the spinal canal stenosis and prolapse of the disc. It would have been perfect. I could give him a clear answer. Unfortunately in this case we cannot do it. So ... he is going to go to the Spine Outpatients, where the spine consultants will send him for MRI [step B3 & B4]. ... In private ... you go for the top, the apex investigation, because the medical aid pays it. So unfortunately [with] the government, our hands are a bit tied" [MP17].

The dilemmas of conducting a complex set of diagnostic imaging investigations in the prescribed sequence are strikingly illustrated in the following example. Pa-

tient 7, who complained of right hypochondriac pain, was referred for chest radiographs at the district hospital. The x-ray request form at the district hospital did not mention the alternate diagnosis of gall stones, even though the medical student had informed the patient about it. The radiographer proceeded with the chest radiograph. When the patient queried the requested chest examination and explained to the radiographer where the pain was, she took an additional abdominal radiograph. On the basis of the interpretation of this unrequested radiograph the referring medical student and a senior medical practitioner diagnosed a potentially blocked shunt. They referred the patient to the tertiary hospital for further specialist assessment. The receiving neurosurgery registrar, who did not view the first set of chest and abdominal radiographs, immediately referred the patient for a CT scan of the brain. This was followed by an abdominal ultrasound examination request by medical interns, which confirmed the alternate diagnosis of gall stones. The radiology registrar commented on this as follows:

"Based on my first conversation ... with the neurosurgeon there was no mention made of the abdominal symptoms. The neurosurgeon says the patient was presenting with some nausea and vomiting and he was worried as it is due to secondary raised intracranial pressure from a shunt being blocked. And I think that is what the patient was referred to him for and the only way to exclude that is by CT brain ... so that was appropriate. ... Following with an ultrasound is a cost-effective way of investigation. So that was appropriate as well. ... I saw later on that there was an abdominal x-ray also performed ... which was also appropriate. The imaging investigation that can be used is a CT abdomen and a pelvis. It is little bit more cost cumbersome if the ultrasound examination was inconclusive. We would have gone to do a CT to see what [the] real cause of the pain was" [MP07].

Multi-level routing of patients

Most patient cases in this study were single referrals. However, in the case of extended or multiple requests, additional processes were sometimes involved in the upward referrals. Referrals from elsewhere to the district hospital often served a dual role; namely to seek a medical

opinion/review or to access a diagnostic investigation. These referrals had to follow the system's prescribed pathway (Figure 1). Two main sub-themes were identified: referral routes; and patients in an 'in-between space'.^[10]

• Referral routes

The upward referral route, and the way in which access to diagnostic investigations is acquired, depends on the situation or the problem a patient presents with. Figure 2 illustrates the various referral route options for diagnostic investigations from a district hospital to a regional hospital. In most cases patients are merely referred for x-rays at the district hospital. When needed, a medical practitioner can also consult with a radiologist at the regional hospital.

Two referral pathways to a regional hospital are possible:

- referral following an x-ray investigation at the district hospital; or
- direct referral to the radiologist at the regional hospital for specific imaging investigations such as CT scans, ultrasound investigations, mammograms and fluoroscopy.

A direct referral from a medical practitioner at a district hospital to a radiologist is not allowed in all cases; CT examinations, for example (except for a brain CT). Such referrals have to proceed via a specialist at the regional or tertiary hospital levels

(Figure 3). In many of these cases the role of a specialist was that of a mediator or gatekeeper to authorise access for the district hospital's referral to specific imaging modalities. A referral of cervical spine trauma did not "have to be seen by the specialist" [MP24] before being referred for a CT scan. However, an orthopaedic surgeon had to be contacted to authorise the referral for a CT scan based on x-ray interpretational findings. Only after the specialist had granted access to a radiologist, "then we [at the district hospital] can phone the radiologist" [MP24]. A radiologist in our study offered the following two reasons for this approach: to avoid unnecessary referrals; and to have a responsible person at the higher-level hospital in case patient admission was required after radiological examinations and diagnosis.

• Patients in 'in-between' spaces

A common system dilemma with upward referrals in our study was the ripple effect of logistical backlogs and/or human resource shortages at the tertiary hospital. One medical practitioner related how a cardiologist "couldn't take any more of our patients ... because they're short of staff" [FG1]. "The time it takes to book the investigations" [FG1] tended to extend the human resource challenges to the district hospital.

Gibson's^[10] observations regarding referrals from district hospitals to regional hospitals bear specific relevance to our

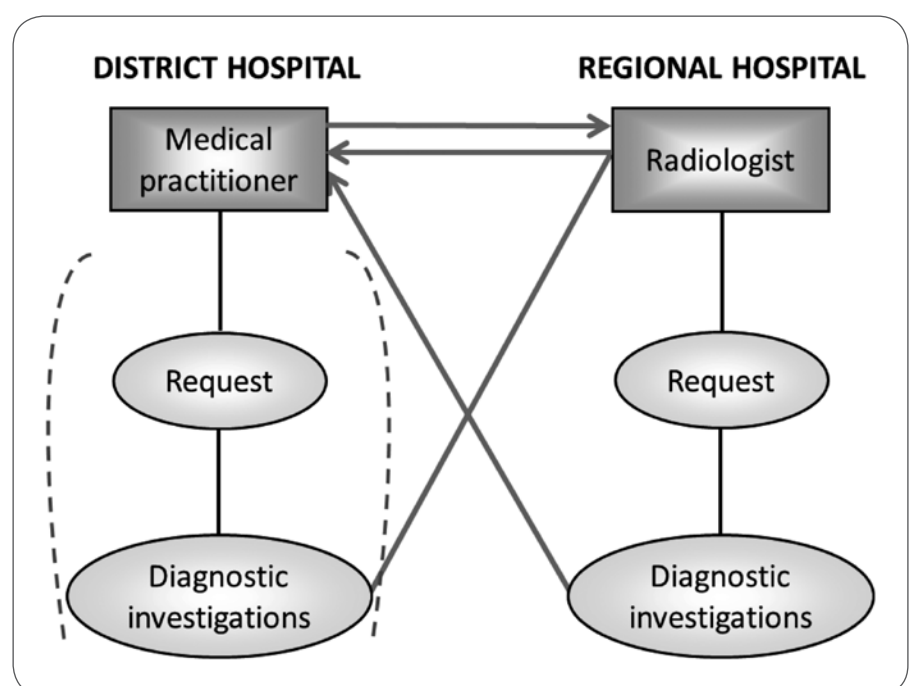


Figure 2. Specialised diagnostic radiology referrals from the district hospital to the regional hospital.

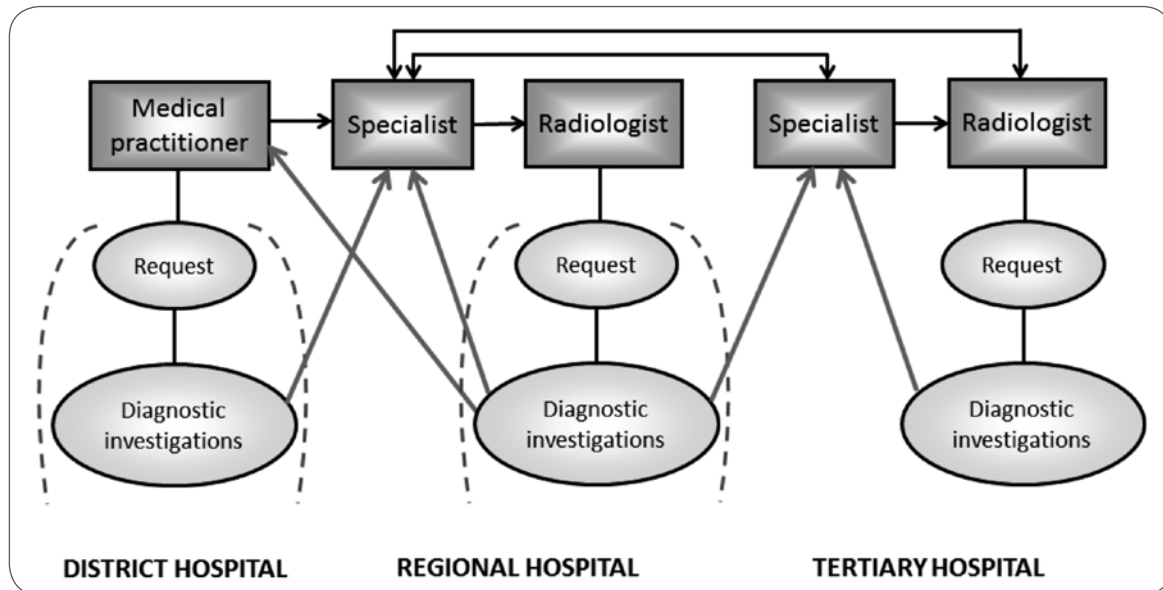


Figure 3. Sophisticated specialised diagnostic referrals via the specialist.

findings. She refers to such patients as being left in an “in-between space” in which no therapeutic intervention occurs and only minimal resources are expended.

Our study identified two specific types of boundaries that impacted on a patient’s journey through the health system: professional boundaries embedded within the system and operational boundaries between the different levels of care. The professional boundaries are governed by the various professional groupings’ scope of practice, which sometimes overlapped with the operational boundaries of the system. Medical practitioners at the district hospital were of the opinion that the “bureaucratic system” [MP11] of the tertiary hospital posed a significant obstacle to their referral decision-making process and access to quality radiological expert opinions. This is how one medical practitioner described the situation:

“It looks like a mass on the x-ray. [The system] won’t allow us to do a lung scan for those patients ... you have to treat the patients with antibiotics first. ... Then I had cases like that after six weeks, the patient is seen by another doctor. After four months the mass [is] actually bigger” [MP11].

Operational boundaries are set by the ‘rules’ and guidelines that govern the operation of the health system. However, in some cases the health professionals’ flexible interpretation of these boundaries results in their relaxation. For example, Patient 7 was given immediate access to the tertiary hospital after a normal abdom-

inal x-ray image suggested a potentially blocked shunt. In contrast, the system boundaries became stricter for orthopaedic-related cases, especially when there were explicit protocols involved regarding specific types of injuries. For example, delayed access to diagnostic investigations was observed in the case of Patient 8 who presented with a suspected deep vein thrombosis. She had to wait for a week in the medical ward at the district hospital before undergoing a Doppler ultrasound investigation. In addition, financial boundaries were a common experience for all the healthcare providers in our study. *“There is no budget, so no need for special investigations right now. That also needs to be taken into account”* [MP07].

Discussion

Shadowing of patients in this study provided insights into the multi-level health system and multi-healthcare-provider perspectives of diagnostic imaging referral procedures and processes from the point of the referral initiation until its ultimate healthcare outcome. The navigation of a patient through the various intra- and/or inter-institutional contact points were intertwined with the structural elements involving access to the most appropriate, efficient and effective imaging services. Gibson^[10] refers to the above as the medical legitimisation of patient institutionalisation, which in our study could have been more apparent as a result of the non-existence of detailed referral guidelines. We were also able to highlight how different processes intersected, inter-

connected and related within the broader framework of different levels of care. How the systemic pathways, the interactions at various stages, and the structural processes are involved, depends on the access to different imaging modalities and types of investigations, which Campion et al.^[13] refer to as “the social organisation of imaging equipment”.

Medical providers are used to weighing up different options when making diagnostic referral decisions, which include decisions on imaging referrals.^[12] This is similar to what we found in our study. In addition, these providers often have to adhere to certain ceremonial referral processes.^[11] Croskerry^[14] refers to this approach as “a gradient of decision-making that parallels the degree of uncertainty associated with the wide variety of patient conditions”. The approach is also closely linked to the challenge of dealing with uncertainty about the diagnosis, the inability to stage the disease and to decide on optimal treatment and management options. Novice medical practitioners in our study also shared this kind of uncertainty.

An important observation we made at the initial consultation between patient and medical practitioner was the absence of written system referral guidelines for diagnostic imaging investigations. Such protocols are actually internationally available, for example in the guidelines of the European Commission.^[15] Malone et al.^[16] support the use of referral guidelines or appropriateness criteria as a good practice in the justification process. In ad-

dition, Khan et al.^[17] state that a medical practitioner, in order to judiciously select imaging tests, must fully understand the focus and limitations of each available test. Ultimately, the absence of referral guidelines often results in delays in receiving timely, effective and efficient diagnostic imaging services.

Also, inter-institutional boundaries become tight or more relaxed, as referrals often depend on who is able to communicate with whom at a higher level and on the degree of uncertainty or confusion of the attending practitioners regarding what is 'allowed' to be referred to a higher level of care and what not. The situation is confounded when higher-level specialists' professional boundaries impact on the medical practitioners' ability to refer their patients to higher levels of medical care. Furthermore, Gibson's^[10] description of a "layered approach of access to health services ... aimed at cost effectiveness and rational usage of available resources" was also evident in our study. As a result, the absence or inaccessibility of preferred modalities may result in delay in medical care.

Our findings also point to some of the

negative effects the prescribed pathways can have on patients. Further studies should focus on the time taken to access specialised diagnostic imaging services in the context of quality care and services.

To the best of our knowledge, this study is a first attempt to visibly map out the referral pathways for imaging investigations in the South African public health sector. Similar studies in the private sector could provide additional insights into the dynamics associated with the referral of patients for diagnostic imaging investigations.

As an exploratory study it also had limitations. Our study was limited to one complex of hospitals and no claims are made about the generalisability of the findings to the district or the region. However, insights gained in this study can have value for other settings and the study approach could be followed in other settings or countries with a multi-level referral system. Of particular value would be studies on the existence and development of formal protocols and guidelines regarding referrals for diagnostic imaging investigation, similar to the study done by Remedios and colleagues^[18] in the European Union.

Conclusion

This paper described the outcomes of our study's aim to explore, conceptualise, and formulate pathways regarding diagnostic imaging referrals, investigations, outcomes and patient care from an intra- and inter-institutional health system perspective. Our approach encouraged a systemic view of the complex informational interactions between providers that take place during a patient's journey through the health system. It also provided a strategic perspective on the management of the system at the macro-level, which could serve as a basis for decision making by managers in terms of effective and efficient service delivery from a diagnostic imaging perspective.

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