Towards a systemic understanding of a hospital waiting list

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Abstract *Hospital waiting lists are a feature of publicly funded health services that result when demand appears to exceed supply. While much has been written about surgical waiting lists, little is known about the dynamics of radiology waiting lists, which is surprising given that rational treatment, and indeed the medical profession's claim to expertise, rests on establishing a diagnosis. This paper reports the findings of a case study of a problematic ultrasound waiting list. In particular, this paper highlights how the management of the ultrasound waiting list served to subordinate the needs of waiting patients and their general practitioners to the interests and values of radiologists. Radiologist concern to protect specialist expertise from encroachment by outpatient clinicians and sonographers is implicated in the growth of the ultrasound waiting list. It is argued that an adequate understanding of ultrasound waiting lists depends on grasping how radiologists are successful in structuring problems of access in ways that enhance radiologist control over ultrasound imaging. The case study reported helps to shed light on why increasing funding to clear waiting lists proves ineffective.*

Introduction

In health systems through out the western world, a range of supply and demand management strategies have been employed to manage the growing imbalance between supply and demand. While in New Zealand waiting lists have been extensively used as rationing mechanisms, it is generally accepted that waiting lists are unacceptably long and create a number of problems. However, there is little agreement between researchers and policy makers over the nature, magnitude or severity of the waiting list problem (Foote *et al.*, 1999a). While a variety of solutions have been proposed as the means to reduce or eliminate problem waiting lists, few interventions have proved effective (Mullen, 1994; Cooper, 1995; Foote *et al.*, 1999b).

Much of what is known about waiting lists is based on studies of surgical waiting lists. Little is known about imaging waiting lists. Durham and McLeod (1999) examined how general practitioners (GPs) used rationed imaging services in the central North Island of New Zealand. They did not, however, include the views of other

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essential stakeholders, notably those of waiting patients and radiologists. The *New Zealand Health Review* (1998) considered only ultrasound waiting times for maternity services and one indication for an abdominal scan: the survey indicated that waiting for these indications for ultrasound is fairly widespread and an issue for some regions, particularly given the undesirability of delaying diagnoses.

In general there is a conspicuous lack of literature dealing with imaging waiting lists, which is curious given that rational treatment, and indeed the medical profession's claim to expertise, rests on establishing a diagnosis that explains patient symptomology. The purpose of this paper is not, however, to document problems associated with imaging waiting lists or to test the effectiveness of a specific intervention. Rather the purpose of this paper is to better understand a particular ultrasound waiting list by adopting a systems approach in order to understand why waiting lists are an intractable health policy problem[1]. To this end the present study focused on an ultrasound waiting list managed by the ultrasound service of a New Zealand regional hospital.

The paper is structured into three sections. First, methodological issues are discussed. Second, the case study findings based on interviews with radiologists, sonographers, departmental managers, GPs and waiting patients are presented from four different perspectives that emphasise aspects of process, structure, meaning and knowledge-power (Flood, 1999). Finally, the paper concludes by discussing the key case study findings.

Methodology

While waiting lists have been depicted by researchers and policy makers as bus queues (Yates, 1987), rational queues (Worthington, 1987), mortlakes (Frankel, 1989) and shops (Pope, 1991), a systems perspective would suggest that these images are limited and that waiting lists are better conceptualised as messes (Ackoff, 1991). A mess, which as its common-sense meaning indicates, is a set of interacting issues, which "cannot be clearly defined and are not susceptible to 'solution'" (Clarke and Lehaney, 1997, p. 615). An important consequence of defining a waiting list in terms of a "mess" is that it is misleading to refer to the waiting list problem. Following Ackoff (1991) a problem is an abstraction – an image – and as such it is partial:

> [Images] ignore many forms of difference, virtually all subtleties, and a wider range of connotations. The images of an enemy, a hero, or a scholar takes little or no account of such people's inner conflicts, misjudgements, fatigue, network of interests, diversions, family, or friends while focusing on a stereotype in the mind that a term evokes (Edelman, 2001, p. 12).

In a problem situation involving different stakeholders with different purposes there are many competing images, which potentially form the basis from which interventions are developed to manage problematic waiting lists. Rather than viewing the ultrasound waiting list as a bus queue, rational queue, mortlake or shop, the present study sought to develop an understanding of waiting list dynamics, based on the accounts of stakeholders such as clinicians and waiting patients. In this manner the research followed Frankel's (1993) suggestion that waiting lists can be better understood in terms of the interplay between stakeholder-specific rationalities and the rationality of the health system based on utilitarian logic.

Given the open-ended and exploratory nature of the research, a qualitative research design employing a case study methodology was adopted (Yin, 1994). Approval for the present study was obtained from the appropriate ethics committees. Unstructured and semi-structured interviews were conducted with a range of stakeholders, including radiologists, outpatient clinicians, GPs, sonographers, departmental managers and waiting patients, between May 1998 and October 1999[2]. Interviews were tape recorded and transcribed. The interviews explored the rationale for the present waiting list management system and what impact waiting had on a variety of indicated scans including patients with cardiac, gynaecological and abdominal conditions.

Stakeholder accounts of the ultrasound waiting list were analysed using grounded theory procedures of open and axial coding (Strauss and Corbin, 1999) and through the theoretical lenses of Flood's (1999) four systemic windows. Use of this framework implies that the ultrasound service consists of a set of vertically and horizontally integrated human and technical activities, which are purposeful and open to the environment and require ongoing management (Flood, 1995). The systemic windows draw attention to four key organisational dimensions and ensures that a variety of issues are surfaced (particularly those often obscured by existing waiting list models) allowing for what Flood (1999) refers to as a deepening systemic appreciation.

The first window considers the ultrasound service in terms of process, while the second window focuses on how structure mediates the productive elements within the ultrasound service, as well as the relationships between internal and external stakeholders. The viewpoints of radiologists, sonographers, departmental managers, GPs and waiting patients are presented in accordance with the third systemic window based on meaning. A number of key themes emerge, themes that are then critically examined through the fourth and final systemic window, knowledge-power. In particular, this research highlights the way in which radiologists construct and maintain claims to expertise, which shapes how the ultrasound waiting list is managed. This leads to a rich understanding of the present systemic arrangements that helps provide insights into a hitherto insoluble and preserve problem.

A systemic view of the ultrasound service

System of process

The ultrasound service, which is staffed by consultant radiologists, sonographers and clerical workers, offers an ultrasonography service to hospital and community-based clinicians in the region. The majority of community-based clinicians are GPs. A workload survey in the mid-1990s indicated that approximately 23 referrals were received each calendar day and about 28 examinations were conducted every day a radiologist was present (for about 11 months of the year). The bulk of the waiting list consists of community-referred requests. At the time of the present study most patients could expect to wait between six and 12 months.

According to Flood (1999, p. 98) processes are those "ordered flows of events" that are undertaken to accomplish a particular task. The system of process covers the initial patient consultation with the referring clinician to the ultrasound diagnosis, as well as management processes, which support these operational processes. In this respect, the system of process cuts across organisational boundaries and spans primary and secondary levels of care. As might be expected the ultrasound service operates in a resource-constrained environment, which places bounds on the systems of process.

Resource constraints include the number of functioning ultrasound scanners and the availability of radiologists and sonographers. In addition, funding constraints (in the form of a set number of contracts) imposed by the funding authority limit the number of community-referred patients that can be scanned.

For the purposes of this paper, there are two key processes that assume central importance when the management of the ultrasound waiting list is considered. The first key process is the urgent mechanism, a priority rule that enables referring clinicians to contact a radiologist (via telephone) in order to request urgent scans. This arrangement is particularly important to GPs since the ultrasound service assumes that all community-referred requests are non-urgent despite the fact that a patient's condition may deteriorate while waiting.

The other key process of note is second look sonography, or "double scanning", where the radiologist may rescan, or double scan, the patient in order to confirm the accuracy of the sonographer's scan (see Tessler *et al.*, 1996). The process of double scanning has a number of implications, which impact on the productive capacity of the ultrasound service. Double scanning restricts session throughput (as patients may be scanned twice), creates session overruns (a single radiologist covers two ultrasound scanners) and makes session throughput vulnerable to the availability of radiologists (as a radiologist must be present when patients are being scanned).

System of structure

The system of structure forms the basis for co-ordination, communication and control of the productive processes. Flood (1999, p. 104) defines structure as "a set of rules and procedures that organise management support around operational activities and within operational activities themselves". As with the system of process, structure needs to be understood so the stakeholder accounts of the ultrasound waiting list can be put in context. A key aspect of structure to emerge from the case study findings was the access arrangements that governed the priority afforded to inpatient, outpatient and GPs requests. This aspect of structure was based on a hierarchy of medical expertise that distinguished and mediated between the interests and values of stakeholders, but notably radiologists and GPs.

The access arrangements were captured by three operational policies. The first operational policy governing access afforded inpatient requests overall priority and required that such referrals are actioned within 24 hours. A second operational policy was an informal arrangement between the radiologists and the outpatient consultants to scan outpatient requests according to a patient's next scheduled clinic appointment. Without this indication outpatient requests are added to the waiting list and allocated appointments according to the sequencing heuristic "first come first serve" (FCFS). Unlike inpatient or hospital outpatient requests, community-referred requests are selected according a third operational policy based on the sequencing heuristic FCFS together with the urgent mechanism. The access arrangements afforded to the inpatient and outpatient requests are effectively an open-ended commitment to scan requests as required. However, the open access for community-referred requests is notional at best and is restricted by contracts set by the funding authority.

The presence of a private radiology facility was another structural characteristic that mediated patient access to ultrasound. Due to the lengthy wait experienced by some community-referred patients, GPs may suggest to their patients that they might

consider paying for a private ultrasound scan at a private radiology facility. While patients and GPs were sensitive to the fact that some patients could not afford a private scan and were concerned about equity, the private radiology facility nevertheless offered a service and helped to ease pressure on constrained public resources. In contrast, radiologists with dual private and public appointments downplayed the significance of the private radiology facility noting that sufficient work existed for both the private radiology facility and the ultrasound service. Furthermore, the process of double scanning regarded as obligatory in the public service was not practised by many of the same radiologists in the private service. This led some departmental managers and sonographers to claim that radiologists with private and public appointments had a conflict of interest over the management of the ultrasound waiting list.

Systems of meaning

Systems of meaning are created from stakeholder interpretations of systems of process and structure. This perspective has received considerably less attention from researchers and policy makers, which on reflection is perplexing, as waiting lists are agreements between the respective hospital departments and referring clinicians to attend to patients at a later date. This section details the perspectives of waiting patients and their GPs as well as the ultrasound service.

Having to wait for up to 12 months created a number of problems for stakeholders. For GPs the ultrasound waiting list acted as a barrier that slowed and frustrated attempts at establishing timely diagnoses and at reassuring anxious patients. Even so, concern among GPs varied about the appropriateness of the waiting time. One GP described the waiting list as a disaster while another noted that the waiting list was of no real consequence as strategies existed to avoid lengthy waiting times. In general, GPs appeared resigned to the existence of the ultrasound waiting list. However, without diagnoses GPs were left with the legal responsibility for patient conditions and at times were unclear about the significance of patient symptomology. Patients with equivocal symptomology such as vague abdominal pain posed a particular problem. For the ultrasound staff such symptoms may indicate either idiosyncratic pain or the presence of a serious underlying condition. Having the capacity to rule out such conditions is important and a number of GPs made referrals for this reason.

GPs managed the problems posed by waiting using a variety of strategies. To secure timely diagnoses, GPs acted outside the existing systems of structure (determined by the referral process) and attempted to subvert/manipulate the systems of process that determined the urgency of the GP request. Using one such strategy, some GPs made what the ultrasound service saw as unnecessary hospital outpatient appointments to bypass the FCFS heuristic. This created a number of disturbances, which among other things clogged up outpatient facilities (lengthening outpatient waiting lists) and complicated efforts to allocate timely scans to urgent patients, and is an example of the perverse effects of an unsatisfactory community referral system. Other strategies employed were to send patients directly to the ultrasound service hoping that an appointment may be available on the off-chance that another patient had cancelled, or to fax urgent requests, neither of which are a legitimate part of the system of process.

A recurring theme that characterised the patient accounts centred on the difficulties created by two sources of uncertainty. The first source of uncertainty was related to concern over what the ultrasound scan might reveal. This diagnostic uncertainty was closely aligned with the GPs' concern about establishing a diagnosis and beginning rational treatment. The second source of uncertainty concerns when a patient is likely to exit the waiting list and receive an ultrasound scan. This form of uncertainty is largely avoidable: the ultrasound service does not formally advise patients of expected waiting times. Patients described graphically the frustration and anxiety of not knowing and being uninformed.

Uncertainty surrounding the likely diagnosis or expected waiting time was rarely a problem at the time of the referral. However, many patients had low expectations of receiving a prompt scan, and while not necessarily happy at the prospect of waiting, tended to be accepting of the need to wait and of the GPs' estimates of the likely waiting time.

Despite this initial resignation, the ongoing experience of diagnostic uncertainty in the upcoming months (or weeks for some) created problems, particularly as symptomology worsened. The absence of information from the ultrasound service, and the vague and inaccurate GP estimates of waiting times, led patients to express feelings of anxiety, annoyance, anger and resignation. In addition to magnifying anxiety associated with diagnostic uncertainty this timing uncertainty interfered with life events such as patient holiday plans, academic examinations and work commitments.

The intersection between diagnostic and timing uncertainty served to create states of powerlessness and helplessness in waiting patients. Many waiting patients reflected on feeling trapped by the waiting list. They could wait and receive an ultrasound scan sometime in the distant and uncertain future; or become increasingly ill and receive an urgent scan. Patients had no control over either eventuality. It is notable that under these conditions patients rarely opted to have a private ultrasound scan.

Waiting patients employed a number of strategies to internalise anxiety and emotions such as frustration and anger in order to make waiting more acceptable. Common strategies included trying to forget about being on the waiting list, maintaining a positive attitude, redirecting energies elsewhere and drawing strength from religious beliefs. The effectiveness of strategies such as these depended on the nature of the patient symptoms and the meaning that patients and their families and friends ascribed to the symptomology. In this respect, some patients appeared untroubled by waiting while for others waiting became increasingly disruptive and constraining, impacting on the ability to undertake day-to-day activities.

Perceptions and experiences of the ultrasound waiting list held by radiologists, sonographers and departmental managers demonstrate a different picture from GP and waiting patient accounts. GPs and waiting patients were broadly interested in managing diagnostic uncertainty and saw the exclusion of abnormal pathology a positive outcome. Indeed, obtaining an ultrasound scan (for the purpose of exclusion or confirmation of abnormal pathology) was an important strategy for bounding diagnostic uncertainty and allows for appropriate treatment including reassurance or referral to secondary level specialist services. In contrast, the ultrasound service's account of the management of the waiting list centred on the difficulties in allocating

scarce capacity to patients who were likely to have abnormal pathology in order to minimise the impact of waiting on ill patients.

Although a GP's request represents medical justification for an ultrasound scan, resource constraints mean that only those patients deemed urgent by the radiologists are entitled to an immediate scan. It is notable that the radiologists do not medically prioritise incoming requests (as urgent or non-urgent) but instead rely on GPs to contact them if an immediate scan is warranted. A key reason for this apparent idiosyncrasy is that the decision to delay a request can only be justified in retrospect after the scan has been conducted. While radiologists and sonographers criticised GPs for providing sketchy and incomplete clinical summaries, many requests (such as in the case of non-specific abdominal pain) were equivocal, highlighting the possibility that patients with abnormal pathology could be incorrectly prioritised as non-urgent. This placed the radiologists in a difficult situation, particularly given concerns over what many radiologists saw as a litigious relationship existing between medical practitioners and patients, as well as heightened media attention being focused on health issues. Although sonographers were broadly sympathetic to the position of the radiologists, they, along with the departmental managers, saw prioritisation as an important strategy for managing the growing waiting list. Indeed, sonographers, under the guise of housekeeping, informally prioritised some incoming requests.

While prioritisation was accepted and even indirectly encouraged, in some cases, by the radiologists, the ultrasound service assumed every GP request to be non-urgent, in order to avoid the possibility of patient litigation. As mentioned, it was the ultrasound service's formal policy for the referring clinician to contact (via telephone) the radiologist if they believed that an urgent scan was required[3]. However, this was the extent to which the radiologists were prepared to let the referring clinicians determine priority. GPs in particular were discouraged from marking the referral form "urgent" because it placed the radiologist in the difficult position of deciding whether an immediate scan was required. Furthermore, the departmental managers feared that acceptance of this practice would encourage GPs to refer more patients, making it even more difficult to manage the waiting list.

Despite the emphasis the radiologist placed on the correct functioning of the urgent mechanism, in practice, many GPs found contacting a radiologist difficult. Combined with these difficulties and the problems in translating clinical hunches that something untoward was occurring, it is of little surprise that the ultrasound service is characterised by high levels of outpatient referrals and problems created by GPs attempting to subvert the systems of process and structure.

Sonographers in particular pointed out that the current access arrangements were not foolproof and serious abnormal pathology would, on occasion, be detected in the assumed non-urgent patient who had waited a lengthy time. In most cases, GP requests when scanned were found to be normal. That is, no abnormal pathology could be established with an ultrasound scan. Frustrated by the inability to scan all requests in a timely manner, the ultrasound service referred to such requests as "rubbish," the label used in such a way as to reflect on the competence of the GP who made the referral.

In addition to blaming funding constraints, perceived inappropriate GPs requests were held responsible for reducing access for genuinely urgent patients: first, by adding unnecessarily to the growing waiting list; second, when scanned they

represented a waste of scarce capacity; and third, such referrals led to a number of patients failing to turn up to allocated appointments, further wasting scarce capacity. Sonographers did however question the utility of double scanning by drawing attention to its detrimental impact on the ultrasound service's productive capacity. Radiologists, however, pointed to the medico-legal implications of missing abnormal pathology (particularly given a lengthy wait) and their right as medical practitioners to govern how they practice radiology. As double scanning (as admitted by radiologists) infrequently detected abnormal pathology missed by the sonographer, the risk assumed by the patient in waiting appears not to be offset through diagnostic accuracy.

System of knowledge-power

Underlying the system of process, structure and meaning is knowledge-power relationships. Flood (1999, p. 116) points out that: "Knowledge power is the idea that people in positions of power determine what is considered to be valid knowledge and consequently valid action". A focus on knowledge-power draws attention to problematic concepts central to system of access to ultrasound, which are viewed by many stakeholders as common-sense even though are they are closely tied to the interests and values of the radiologists[4]. This section discusses two issues surfaced from the systems of meaning: first, the issue of inappropriate GP referrals that form an understanding of legitimate need; and second, the process of double scanning, which imposes significant limitations on the ultrasound service's productive capacity to meet legitimate need.

Inappropriate referrals and the diagnostic practices of radiologists and GPs. With radiologists, sonographers and departmental managers having identified inappropriate GP referrals as being responsible for the growing waiting list, referral criteria and practices are then seen as a potential point of leverage to improve accessibility to existing scarce capacity. A referral – irrespective of its origin – is deemed inappropriate if the referring clinician asks for an imaging examination that does not have the necessary diagnostic sensitivity or when the examination is unlikely to provide information useful for rational treatment. This latter aspect of inappropriateness, expressed in terms of benefit, is dependent on the purposes for which the examination was requested. This is often the subject of dispute between GPs and radiologists and as such is a pertinent focus for the fourth systemic window based on knowledge-power. Indeed, a dichotomy based on appropriateness/inappropriateness defines accessibility in such a way that it allows radiologist-centred images of illness and expertise to be enacted and buffered from the realities of general practice.

Radiologists and sonographers offered a number of reasons of why GPs made inappropriate referrals but all agreed that that there were few incentives for GPs to refer patients appropriately. Because ultrasound is a relatively inexpensive, safe and (in principle) an accessible examination, inappropriate referrals were perceived as a means to cover shortcomings in GP clinical skills and avoid litigation. Radiologists and sonographers pointed to the high proportion of GP requests that when scanned were normal, which frustrated attempts by the service's internal stakeholders to reach diagnoses by confirmation. GPs on the other hand expressed concern over the lack of back-up provided when dealing with patients with equivocal conditions. While some

GPs may refer patients for the reasons suggested by the ultrasound service, having the capacity to rule out serious underlying conditions – diagnosis by exclusion – they considered as of most importance.

Despite the supposed wastefulness of inappropriate referrals, radiologists were reluctant to screen the incoming GP requests for appropriateness given the medico-legal consequences of dismissing appropriate (in hindsight) requests as inappropriate. Radiologists rarely refused to scan GP requests and only passed judgement on the quality of the referral after the patient had been scanned.

Viewed through the lens of knowledge-power, the waiting list played in important role in mediating between the diagnostic practices of GPs and radiologists, practices that result in conflict over which patient ought to be scanned. As the waiting list builds a delay between referral and the examination, some patients' conditions will deteriorate and need to be scanned urgently. In this sense, the waiting list allows GP exclusion requests to be transformed into likely abnormal pathology (if the request is appropriate) or idiosyncratic pain (if the request is inappropriate).

It is the responsibility of the GP to organise an urgent scan but notably it is the waiting patient who ultimately assumes this responsibility. In contrast to the radiologists, the patient is charged with the responsibility of returning to their GP if their symptomology deteriorated. In this way the ultrasound waiting list enables the radiologists to define the problems of access in terms of their expert understanding of illness. This simple dichotomy based on appropriateness/inappropriateness buffers the radiologists from the clinical dilemmas that GPs face at the time of referral, allowing them to concentrate on undertaking ultrasound examinations – a skill that radiologists (incidentally as do sonographers and some outpatient clinicians) claim expertise in.

Double scanning and turf protection

Building on an understanding of inappropriate referrals, this section seeks to problematise double scanning by demonstrating how it is coloured by issues of knowledge-power, and in particular how double scanning is central to radiologist attempts to control the diffusion of ultrasound technology.

At the case study site, non-radiologist (cardiologist, obstetrician and gynaecologist) use of ultrasound is a contentious issue. Encroachment into scanning by non-radiologists without radiologist involvement is driven by difficulties in accessing the ultrasound service due to its growing waiting list, along with the ultrasound service's insistence that a radiologist must be present when patients are being scanned[5].

Both radiologists and sonographers disapproved of non-radiologists undertaking and interpreting ultrasound scans. Radiologists were frustrated that hospital departments obtained ultrasound scanners when the ultrasound service was unable to secure funding to augment its service, particularly when some radiologists and sonographers felt that the outpatient clinicians had exploited the open-ended commitment to timely access by manipulating the ultrasound service's waiting list. The number of requests marked "urgent" directly reduced the rate at which outpatient requests were removed from the waiting list. This created the appearance of a lengthy wait and helped build the outpatient clinicians' case that a dedicated outpatient ultrasound scanner in their area was needed. However, radiologists were powerless to

stop this action since it would require them to prioritise the requests and accept the resulting medico-legal consequences.

In the case of imaging technologies such as computerised tomography and magnetic resonance there are good economic arguments that support the radiologist's claim that such services need to be radiologist-centred. However, arguments for the centralisation of ultrasound imaging are weak since most scanners are relatively inexpensive to purchase and operate. Unlike non-radiologists who have reportedly referred to ultrasound as little more than "high tech" stethoscope (Martin, 1995), radiologists argue against the widespread diffusion of ultrasound on the basis that users need to be appropriately qualified and that radiologist expertise is scarce. In the UK, Australia and New Zealand there is a shortage of qualified radiologists (Chapman, 1997; Jones *et al.*, 1999). It is within this context that the widespread adoption of double scanning by the radiologists is interpreted.

The guarantee that double scanning successfully restricts the diffusion of ultrasound technology rests on its ability to adapt and build on existing professional identities, which differentiate the radiologist from both the sonographer and the outpatient clinician. In plain film radiography, other than following a technically prescribed set of rules governing image quality and the positioning of the patient, the technologist does not need to consider how the diagnostic information will be interpreted. For Larkin (1983) the social organisation of radiology departments revolves around this fundamental distinction between production and interpretation. Radiologists and technologists have clearly defined identities and roles: technologists produce diagnostic information while radiologists, as medical professionals, supervise production and interpret this diagnostic information. With the introduction of other advanced imaging modalities such as computerised tomography this distinction has been largely maintained.

Ultrasound imaging is in many respects anomalous, given that the diagnosis results from the interplay between scanning and interpreting the real time image. The ability of the radiologist/technologist to reach a correct diagnosis depends on the radiologist/technologist formulating a provisional diagnosis from the referring clinician's request and testing it by imaging the site of suspected abnormal pathology. Scanning and interpretation are intertwined and collapses the distinction between production and interpretation along with the identities of the radiologist and technologist. Given the operator dependent nature of an ultrasound image, double scanning can be viewed as an attempt to maintain this traditional division of labour[6]. In this manner, a sonographer will undertake initial (technical) examination, which is not accepted until it is validated (or interpreted) by the radiologist as the correct or likely diagnosis. The production/interpretation distinction is maintained.

This strong pairing of the radiologist and the sonographer creates two problems. First, given the uncertain contribution that the sonographer makes to the overall production of the ultrasound scan, the need for the sonographer is in question. Indeed, it is conceivable that radiologists could scan and interpret ultrasound scans unaided. Second, the basis for double scanning rests on the arguments that sonographers cannot scan autonomously without radiologist supervision, given that they lack necessary medical knowledge, and that the medico-legal consequences are the radiologists' responsibility. In this regard, radiologists differentiate themselves from sonographers by their skill in interpretation, according to the production/interpretation distinction.

However, the scanning skills of sonographers could complement (in theory) the non-radiologist expert understanding of the organ system being scanned (as opposed the radiologists' generalist understanding). Under the production/interpretation distinction, outpatient consultants could strike up alliances with the sonographers, making radiologist expertise redundant in ultrasound services. In view of the rapid growth and promise of ultrasound technology, this possibility poses a real threat to diagnostic radiology.

Radiologists and sonographers objected to non-radiologists undertaking ultrasound examinations, on the basis that they lacked the necessary scanning skills to reach an appropriate diagnosis and that patient care and safety could be compromised. It is possibly for this reason that radiologists engaged in double scanning, demonstrating not only clinical but also technical expertise. In both instances, double scanning serves to validate the legitimacy of a radiologist-centred ultrasound service, despite growing waiting lists and poor accessibility. In the first case, the difference between radiologists and sonographers is maintained, ensuring that sonographers do not scan independently of radiologists; while in the second case, non-radiologists are constructed as lacking the appropriate technical expertise in production. Radiologist expertise is therefore constructed as central and double scanning communicates to other clinicians that radiologist expertise is exact, scarce and important. However, at present, the insistence of double scanning creates significant backpressure onto the waiting list, further reducing accessibility and in doing so amplifies calls from departmental managers and sonographers to relax the policy of double scanning.

While the waiting list acts as an effective sense-making mechanism, translating the diagnostic dilemmas of general practice into the expert "language" of the radiologists, it simultaneously threatens the very erosion of radiological expertise. The arguments for centralisation are not so strong as in the case of other imaging modalities such as computerised tomography. As ultrasound imaging blurs the traditional distinction between radiologist and technologist, and outpatient clinicians faced difficulties in gaining timely ultrasound scans, radiologists have taken on a technician-like role to validate the centrality of radiologist expertise. In addition to employing a discourse that downplays the validity of GP referrals, thus buffering radiologist expertise from the realities of general practice, radiologists have also resorted to a technical discourse to legitimise their claim to control over ultrasound imaging. Viewed through the lens of knowledge-power, these discourses help construct a series of dichotomies that mediate the relationships between radiologists and other stakeholders constituting radiologist expertise (see Table I). Double scanning is instrumental, protecting radiologist turf, but is the source of domination and alienation underlying waiting patient, GP and sonographer accounts of the waiting list.

Conclusions

This present study has sought to better understand an ultrasound waiting list. To this end, a case study of a problematic waiting list was undertaken where patients were waiting anywhere from a few weeks to 12 months. The case study findings were examined through Flood's (1999) four systemic windows based on process, structure, meaning and knowledge-power.

A significant finding, in contrast to other waiting list models which privilege medical prioritisation as unproblematic (e.g. Yates, 1987; Worthington, 1987; Frankel,

Stakeholder	Similar competencies	Dichotomy	Distinction enacted by
Sonographers	Scanning skills	Production vs interpretation	Medico-legal risk assumed by radiologists. Radiologists as medical practitioners have the necessary clinical knowledge to interpret the ultrasound scan
GPs	Clinicians	Appropriate vs inappropriate	Judging the utility of scan and the appropriateness of the request in hindsight. Waiting list decoupling radiologist expertise from problems of general practice
Outpatient clinicians	Medical diagnostic	Ultrasound service vs non-ultrasound service	Only radiologists have the necessary scanning and interpretation skills needed to undertake ultrasound examinations

Table I. Systems of knowledge-power enacted through double scanning

1989; Pope, 1991) is that the waiting list enabled GP requests to be standardised in two important ways, enhancing the positional power of the radiologists. First, it allows a particular image of illness to be enacted by enabling capacity to be allocated to patients deemed urgent. For the most part, the waiting list serves to transform vague non-specific symptomology into what the ultrasound staff saw as either recognisable abnormal pathology or idiosyncratic pain. The image of waiting patients as work-in-progress is striking and raises questions about how clinical uncertainty is being managed. Second, all patients (despite the reported number of normal scans) are assumed to be lawsuits in action. Radiologists do not prioritise patient requests and unless the GP arranges an urgent scan, the patient is assumed to be non-urgent. Responsibility to manage and prioritise the ultrasound service's workload is thus passed to outpatient, GPs, sonographers and, most notably, waiting patients. Radiologists can focus on undertaking and interpreting ultrasound examinations. Accordingly, the ultrasound waiting list represents a significant disinvestment in community access as it serves to buffer and decouple radiologist-based images of illness and expertise from the complexity and equivocality of associated with general practice.

Another key finding was that the productive capacity of the ultrasound service is socially constructed around the contested radiologist image of expertise rather than a result solely of funding constraints, as many stakeholders believed. In particular, double scanning affords radiologists control over the diffusion of a technology, which is believed to be safe and inexpensive, and as such many argue ought to be readily available. For radiologists with private appointments, structuring the organisation of the ultrasound service around radiologist expertise ensures that private practice profitability is maintained.

Unlike many studies of waiting lists, this present study has shown that an adequate understanding of an ultrasound waiting lists depends on grasping how powerful stakeholders, such as radiologists, are successful in imposing a particular definition of the waiting list problem over the interests and values of less powerful stakeholders such as GPs and waiting patients. Indeed, this present study has raised a number of questions about the appropriateness of how specialist radiologist expertise dominates over the GP and waiting patient interest in managing clinical uncertainty. This mirrors

comments made by Gray (1966, p. 583), which, despite the strengthening of primary care, appear still relevant today:

> Far from being a help to general practice, hospital medicine is becoming a positive hindrance; it deals with the serious, the advanced, and the rare cases, and it is pervaded by a materialistic philosophy long since abandoned by all other educated sections of the community. In general practice, on the other hand, the central problem is presented by our old friend, the "trivial case." For the benefit of those who have forgotten, the trivial case is the one that is too difficult for the consultant (if anyone doubts this let him [*sic*] send his [*sic*] next trivial case to a consultant). Yet the trivial case includes many of the earliest manifestations of serious disease, together with many minor conditions, both organic and psychological – all in their early and most treatable state – for those who have the "know-how." What the general practitioner needs is more instruction in general practice, not in some largely irrelevant speciality.

The present study has highlighted a central difficulty in effectively managing a particular waiting list. This key difficulty is that due to the partial and bounded nature of the social construction of the waiting list problem, translating research findings is unlikely to be straightforward since at the root of the problem are professional power structures that require political rather than technical solutions.

However, change may be possible. The backpressure created by radiologist insistence on double scanning makes the viability of the radiologist-centred ultrasound service problematic. This is particularly the case given the growing number of ultrasound indications; increasing pressure for GPs and radiologists to practice defensive medicine; public health service rationing objectives; the push by sonographers to relax the policy of double scanning; and extra demand for ultrasound examinations created by the introduction of the booking system in New Zealand. It is not surprising that radiologists feel as trapped and powerless as waiting patients and their GPs, although radiologists tend to blame external factors such as resourcing and demand as causes, not internal factors. Radiologists, along with waiting patients and their GPs, may require emancipation from the radiologist-dominated systems of process and structure.

Notes

1. This paper reports on one aspect of a study conducted for a PhD in health systems management.
2. Midgley (2000) argues that what counts as knowledge depends on the purposes of research or intervention. Stakeholders external to the specific ultrasound service such as politicians and policy makers were not interviewed: while their decisions on resourcing and monitoring impact on all ultrasound scans, they have little influence on internal management practices that produce what amounts to a local problem. Early on in the data collection it emerged that radiologist interests and values played a central role in constituting the many problems associated with accessing the ultrasound serviced faced by outpatient clinicians, GPs and waiting patients.
3. This arrangement underlies the third operational policy that allocated appointments to GP patients. The sequencing heuristic FCFS preserves the date order of the request, making it easier for clerical workers to locate the patient's clinical summary so that the radiologist can discuss with the referring clinician whether an urgent scan is warranted.

4. Recognising that the ultrasound service is not based on objective necessities but contestable assumptions that potentially result in alienation and oppression offers a site from which systemic interventions can be developed to reframe the delivery of ultrasound so that it better serves the needs of GPs and waiting patients (Foote, 2002).
5. Martin (1995, p. 589) notes that ultrasound "is not and has never been solely radiological. It was not developed by radiologists and it is not performed uniquely by radiologists". In a similar manner Rogers (1990, p. 319) has cautioned the radiological community about reaching "obvious conclusions" about the appropriateness of non-radiologist use of ultrasound and notes that ultrasound imaging developed from "the early work of ophthalmologist Gilbert Baum, internist Joseph Holmes, and cardiologist Harvey Feigenbaum".
6. In the UK, it should be noted that prior to circa 1920 technologists routinely produced diagnoses. The emergence of the radiologist as an expert diagnostician occurred only after a boundary dispute was settled between the newly established Society of Radiographers and the recently founded speciality of radiology (Larkin, 1983).

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