The Turnaround Times for Patients Undergoing Ultrasound Examinations at the Radiology Department, Kenyatta National Hospital

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Abstract:
Background: Ultrasound examination turnaround time is the time between ordering a test by the clinician or the referring doctor at the time of submitting and or reporting of the results. Mae (1997: 83) argues that turnaround time definitions vary from institution to institution, hence necessitating specification by date, time, and type of the procedure. Ultrasound examinations are valuable in evaluation of both emergent, life threatening patients that have injuries that are not apparent on the initial physical examination as well as for routine examinations, all of which need to be as timely as possible. According to (Jill 2011: 253) timely and accurate diagnosis for ultrasound patients and initiation of optimal care is required. It is important that several quick steps in the management (including) extensive, thorough, but short interval ultrasound examinations with emphasis aligned towards reducing patient waiting time is put in place in the radiology department.
Objectives: Turn-around time (TAT) is one of the major determinants in the overall institutional processes growth evaluation tool. The purpose of this study was to evaluate the turnaround time for patients undergoing ultrasound examinations at the radiology department, Kenyatta National Hospital, Nairobi. The research was conducted between 2nd January and 30th May 2015 with turnaround time as the dependent variable while factors influencing turnaround time being the independent variables.
Methods: A three-month cross sectional descriptive survey in which 96 study subjects selected by systematic random sampling and then requested to complete a self-administered questionnaire. Data analysis was by Ms Excel and the results were tabulated and graphically presented.
Results: Out of the 96 patients' respondents, 51 were females while 45 were males. The major causes of longer turnaround times identified were: power black outs, jumping of queues by other patients, and burnouts of the staffs while working alone. Majority of the respondents were dissatisfied with the turnaround times for ultrasound examinations.
Recommendations: Investment in more diagnostic imaging resources and personnel by the Kenyatta National Hospital is advised. Further research on customer satisfaction is also advised.

1. Introduction

Ultrasonography may allow timely diagnosis of potentially life threatening cases and act as decision-making tool to help determine the need for transfer a patient to the operating room, CT or angiography suites (Alex 2001: 6). Many scholars have highlighted some of the factors influencing turnaround times for ultrasound examinations such as availability of continuous power supply to the ultrasound equipment during examinations, adequate staff performing the ultrasound examinations, giving of adequate and appropriate instructions to the patients, among many others. Shorter turnaround times for ultrasound procedures ensure the clinician's decision making in the overall patient management is faster and they also reduce overall patient stay in a hospital. Above all, short turnaround times in the imaging department also minimize complaints of delay in provision of healthcare to patients.

1.1. Statement of the Problem

In several instances, at each imaging department, it is presumable that the technologists are well aware of the urgency to attend to clients. It is incumbent upon the technologists to adhere to protocols and to have an understanding of specific items they need to enhance provision of rapid quality imaging services.

Scholars have demonstrated that stationing imaging equipments at the point of care such as the accident and emergency departments, intensive care unit, maternity units, and the renal units minimizes the examination related turnaround times (TAT). Prolonged turnaround times create medico-legal pitfalls for the involved medical personnel.

Determination of TAT is crucial in the Kenyatta National Hospital radiology department especially for ultrasound examinations to enable the hospital decide whether to equip the different hospital departments with adequate ultrasound technologists (healthcare providers), and machine(s) and which will specifically attend to these areas in order to reduce turnaround time. In this case, the patients will be the main beneficiaries, as they will no longer queue together for examinations.

1.1.1. Research Question

What is the turnaround time for undergoing ultrasound examinations at the radiology department, Kenyatta National Hospital?

1.1.2. Broad Objective

To determine the turnaround times for patients undergoing ultrasound examinations at the radiology department, Kenyatta National Hospital.

1.1.3. Specific Objectives
    i.   Determine factors influencing turnaround times at the radiology department, Kenyatta National hospital.
    ii. Determine the level of satisfaction on time management for patients undergoing ultrasound examinations at the radiology department, Kenyatta national hospital.
    iii. Determine the turnaround times for ultrasound examinations at the Kenyatta National Hospital.

2. Literature Review

2.1. Introduction

This chapter addresses the relevant literature in this study. Literature was reviewed according to the study objectives.

2.1.1. Factors Influencing Turnaround Time

In the radiology department, optimal minimization of turnaround times for ultrasound examinations reduces the complaints that may arise from the patients undergoing ultrasound examinations (Venus, 2012: 41).

According to (Frances, 2009:16), the healthcare providers in the radiology department should ensure that proper instructions regarding patient preparations (e.g. intake of fluids for full urinary bladder in pelvic examinations) are prompt and clear. Instructing patients appropriately can reduce errors, inconvenience, and delays in waiting for both patients and the staff.

Moreover, (Catherine 2010: 113), argues that adequate staff ensures that patients are all not booked or rescheduled for later dates due to the staff taking offs and duty leaves which is a factor contributing into longer waiting times. Randolph (2006:2) concurs that several problems may lead to patients crowding including access to an on-call specialists among others. In addition, where equipment shortages are experienced, patients may queue in a single room waiting for their turns thus increasing turnaround time. Operating more than one or two ultrasound equipments in the radiology department ensures even distribution of patients, thus reducing turnaround times.

Frequent electrical power outages and inadequate electrical power supply during an ultrasound procedure prolongs waiting times for the patient and the healthcare provider performing the examination. Back-ups (UPS) and generators always come in handy during these mishaps however, not for longer periods, especially if the power shortage takes longer (McGraw 1922: 133). According to Leonard, King and David (2010: 122), emergency ultrasound examinations can be performed rapidly (usually in less than 2- 4 minutes). Moreover, (Sten2012: 148), argues that, moving the patients to a radiology department in another place could be a major challenge to the patient and will consume time.

In the case of emergency extremity venous Doppler studies, timely diagnosis (without bookings or delays related to queuing) is very important due to the associated risks of pulmonary embolism, renal failure and phlegmasia cerulean dolens, besides it being a life threatening disorder (Borut, 2007: 584).

Patients presenting in the radiology department with per-vaginal bleeding requiring pelvic examinations in their early or late pregnancy states, need utmost urgency (Betsy, 2012: 445). Queuing in lines for longer periods could result in pregnancy loss and therefore they need quick response in the radiology department to help with clinical management.

Longer waiting times may also be experienced where the nature of the ultrasound examination requires immediate additional work-up such as, in differentiating benign from malignant nodes, in which case contrast studies or ultrasound guided fine needle aspirates (FNAC) correlation may be needed (Robert, 2012: 225).

2.1.2. Turnaround Times for Routine Ultrasound Examinations

In a busy radiology department that incorporates ward radiography portable radiography, antenatal care patients, and outpatient examinations, longer turnaround times can be one of the factors that determines the general hospital efficiency and level of patient management.

According to (Evelyn 2010: 221), short turnaround times have been witnessed following utility of Picture Archival and Communication System (PACS) in radiological services whilst at the same time delivering substantial cost reduction for the service.

John (2008: 166) states that despite certain times when we may be pushed to see more patients, if operator burnout or operator motion injury is the ultimate result, everyone loses. Ultrasound examinations for a first trimester pregnancy usually takes less than 20 minutes, while a third

trimester pregnancy scan can be completed within 30 minutes though a second trimester scan (especially the genetic sonogram) may take about 45 minutes.

2.1.3. Satisfaction on Time Management for Patients Undergoing Ultrasound Examinations

In the radiology department, faster attendance and delivery of reports can always alleviate the patient's psychological suffering in place where emotional and physical torture has occurred. A study on patients' complaints about services in the different service windows revealed that 104 patients complained against services obtained from the radiology department, 89 patients complained about laboratory services and 21 complained about the pharmacy respectively (Zlliyasu et al 2010: 371-2).

In evaluating patient complaints, a large medical centre with a sizeable outpatient clinic found that the most frequent complaint on patient satisfaction surveys was excessive waiting time Henry (1997: 114-16). The writer states that as a result, patient may find other diagnostic facilities from which to obtain their outpatient diagnostic imaging or leave dissatisfied with service rendered.

According to Zilligae et al (2010, journal: 75), the most frequent complaint in the radiology department included delay in attending to patients (47.1%), and long appointment periods (26.9%). In the same study, patients expressed dissatisfaction with the long queues where service delivery did not take into consideration one's disease severity or whether the patient is an in-patient or outpatient. In a related study, Teske (2012:72), a patient could wait in the ultrasound department for an examination while spotting and bleeding only to realize that later she was miscarrying.

In scenarios where turnaround times are shorter, OECD (2010:36) argues that consumer satisfaction is better whenever there is less waiting time for both tests and results, which also means that there is less delays before instituting treatment.

3. Research Design and Methodology

3.1. Location of Study Area
Kenyatta National Hospital is a referral hospital located in Nairobi County, Kenya. Nairobi County has experienced one of the most rapid growths in the recent past due to the rapid population rise in Kenya by an average of about 3% each year (www.google.map.kenya). With a population of over 3 million, Nairobi city is the main commercial center in central Kenya (wikipedia.org/wiki/Nairobi County)**.** Nairobi city lies on the central Kenyan plateau at an altitude of about 1,680 m (5,500 feet) with an area of 696 km² spanning between 1.28° South latitude, and 36.82° East longitude.

3.2. The Study Design
This was a cross-sectional observational type of study conducted with an aim of determining turnaround time for ultrasound examinations at the radiology department, Kenyatta National Hospital.

3.3. Study Variables
The researcher identified turnaround time as the dependent variable while factors influencing turnaround time as the independent variable.

3.4. Study Area
The study was conducted in the radiology department at the Kenyatta national hospital.

3.5. Study Population
The study participants were patients that sought ultrasound services at the KNH radiology department. Data was collected vide a self-administered questionnaire in the radiology department, Kenyatta National Hospital.

3.6. Sampling
Systematic random sampling was used to get the required sample for this study whereby two patients were interviewed each day on a first come first serve basis.

3.7. Data Analysis and Presentation
Data was analyzed vide MS Excel, then graphical presentation and descriptive statistics undertaken.

3.8. Inclusion Criteria
Patients that were booked or sought ultrasound examination services at the KNH radiology department were included in the study.

3.9. Exclusion Criteria
Patients' next of kin were not included in the study. The patients who were in the radiology department for other examinations were also not included.

3.10. Ethical Consideration
The data collected is handled with confidentiality. The nature and significance of the study was clearly explained to the respondents and consent obtained before the study was conducted. Permission to carry out the study was obtained from the research committee, Kenyatta National Hospital and the Jomo Kenyatta University of Agriculture institutional review board..

4. Results Analysis and Interpretation

4.1. Introduction
The ultrasound examination services that were undertaken in the radiology department included: obstetric ultrasound, pelvic, abdomen, breasts, limb Doppler ultrasound services, FNA ultrasound guided services, endovaginal, transrectal, and thyroid scans as well as FAST scan. There were different ultrasound rooms (suites) that were dedicated for the ultrasound services that were manned by healthcare providers (radiologists, radiographers and sonographers on duty)
The turnaround time for the above mentioned ultrasound services was sampled at random depending on the patient's examination that was in the request form as they were being interviewed. The other services in the department noted were 'ultrasound bookings' by the patients for different ultrasound examinations. The bookings were mainly for non-urgent cases antenatal follow-up cases.
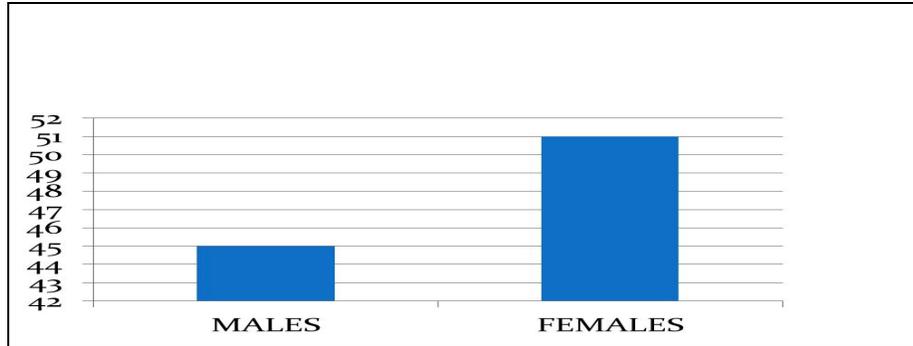
4.2. Information from the Patients

Figure 1: Gender distribution of respondents.

In the graph above, 47% (n=45) of the respondents were males while 53% (n=51) were females.

Services	Respondents	%
Booking scans	18	19
Obstetric scans	23	24
Pelvic scans	22	23
Abdominal scans	26	27
Others (FAST, doppler limbs, breast, thyroid)	7	7.3
Total	96	100

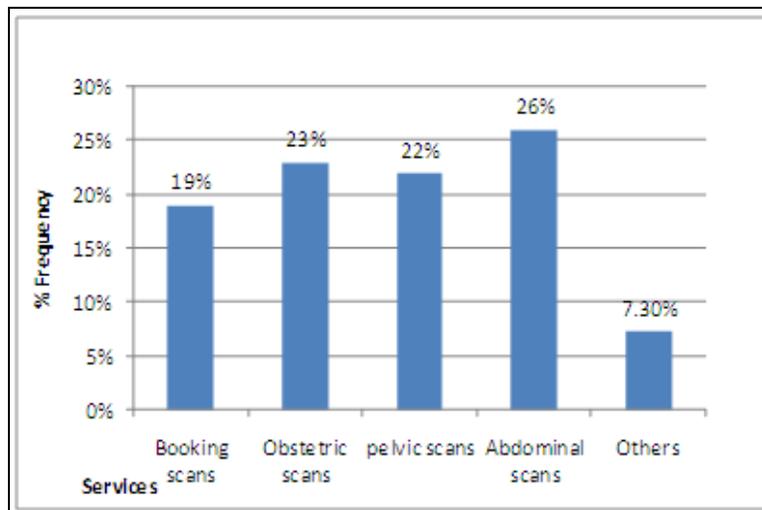*Table 1: Services sought by respondents*

Figure 2: Services sought by respondents

In the table above, 19% (n=18) of the respondents came to book for ultrasound examinations, 24 %(n=23) for obstetric scans, 23 (n=22) for pelvic scan, 27% (n=26) for abdominal scans while the rest, 7.3% (n=7) had special procedures including limb Dopplers, breasts scans, thyroids and FAST examinations).

Time taken	No. of respondents	%
<5min	2	2.1
< 10min	9	9.4
<20min	46	47.92
<35min	23	23.96
>40min	17	17.71
total	96	100

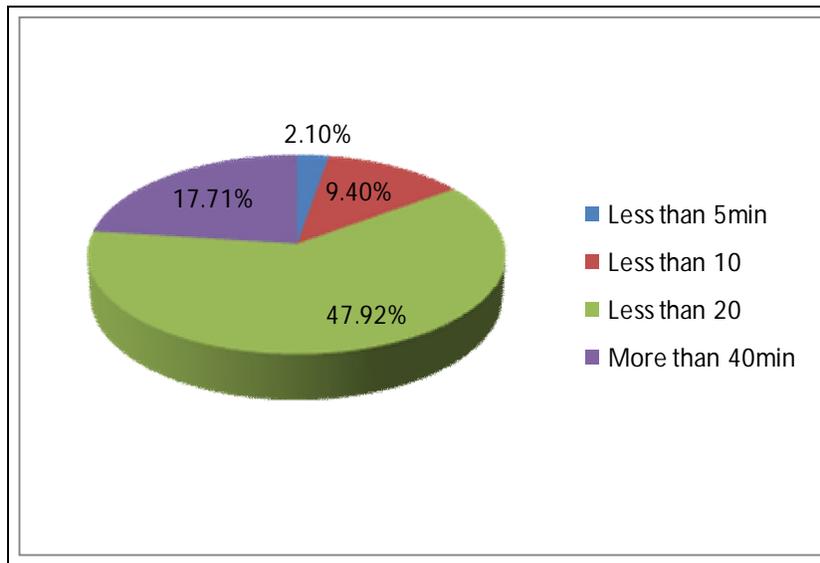*Table 2: Time taken for waiting before the service is done*

Figure 3: Time taken for waiting

In the figure 3 above, 2.1% (n=2) of the respondents waited for less than 5 minutes before their turn to be served at the radiology department. The rest, 9.4% (n=9) waited for less than 10 minutes, 47.92% (n=46) for less than 20 minutes, 23.96% (n=23) for less than 35minutes while 17.71% (n=17) waited for more than 40 minutes.

Time Taken	No. of Respondents	%
10min	11	13
15min	12	14
20min	31	35
30min	29	33
40min	4	4.5
>45min	1	1.14
total	88	

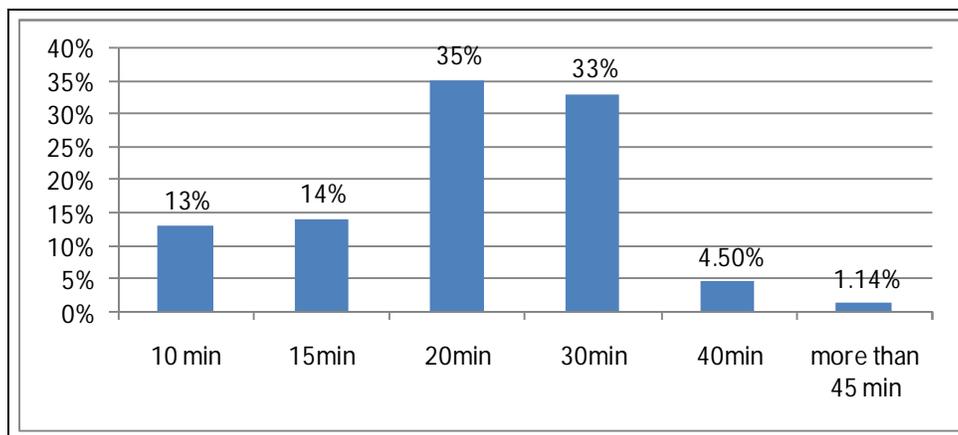*Table 3: Time taken for the scan to be done*

Figure 4: Time taken for the scans

In the figure 4 above, 13% (n=11) of the patients had their scans completed within 10 minutes, 14% (n=12) in 15 minutes, 35% (n=31) in 20 minutes, 33% (n=29) in 30 minutes, 4.5% (n=4) in 40 minutes and 1.14% (n=1) in more than 45 minutes.

Causes	No. of Respondents	%
no one to attend to us	18	18.75
Long queues	36	37.5
Jumping of queues	18	18.75
Power blackouts	11	11.46
Others (filling bladder)	13	13.54
Total	96	100

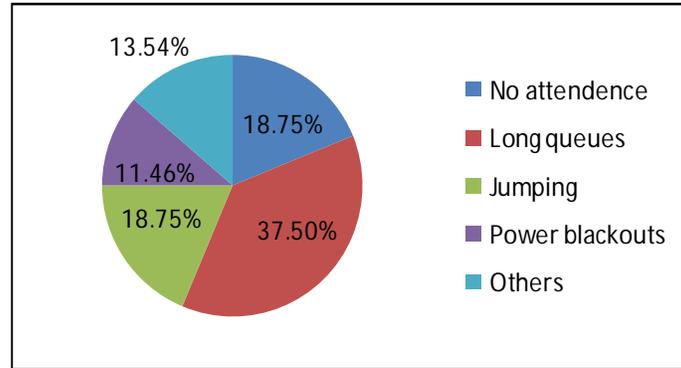*Table 4: Causes of the wait before the scans*

Figure 5: causes for the wait

In the figure 5 above, 18.75% (n=18) of the respondents complained of their causes for waiting before being attended that no one was in place to attend to them, 37.5% (n=36) that there were long queues, 18.75% (n=18) complained of staff and other patients jumping the queues while 11.46% (n=11) complained of power black outs. The rest, 13.54% (n=13) waited for the scans because of empty urinary bladders and were still filling to adequately prepare for the examination.

Respondents	Frequency	%
Yes	41	42.71
No	55	57.29
Total	96	100

Table 5: Patients who believe the waiting time is reasonable
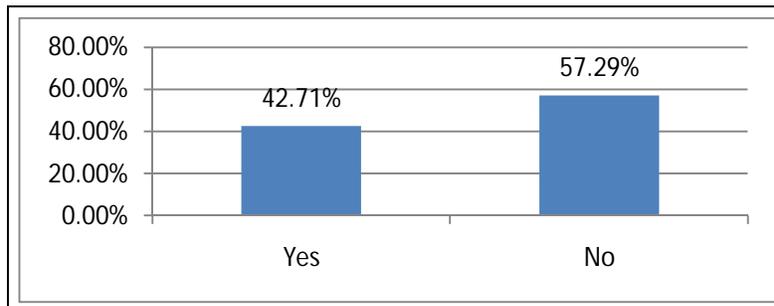

Figure 6: Reasonable time waiting for the patients

In the table above, 42.71% (n=41) of the respondents believed that was reasonable, while the respondents that believed the waiting time was unreasonable were 57.29% (n=55).

Respondents	Frequency	%
Yes	33	34.38
No	63	65.63
Total	96	100

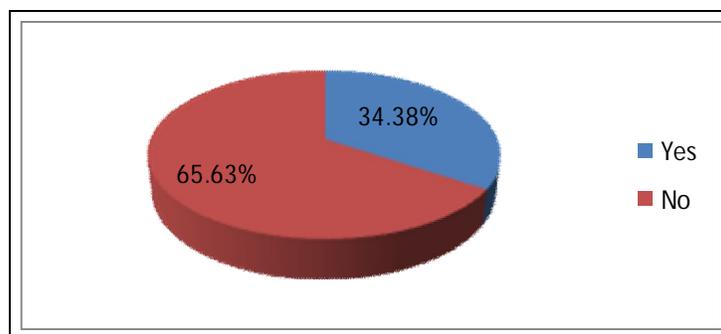*Table 6: Satisfaction of patients on effectiveness of TAT*

Figure 7: Satisfaction on effectiveness of TAT

In the table above, 34.3% (n=33) of the respondents were satisfied on the effectiveness of turnaround time while 65.63% (n=63) were dissatisfied.

5. Discussion, Conclusions and Recommendations
This chapter represents discussion, conclusion and recommendations of the study based on the objectives as well as the study variables in line with the literature review.

5.1. Discussion
Out of 96 respondents interviewed, 47% were males while 51 per cent were females. This shows that the majority of the respondents were females during their visit to the Kenyatta Hospital radiology department.

From table 2, the highest ultrasound service sought during the scan period was abdominal ultrasound at 27% (n=26) followed by obstetric scan requests at 24% (n=23). While 1%9 (n=18) were booked for ultrasound services.

The longest noted time waited before a given service by a large number of respondents was 20 minutes at 47.92%, followed by 35 minutes at 23.96%.This concurred with Henry (1997) who noted that the longest waiting time could reach up to 35 minutes in certain cases.

The longest time taken for a specific ultrasound scan to be complete from, scanning, reporting, and discharge took 45 minutes at 1.14% (obstetric doppler and limb dopplers) followed by 40 minutes (4.5% for combined abdominal pelvic examinations. Some patients still alleged to have taken more time (50 to 60 minutes). This is in agreement with John (2008) who stated that advanced obstetric ultrasounds could take more than 45 minutes without notice. The 20 minutes was almost optimal when compared with the Kenyatta National Hospital departmental standards for TAT for ultrasound examinations which ranged between 20- 30 minutes, while the 45 minutes noted were not. This was also in line with the society of radiographers guidelines on the respective turnaround times for ultrasound examinations (http://www.sor.org/learning/document-library/guidelines-professional-working-standards-ultrasound-practice/section-1-general-guidelines#table1 accessed 2/06/2015).

The major causes for waiting before scan procedures included long queues (at 37.5%), jumping of queues by other emergency cases and no one to attend to the patients (at 18.75%) and power blackouts (at 13.54%). This agrees with (McGraw 1922: 133), who stated that power outages could contribute to patient waiting time increases in the hospital and Randolph (2006:2) who also noted that doctors on call also contributed to patient waiting time.

The numbers of the respondents that believed waiting time was reasonable were 42.71% while 57.29 % did not. For the patients who believed waiting time was reasonable, they appeared satisfied. This is in line with (OECD 2010:36) who stated that patients being attended faster have higher satisfaction levels as they no longer stay in the hospital more than they intended and this boosts the hospital and the radiology departmental image positively.

The number of the respondents that were satisfied with turnaround time for their ultrasound procedures were 33.38 % while the rest 65.63 % were not satisfied. This is probably due to having to wait in the long queues as they waited for their turns due to in adequate staff and jumping of queues as well as waiting related to the registrars on call who had to respond to emergency telephone calls while on evening and night duty calls thus interrupting service delivery.

5.2. Conclusions
The optimal turnaround time is yet to be realized at the Kenyatta National Hospital radiology department as the turnaround time was found to exceed 45 minutes in some examination cases in late third trimester and in bilateral limb dopplers, and in multiple examinations for a single patient like abdominopelvic scans.

The majority of the patients were dissatisfied with their turnaround time. The shortest ultrasound examination scan (from the time of identifying the patient, preparing the patient and doing the scan up to reporting the findings) took 15 minutes.

5.3. Recommendations
In line with McGraw (1922), the hospital should invest more resources to purchase and install power back-ups (e.g. generators dedicated for the radiology department) and durable UPSs (for ultrasound equipment) that could be handy in view of the frequent power outages that interrupt service delivery.

It is also high time that the Kenyatta National Hospital deployed more staff to the ultrasound units in the Intensive care unit and maternity wards and consider extending these services to other sections like the renal unit as well.

Further comprehensive research on customer satisfaction should be undertaken at the Kenyatta National Hospital Radiology department.

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