A review of the delay in diagnosis and management of breast lumps in the Theewaterskloof sub district in the Western Cape.

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Abstract

Breast cancer is the most feared and common female malignancy in the world. About one in ten women in South Africa will be diagnosed during her lifetime with this disease. The outcome of breast cancer treatment is dependent on early detection and swift subsequent management. A lack of research exists in South Africa about diagnostic and treatment delay factors. A situational analysis is currently underway to improve the breast cancer service in the country. Even less is known about the delays in rural health care. This study examined the delay during the diagnosis and treatment of breast lumps in the Theewaterskloof (TWK) sub district in the Western Cape. The results were compared to Worcester hospital, the secondary referral centre of this district. Three hundred and twenty (322) patients from Caledon hospital and surrounding clinics in the TWK and 322 randomly selected patients from Worcester hospital surgical clinic, who presented during 2007-2010, were retrospectively studied. The mean breast lump diagnostic period at TWK was 45 days versus 16 days at Worcester. Breast cancer diagnostic times were 38 days and 19 days respectively. More alarming was the difference in breast surgery delay of 173 days versus 16 days at TWK Worcester hospital respectively. These time periods were compared to the tertiary institutions in the Western Cape and with international guidelines. Cytological adequacy i.e. Fine Needle Aspiration (FNA) and core needle biopsy between the institutions are also reported. In conclusion it is suggested that regular training in FNA is required to improve the cytological adequacy at TWK. Long delay in surgical waiting periods can be addressed by referring TWK breast cancer patients to Worcester hospital after diagnosis.

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Introduction

Breast cancer is the most feared and common female malignancy in the world and about one in ten women in South Africa will be diagnosed during her lifetime with this disease.[1,2] Early detection is important and relies on the triple test which comprises ~~of~~ a thorough clinical examination, a fine needle aspiration (FNA) and a mammogram. A lack of research exists in South Africa about diagnostic and treatment delays and its causative factors. Even less is known about the services in rural health care. Tertiary and secondary hospitals in the Western Cape have adequate resources and expertise to perform the triple test quickly and efficiently due to dedicated breast cancer and surgical clinics. Rural areas such as the Theewaterskloof (TWK) sub district are not as fortunate with long waiting periods for mammograms, variability in clinical expertise and an inadequate FNA technique. This results in an unnecessary delay in the diagnosis of a breast lump and hence breast cancer.

Bernhardt[3] in a situational analysis of breast cancer management in the Western Cape found that at Groote Schuur hospital the breast cancer diagnostic delay is 14 days and unknown at Tygerberg hospital (TBH). Breast surgery at Groote Schuur hospital takes place within 6-10 weeks and 4-6 weeks at Tygerberg hospital. No data about district hospital level delay in diagnosis and treatment is known. Van Schalkwyk[4] researched diagnostic and treatment delay factors in women who presented late with cervical cancer amongst urban and rural dwellers of KwaZulu Natal. The average number of months from first contact with a health care professional until diagnosis was 17.3 months, ranging from 11.8 months for urban participants to 28.4 months for rural participants, and 3 to 7 months from diagnosis to treatment. International standards for breast cancer diagnosis and treatment were published by the Breast Health Global Initiatives (BHGI) in 2007[5], the Manual Update on Breast Cancer Service of the National Institute for Clinical Excellence (NICE)[6] in 2002 and the Improving Breast Cancer Outcome summit of the British Association of Surgical Oncology (BASO) in 2005[7]. In these first world countries breast lump analysis is performed by a one stop service for

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the triple test. Their guidelines state that FNA or core needle biopsies should be available within 5 days and their mastectomies are performed within 17 days. Groote Schuur hospital has a one stop triple test clinic which provides outcome of cytological testing and mammography on the same day. TBH primarily accepts patients with cytology-proven malignancy for assessment, staging (including mammography) and treatment. Diagnostic investigations for the TBH drainage area are performed mainly at primary and secondary levels of care.

In South Africa the diagnosis of breast cancer relies on the triple test – very well described by Apffelstaedt. [7] A South African consensus on the general management of breast cancer is further described by Apffelstaedt in two other papers. [8, 9] He argues that a good history and clinical examination, with a mammogram and fine needle aspiration can diagnose the majority of breast diseases. Common problems encountered with FNA and indications for mammography are discussed. A step wise logical approach is given from noting relevant aspects in history taking to eventual treatment.

The researcher could not find research done in South Africa which focused on the technique of FNA as a delaying factor. Kogjan highlighted the continuing role of fine needle aspiration cytology in the diagnosis of breast lesions, against a background of its diminishing use in some centers in Croatia, because of its controversial inadequate rate and suboptimal accuracy. [10] His review explored the current practice and confirms the continuing role of FNA in the diagnosis and management of breast lesions. The three main areas where FNA still plays a major role in Croatia are the following: (a) diagnosis of benign disease in symptomatic palpable lumps as part of triple assessment; (b) staging of breast carcinoma, in particular preoperative axillary lymph node FNA and intraoperative sentinel node imprints; and (c) diagnosis of metastatic disease at distant sites following treatment for carcinoma. Kogan argues that excision biopsy of a breast lump to establish whether it is benign or malignant is not an acceptable mode of diagnosis. Contrary to his argument, in rural settings, long referral delays forced clinicians to revert to excision biopsy to obtain a definite diagnosis after repeated cytological diagnostic failure. This practice however could compromise eventual

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therapeutic treatment option e.g. radical mastectomy versus breast conservative treatment. Mammography as part of the triple test is problematic due to long waiting lists at public health care institutions, a very frustrating factor for rural health care practitioners. Ultimately, patient awareness cannot be ignored, because even when diagnostic and treatment procedures have been streamlined, nothing can be done unless the patient presents at an early stage. The aims and objectives of this study were to determine the TWK sub district a) breast lump diagnostic delay from 1st cytological test to definitive diagnosis, b) delay from diagnosis to initiation of treatment, c) whether a patient obtained a mammogram, and d) to compare TWK delays with Worcester hospital, the regional referral hospital. This information will be used to construct practical guidelines in a rural setting for the efficient management of patients with a breast lump.

Methods

This was a retrospective descriptive study of patients who presented with a breast lump in the TWK sub district and at Worcester Hospital from January 2007 until December 2010, determining and comparing diagnostic and treatment delays. In the TWK sub district patients with breast lumps are seen and managed initially by doctors at peripheral clinics or practices, otherwise referred to the surgical clinic situated at Caledon Hospital in the TWK. The surgical clinic is managed by a general surgeon. The referral clinics are Genadendal, Botrivier, Caledon, Greyton, Bereaville, Tesselaardal, Riviersonderend, Grabouw Community Health Care Centre and three general practices one situated in Riviersonderend and two in Caledon. These facilities are responsible for the health of approximately 110 000 people. Caledon hospital in the TWK is a level 1 facility and the nearest level 2 hospital is Worcester, 120km away. The nearest tertiary hospital is Tygerberg, 135 km away. The study population was all patients seen during the study period in the TWK and Worcester hospital surgical clinic. Patients with breast lumps at Worcester hospital are managed at the Worcester hospital surgical clinic. A total of 322 patients presented with breast lumps in the TWK during the study period. All their cytology and pathology reports were obtained from the National Health Laboratory

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Services at Tygerberg Hospital laboratory. The diagnostic delays were calculated from the time the first cytological specimen was sent for analysis until a definitive result was reported for the patient. The treatment delay was calculated from the time a definitive result was reported until a patient received surgical intervention i.e. lumpectomy or mastectomy. The date of surgical intervention was determined from laboratory report indicating the date the histology specimen was taken at the time of surgical intervention.. The same number of patients was selected randomly from the National Health Laboratory Service's data base of patients with breast lumps who presented during the same period at Worcester hospital surgical clinic. Eighty (80) patients per year from 2007 - 2009 and eighty two (82) from 2010 were randomly selected. Information regarding mammograms was obtained from the radiology department at Worcester hospital.

Since delay times are continuous, an analysis of variance (ANOVA) was performed to determine significant differences. MS Excel was used to capture the data and STATISTICA version 9 (StatSoft Inc. (2009) STATISTICA (data analysis software system, www.statsoft.com.) was used for analysing the data.   The ethical consideration was that of accessing private and confidential information of patients. For some individuals, suffering from cancer is today still a matter of privacy and do not want this information to be made public. There was however, no reason to disclose names or personal information of patients under researched. For this reason an application for waiver of consent was made to the ethical committee of the University of Stellenbosch. Ethical approval was obtained from the Health Research Ethics Committee at the University of Stellenbosch. –

Results

Three hundred and twenty two (322) patients with breast lumps presented in TWK on which 396 FNAs were performed at 8 health care centres. The majority were done at Grabouw Community Health Care Centre (173) and Caledon hospital surgical clinic (113), Botrivier clinic (23), Caledon clinic (37), Genadendal (7), Greyton (11), Riviersonderend (23) and general practitioners (9). From these patients with breast lumps 184 (57%) had a final

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pathological diagnosis. The diagnosis of the rest was unclear based on the cytological and histological reports. Of the 184 patients with a diagnosis, FNA alone diagnosed 85% and the rest were diagnosed with either core needle biopsies (2) or surgery i.e. incision or excision on biopsies. The FNA adequacy rate i.e. suitable for cytological diagnosis was 51%. Of the 322 patients randomly selected at Worcester surgical clinic, 348 FNAs were performed with a 59% adequacy. FNA diagnosed 83% of the patients. The rest were diagnosed with core needle biopsies (4) and others with excision or excision biopsies. A total of 49 core needle biopsies were done at Worcester during the same period of which 45 were in conjunction with FNA. Forty (82 %) of these core needle biopsies were positive. See Table 1.

Table 1. Description of patient diagnosis and FNA success rate.

	Theewaterskloof	Worcester hosp. surgical clinic
Patients with breast lumps	322	322 (random samples)
Those with a diagnosis	184 (157 from FNA, 27 from biopsies)	211 (176 FNA, 35 biopsies)
Uncertain diagnosis	138	111
No of breast cancer patients	29	39
Total FNAs	**396**	**348**
FNA adequate for cytology	200 (51%)	207 (59%)
FNA inadequate for cytology	196 (49%)	141 (41 %)
No FNAs done	12	10

Comparison of the various pathologies detected during the study period is shown in figure 1. Patients from TWK receive mammograms at Worcester hospital Radiology Department and only 18% of TWK patients had a mammogram. The mammogram date was determined by available appointments at Worcester hospital and the TWK patients were not discriminated against. Mammograms waiting times vary from 10 - 42 days.

Figure 1. Breast pathology detected at (TWK) and Worcester surgical department during the study period.
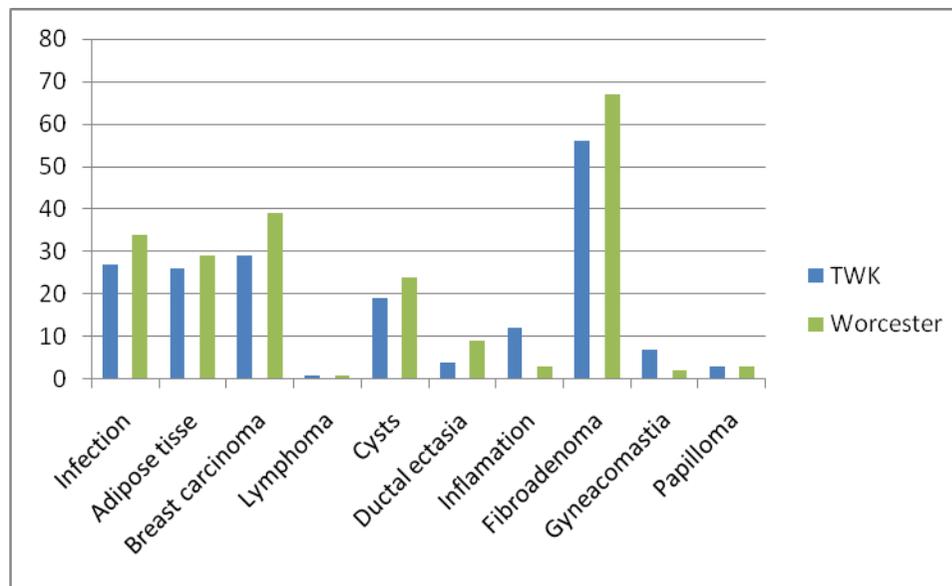
The mean number of days at TWK to reach a diagnosis of a breast lump using any cytological or histological method was 45 days (95% Ci: 34 -56) and at Worcester surgical clinic 16 days (95% Ci: 14 − 18) with p=0.0001. See table 2.

Table 2. Delays in diagnosis.

| Delays	Theewaterskloof	Worcester	P value
*1st FNA to diagnosis – all tests included	45 days	16 days	p=0.0001
**1st FNA to diagnosis – only FNAs	28 days	17 days	p=0.002

*time from the 1st FNA performed until final diagnosis, all pathology tests included.

**patients diagnosed from FNA alone.

FNAs = Fine Needle aspirations.

A box plot of these differences is shown in figure 2. The delay of those patients diagnosed only by means of FNA was 28 days (95% Ci: 24 – 32) at TWK and 17 days (95% Ci: 13 - 21) at Worcester hospital surgical clinic (p=0.002).

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Figure 2. A box plot comparing diagnostic delay using any cytological or histological method.

Box plot by Group
Variable: Diagnostic Time (Days) - Any Method
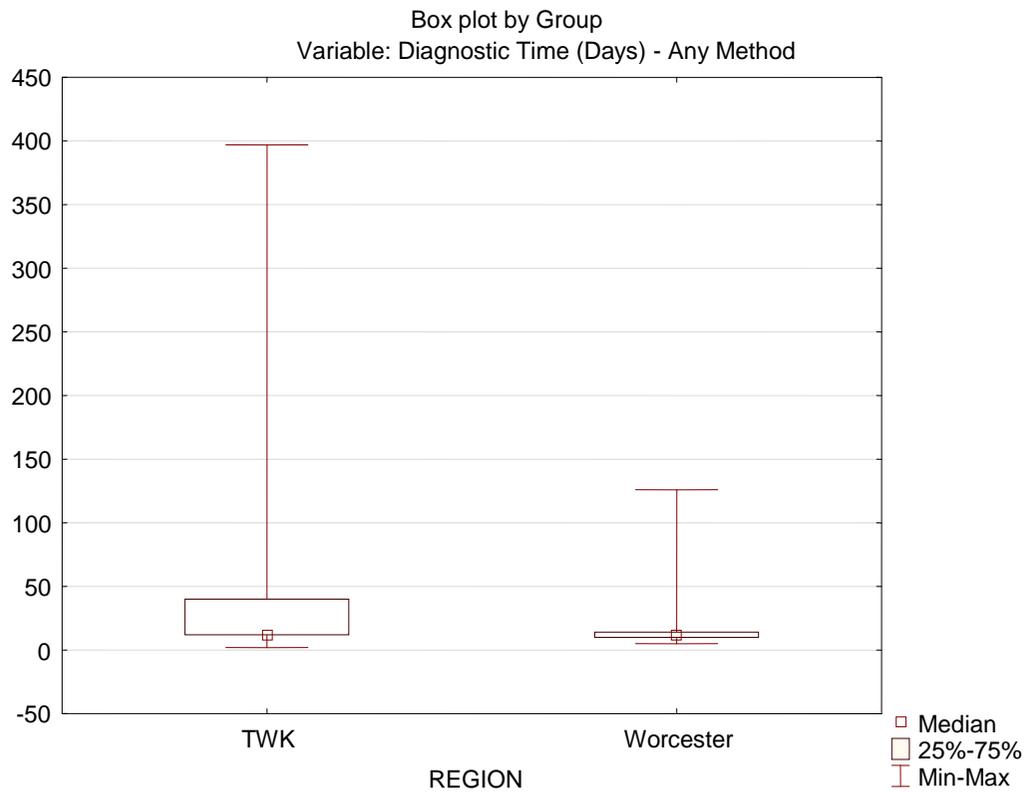
Breast cancer diagnostic analysis

The following analysis only pertains to those patients found to have breast cancer (table 3). Twenty nine (29) and thirty nine (39) breast cancer patients were diagnosed in TWK and at Worcester surgical clinic respectively. The mean time to reach a diagnosis was 38 days (95% Ci: 17-60) at TWK and 19 days (95% Ci: 13-27) at Worcester hospital (p = 0.09). See figure 3. Those diagnosed by FNA alone were 76% and 72% respectively with a delay of 44 days (95% Ci: 32-65) and 20 days (95% Ci 16-24) respectively (figure 4; p= 0.03).

Table 3. Delay (days) of diagnosis and treatment of breast cancer patients.

	Theewaterskloof	**Worcester**	**p-value**
Total number of breast cancer patients	29	39	
Number of cancer patients diagnosed from FNA alone	22 (76%)	28 (72 %)	
Number of cancer patients diagnosed from 1st FNA	15 (52%)	28 (72 %)	
Number of cancer patients from >1 FNA	7 (24%)	NA	
Number of cancer diagnosed from core needle biopsies	2 (7%)	7 (18%)	

Excision biopsies	5 (17%)	4 (10%)	
Delay* to reach a breast cancer diagnosis – all methods	38	19	p = 0.09
Delay to reach a breast cancer diagnosis from FNA	44	20	p = 0.03
Delay until mastectomy	*173	16	p = 0.0001

*Days ** performed at Tygerberg hospital

Figure 3. Comparisons of overall breast cancer diagnostic delay at Theewaterskloof and Worcester surgical clinic.

Box plot of breast cancer diagnostic delay (days) using any method.
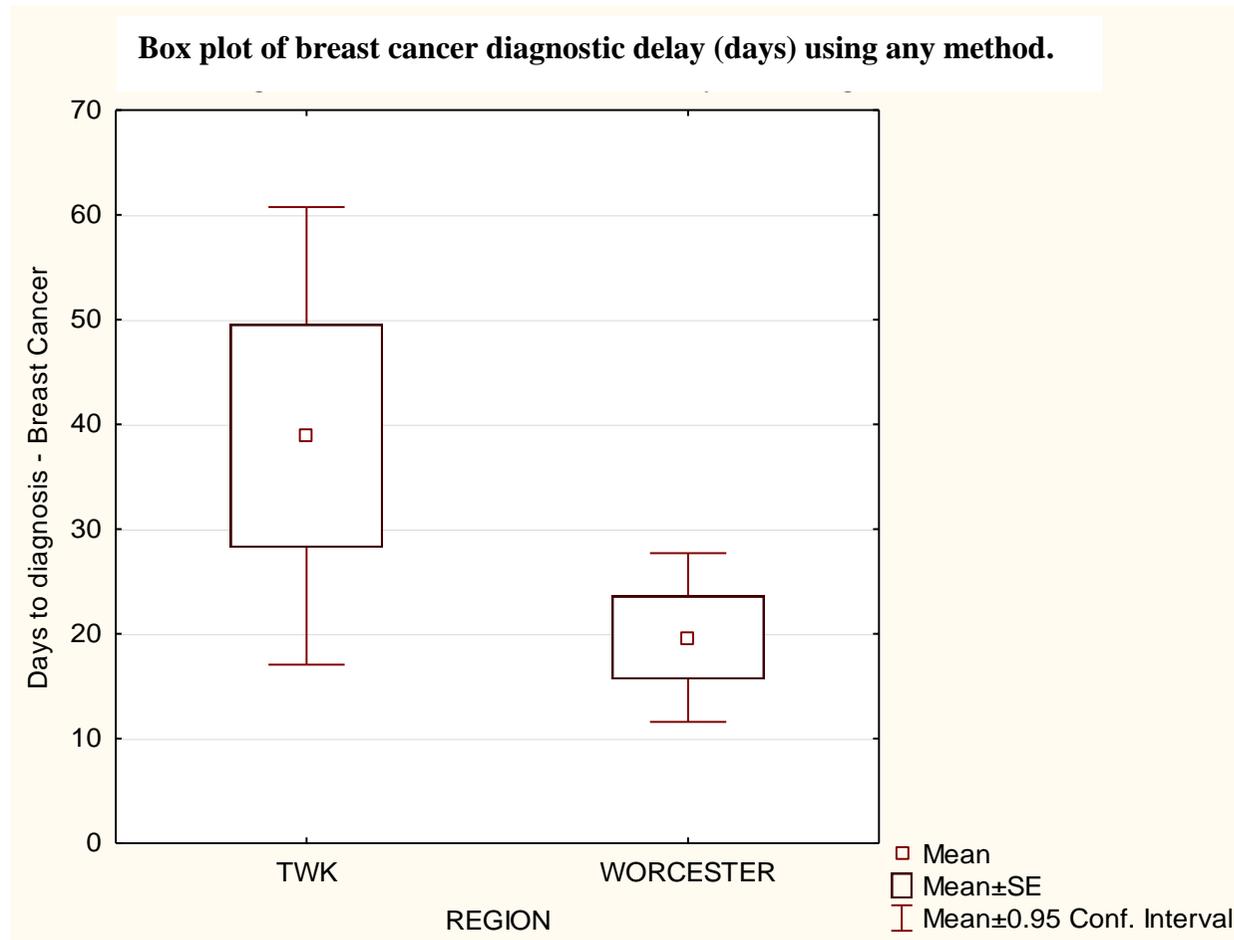
The number of patients diagnosed from the 1st FNA at TWK and Worcester surgical clinic was 52% and 72% respectively. Seven (24%) required more than one FNA at TWK and 7 (24%) were diagnosed with biopsies of which two (2) were from core needle biopsy. At Worcester surgical clinic, 28 (72%) were diagnosed from the first FNA, 7(18%) from core needle biopsies and the rest with excision biopsies. Breast cancer patients diagnosed at TWK were

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all sent to Tygerberg hospital for staging, chemotherapy, radiotherapy and surgical intervention if indicated. The time period from diagnosis to mastectomy was 173 days (95% Ci: 102-242) at Theewaterskloof versus 16 days (95% Ci: 13 - 19) at Worcester hospital (figure 5; p=0001).

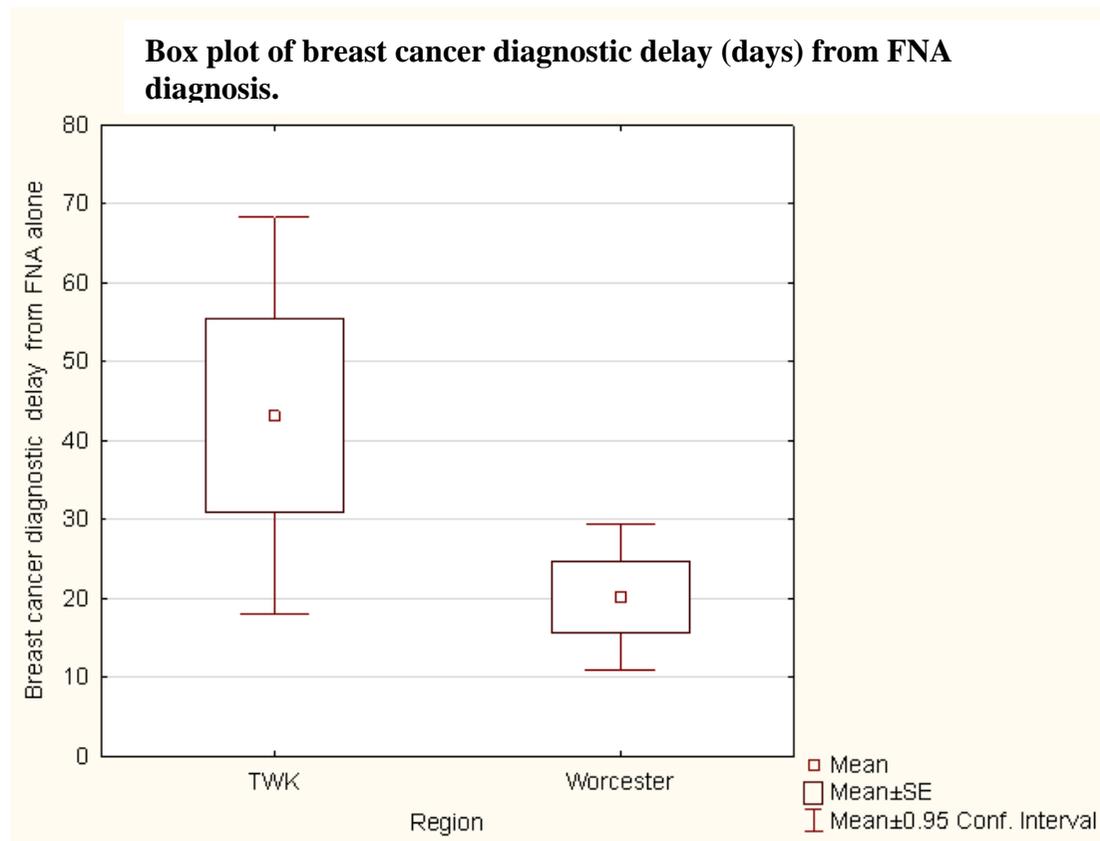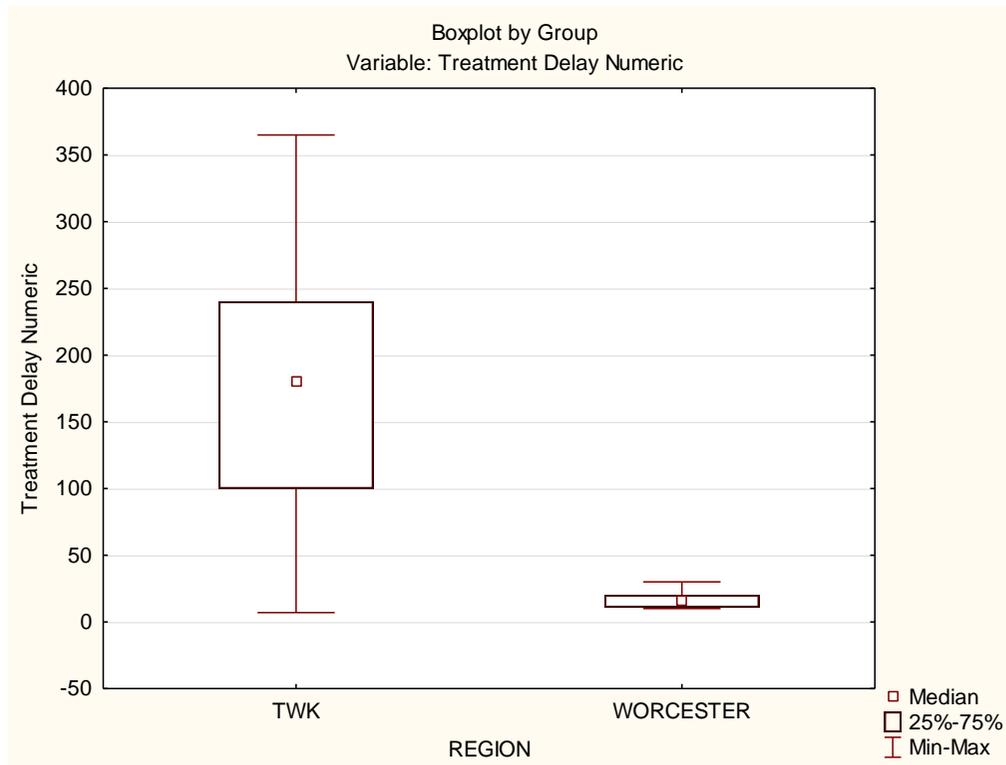**Figure 4.** Comparisons of breast cancer diagnostic delay of patients diagnosed from FNA alone.

Figure 5. Comparisons of breast cancer treatment delay for patients at Theewaterskloof and Worcester surgical clinic**.**

Boxplot by Group
Variable: Treatment Delay Numeric

Discussion

The findings of this study are very relevant in light of the current quest for a better streamlined service for the diagnosis and treatment of patients with breast cancer in the Western Cape. It illustrates the disadvantage faced by patients who present with breast lumps in a rural setting such as the TWK sub district in the Western Cape when it comes to diagnosis and treatment. The diagnostic results found in this study are compared to international standards as outlined by the Breast Health Global Initiatives[5] (BHGI) in 2007, Manual Update on Breast Cancer Service of the National Institute for Clinical Excellence[6] (NICE) in 2002 and the Improving Breast Cancer Outcome summit of the British Association of Surgical Oncology[7] in 2005. It is also compared to a situational analysis completed in 2010 by Bernhardt[1] for the Western Cape Department of health regarding breast cancer treatment and diagnostic services in the Western Cape.

Delay of breast cancer diagnosis and treatment

The National Institute of Clinical Excellence[6] in 2002 stated that the results of breast cytological tests should reach the patient within 5 working days to prevent patient anxiety and to speed up services. Bernhardt[1] found the breast cancer diagnostic delay at Groote Schuur hospital to be 14 days and unknown at Tygerberg hospital which is the referral hospital for breast cancer patients diagnosed at TWK. It took 38 days at TWK versus 16 days at Worcester surgical clinic to arrive at a breast cancer diagnosis utilizing any available method. The same diagnostic delay disparity is seen when analysing the combined diagnostic delay of all pathologies. Patients who present with a breast lump at TWK will have to wait for 45 days compare to 16 days at Worcester hospital for a diagnosis to be made. This long delay at TWK is mainly due to FNA technique variability evident by the percentage of cytological tests inadequate for analysis. Overall 49% and 41% of FNAs received were inadequate at TWK and Worcester surgical clinics respectively. Bernhardt[1] reported a 43% inadequacy for district hospitals overall in the Cape metropole, 40% for regional hospitals and 27% for tertiary hospitals in the Western Cape. The efficiency rate therefore increases with

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higher level of care. The accuracy rate of doctors at TWK is therefore slightly better than the rest of the district hospitals in the Cape Metropole, but considerably less compared to Worcester hospital. No data were given by Bernardt for the diagnostic delay time periods at district hospital level and the results in this study is the first to be reported.

Even more alarming is the delay before surgical intervention for breast cancer. Breast surgery at Groote Schuur hospital takes place within 6-10 weeks and 4-6 weeks a Tygerberg hospital. Patients at TWK received a mastectomy at Tygerberg hospital after an average of 173 days post diagnosis compare to only 16 days at Worcester hospital. Patients diagnosed at TWK are currently referred to the mamma clinic at Tygerberg hospital for further management. Patients diagnosed at Worcester surgical clinic received mastectomies at the same institution and then referred to Tygerberg for chemo and radiotherapy. Internationally the delay is 17 days[6] as outlined by the NICE guidelines. Worcester compares well with these standards. When the results of this study are compared to the situational analysis of Bernhardt[1] it is clear that patients from TWK are at a major disadvantage during the diagnosis of a breast lump and treatment of breast cancer. This is strong evidence in favour of referral of all patients diagnosed with breast cancer to Worcester hospital instead of Tygerberg hospital for staging and evaluation for surgical intervention.

Delay due to FNA technique variability
It is not advised to do an incision or excision biopsy to gather breast tissue due to the risk of spread if the lump is breast cancer and to prevent unnecessary surgery. This is especially important if a woman decides to have breast conservation therapy. Therefore the time taken to reach a diagnosis from FNA alone was also calculated. Doctors at TWK took an average of 28 days versus 17 days at Worcester surgical clinic to reach a diagnosis of a breast lump from FNA alone. The reason for a shorter time period for FNA compare to the overall diagnostic time period is the added delay when a biopsy is arranged to make a diagnosis for those patients with repeated negative FNA results.

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While studying patient records at Theewaterskloof, the lack of a systematic way of following the diagnosis process was evident. This was due to a lack of a recording system such as a paper trail or computer data system. The surgical clinic at Caledon hospital was the only location to record this process. At other clinics no follow-up dates were recorded for patients and the next intervention only took place once a report finally arrived at the specific clinic or being sent to the doctor via Caledon hospital.

Analysis of breast cancer patients diagnosed by FNA alone revealed a difference of 24 days between TWK and Worcester surgical clinic. Seventy six percent (n=22) were diagnosed from FNA at TWK compared to 72% (n=28) at Worcester hospital surgical clinic. However only 52% (n=15) of patients were diagnosed with the 1st FNA at TWK and this further explains the delay of 44 days to reach a breast cancer diagnosis. Worcester hospital performed better with 72% positive after the 1st FNA and this highlights the lack of the right technique when performing an FNA at TWK. All the core needle biopsies performed at TWK and Worcester surgical clinic were positive. The numbers of core needle biopsies of 49 were too small to draw a definite conclusion, but this shows a trend in line with a United Kingdom audit which found 85% core needle efficiency versus 62% for FNA.[6] However, they noted that core needle biopsy may be less effective than FNA for small mobile lesions. Mammograms are a vital part of the triple test and it is alarming that only 18% of patients at TWK received one during initial investigation. The lack of mammograms must be investigated since a mammogram is a vital part in the triple test. All patients at Worcester received a mammogram before FNA or other cytological and histological tests were attempted.

Limitations

The diagnostic time periods were calculated from the time the specimens were taken until a definitive result was reported by the laboratory. Information on the delay from the time the patient presented till the first specimen was taken could not be obtained. Likewise, an accurate estimation of exactly when the results were reviewed and acted upon by doctors could not be ascertained at Theewaterskloof. This was due to a lack of a recording system for breast

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lump management. The delay reported in this study is therefore most probably an underestimation of the true delay. This needs to be further investigated.

Conclusions

A significant difference in diagnostic delay exists between TWK and Worcester surgical clinic during the management of a patient with a breast lump. The overall diagnostic period is twice as long at TWK. This general delay is more pronounced in the case of breast cancer where the delay until surgical intervention was 173 days versus 16 days for TWK and Worcester hospital respectively.   TWK breast cancer patients who qualify for mastectomies are being managed at Tygerberg hospital currently, although Worcester hospital is the secondary referral centre. The cytological adequacy rate in TWK is in line with other district hospitals in the Western Cape. However, only 52% of FNAs were positive after the first attempt, illustrating operator skill deficiency which needs to be addressed urgently. Mammograms are not routinely done for patients with breast lumps at TWK for unknown reasons at this stage. This study highlights the inequity between urban and rural health services for patients who present with a breast lump as well as patients with confirmed breast cancer.   The one-stop breast diagnostic service provided at Groote Schuur hospital is in line with international standards and is needed to address variability in clinical expertise in the rest of the Western Cape.

Recommendations for the management of patients with breast lumps in the TWK:

1. The immediate incorporation of a simple diagnostic audit trail either in the form of a computer data package or a simple paper trail. This must be reviewed on a weekly basis at every institution where cytological tests are being undertaken.
2. An annual training session for all new and senior doctors in the technique of FNA and core needle biopsies by pathologists from Tygerberg hospital.

3. Referral of a patient to Caledon surgical clinic by other clinics if the first cytological or histological test is inconclusive. The use of core needle biopsies should be utilized in selected patients.

4. All patients with breast lumps must receive a mammogram as part of the triple test preferably before cytological or histological test are undertaken.

5. Referral of all breast cancer patients from TWK to Worcester surgical department for further surgical intervention.

6. Comparative studies to be undertaken in the rest of the rural districts.

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4. *My wife Rosemary and children Robin and Jessica who sacrificed much of our quality time.*