

One-stop Breast Imaging Service in Hong Kong

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ABSTRACT

Objective: To evaluate potential benefits and patient acceptance of the one-stop breast imaging service in a regional hospital in Hong Kong.

Methods: A total of 87 patients referred from the new-case surgical breast clinic for one-stop breast imaging were prospectively evaluated. Patient satisfaction and acceptance of the service were also assessed.

Results: For the 25 patients diagnosed to have breast cancer during the study period, the median time from the first surgical visit to surgery was 34 days, significantly shorter than that of historical controls (48 days) [$p < 0.001$]. Of the 87 patients, 82 (94%) thought that the one-stop breast imaging service should be provided at the same location as the surgical breast clinic and 67 (77%) agreed the service would benefit other patients and should be extended to other hospitals.

Conclusion: The one-stop imaging service is important for both patient care and decreasing the unnecessary workload of hospital staff.

Key Words: Biopsy, needle; Breast neoplasms; Mammography; Ultrasonography

中文摘要

香港的一站式乳房造影服務

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目的：探討香港一所地段醫院一站式乳房造影服務可能帶來的好處及病人對服務的認受性。

方法：前瞻性評估共87位由乳房外科診所轉介接受一站式乳房造影的新症病人，並評估病人對此服務的滿意程度及認受性。

結果：研究期間共25位病人被診斷有乳癌，她們從首次造訪至接受手術的時間中位數為34天，比歷史對照組（48天）明顯短（ $P < 0.001$ ）。87位病人中，82位（94%）認為一站式乳房造影服務應和乳房外科診所設立在同一地方，67位（77%）同意類似服務會為其他病人帶來好處，並應推廣至其他醫院。

結論：一站式乳房造影服務不但在病人醫護方面扮演很重要角色，並能減省醫院員工不必要的工作。

INTRODUCTION

Breast cancer is one of the most common malignancies in women worldwide. In Hong Kong, it has surpassed

lung cancer as the commonest malignant disease among females since the early 1990s. Each year, an excess of 2000 new female patients are diagnosed to have breast

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cancer.¹ While the lifetime risk of breast cancer in Hong Kong women is 1 in 20,¹ this is significantly lower than the 1 in 9 figure for women in western countries such as the United Kingdom,² the risk has nevertheless been increasing over the past 2 decades.¹ With the rapidly escalating caseload, greater patient expectations and demands for higher standards of care, there is an imperative need for an efficient, effective, easily accessed, and rapid breast service.

Currently, the provision of breast services for patients with suspected cancer within the public sector is variable and fragmented. Multiple visits to more than one clinic are frequently required before a diagnosis is made. This results in confusion and heightened anxiety in patients and their families. The delay in diagnosis and thus formulation of management plan may also delay treatment. Faced with long waiting times, it is perhaps not surprising that many of these women choose to be investigated in the private sector. Often this results in duplicated appointments and frequent defaults. Even after self-financed private imaging and / or cytopathological examination, many women re-present for further assessment or definitive surgery in the public sector. Variations in practice and reporting standards often mean that part or all of the investigative procedures are repeated before arriving at a diagnosis and treatment plan.

A specialist breast clinic integrating all aspects of care and capable of providing a one-stop diagnosis is the obvious answer to these challenges, and already considered as standard in many countries such as the United Kingdom.³ Triple assessment (based on the combination of clinical examination, imaging and cytopathological analysis) all provided within the same clinic visit facilitates making an accurate and timely diagnosis.^{4,5} For those with malignant disease, formulation of a management plan can even be made at the initial attendance. Instant reassurance and discharge on the other hand can be offered to those with benign breast conditions. Close collaboration between breast surgeons, radiologists, and pathologists also provides the perfect clinical environment for multidisciplinary care, enhances the efficiency of diagnostic work-ups,⁶ and improves clinical outcomes.^{7,8} A well-resourced specialist breast clinic with clear referral guidelines also allows rapid, open access to general practitioners. The high volume throughput of both new and old cases facilitates ongoing audit and research for maintaining performance standards.

Despite its obvious advantages, a one-stop clinic for

symptomatic breast disease remains a novel experience within the Hong Kong public health sector, primarily due to limitations of manpower and other resources. Here we present the findings of a prospective study of the first such clinic of its kind in Hong Kong. The benefits of such a service to both patients and hospital staff are also discussed.

METHODS

Referral from Surgical Breast Clinic

A prospective study involving the pilot phase of our one-stop breast imaging service was carried out from February to July 2008. The study was approved by our hospital ethics committee. Patients who attended the new-case surgical breast clinic on Wednesday mornings were referred for a mammogram and ultrasound examination on the same afternoon. A quota of 4 cases per week was set in the pilot phase of the service. The surgeons were responsible for the selection of these new patient referrals, based on the clinical diagnosis. The aim of this fast-track imaging was to shorten the waiting time for surgery in patients with potential cancer and facilitate early discharge of patients with probable benign lesions. As the major aim of our one-stop breast imaging service was to streamline investigation procedures for patients with breast cancer so that they could proceed to surgery as soon as possible, those with a clinical diagnosis of breast carcinoma received the highest priority for one-stop breast imaging.

Mammography, Ultrasound Breast Examination, and Triage

All patients underwent mammography and ultrasound of the breasts unless they were younger than 35 years (for whom ultrasound was recommended as the first-line investigation) or if a recent mammogram prompted additional imaging by ultrasound scan only. All the biopsies were performed after imaging. The radiologist-in-charge of the mammogram and ultrasound examination was responsible for triage of the patients in case a breast biopsy was required. In our protocol, the most complicated cases (i.e. patients found to have additional lesions on imaging, apart from the palpable breast cancer) were given the highest priority for biopsy. Biopsy of all the lesions was performed by the radiologist within the same session, but if time was not sufficient, an early appointment for biopsy was scheduled within 1 week. The second highest priority was given to patients with a solitary palpable mass, either benign or suspicious of breast cancer. As their lesions were clinically palpable, these patients were also referred to pathologists / surgeons

for freehand-guided biopsy.

Patient Acceptance on Our One-stop Breast Imaging

Upon completion of the imaging evaluation, the preliminary result was disclosed to the patient. After giving informed consent, each patient was asked to complete a questionnaire which consisted of 2 parts. The first part collected patient demographic information, including: age, education level, occupation, and monthly family income. The second part evaluated their views and attitudes towards our one-stop breast imaging service. Patients' satisfaction and acceptance of the service were assessed on a scale of 1 to 5 (1 being very dissatisfied or of no benefit, and 5 being very satisfied or of great help). Statistical analysis was performed using the Mann-Whitney *U* and Student *t* test, with significance accepted if $p < 0.05$.

RESULTS

Clinical Presentations

Patients' demographic profiles are shown in Table 1. Of 87 patients, 66 (76%) of the patients were referred because of breast lumps, 11 (13%) presented with breast lumpiness (Table 2). Ten (11%) patients had nipple discharge, while 3 (3%) and 24 (28%) had cyclical and non-cyclical mastalgia, respectively. In all, 38 (44%), 36 (41%), 8 (9%), 6 (6%) and 1 (1%) had symptoms located in the right breast, left breast, both breasts, left axilla, and right axilla, respectively.

Twenty-one (24%) of the patients were referred with a clinical diagnosis of carcinoma of the breast while 11 (13%) were referred because of suspected breast cancer. Two patients with breast cancer diagnosed by mammogram were referred for ultrasound before surgery. The percentage of patients referred because of probable benign and indeterminate breast lesions were 36% (30 patients) and 25% (22 patients), respectively.

Breast Imaging and Biopsies

The majority of patients ($n = 81$, 93%) had mammograms and ultrasound scans performed, and 6 (7%) had ultrasound scans only because they were either aged less than 35 years or because of a previous abnormal mammogram requiring additional imaging by ultrasound. When the breast density on mammography was graded according to the American College of Radiology Breast Imaging Reporting and Data System protocol,⁹ 10 (12%) of the patients had a fatty breast (grade 1). Eight (10%), 28 (35%) and 35 (43%) of the patients had denser breast

Table 1. Patient demographic and clinical profiles.

Characteristic	No. (%) of patients
Sex	
Female	86 (99)
Male	1 (1)
Age (years)	
20-29	2 (2)
30-39	12 (14)
40-49	25 (29)
50-59	24 (28)
60-69	11 (13)
70-79	6 (7)
≥80	7 (8)
Previous history of breast cancer	
Yes	3 (3)
No	84 (97)
Duration of symptom (weeks)	
0-2	9 (10)
2-6	18 (21)
6-10	20 (23)
10-26	18 (21)
26-52	12 (14)
52-156	7 (8)
>156	3 (3)
Monthly household income (HK\$)	
CSSA	18 (21)
<4,000	11 (13)
4,000-17,250	42 (48)
17,250-40,000	16 (18)
Education	
Primary or below	49 (56)
Secondary	33 (38)
Tertiary or above	5 (6)
Occupation	
Housewife	38 (44)
Retired	12 (14)
Unemployed	8 (9)
Employed	29 (33)

Abbreviation: CSSA = Comprehensive Social Security Assistance.

tissue graded 2, 3, and 4, respectively (Table 2).

For those who required breast biopsies, 22 (30%) of the patients had them performed on the same day as the imaging, while 51 (70%) were re-scheduled for the procedure on a later day (Table 3). Thirty-three (45%) of the patients had their initial breast biopsies performed by radiologists, and 33 (45%) who had solitary palpable lesion had the biopsies performed by pathologists. Seven (10%) of the patients had initial breast biopsies performed by surgeons. Thirty-four (47%) of the initial biopsies were performed with ultrasound guidance, while 39 (53%) of the initial biopsies were performed based on palpation (by either pathologists or surgeons). There were a total of 93 fine-needle aspiration biopsies, 49 core biopsies, and 5 excisional biopsies. None of the patients in our current study had stereotactic-guided biopsy. For those who required breast biopsies, the me-

Table 2. Clinical presentation, mode of imaging, and breast density of patients attending the one-stop imaging service.

Characteristic	No. (%) of patients
Symptoms	
Breast lump	66 (76)
Breast lumpiness	11 (13)
Nipple discharge	10 (11)
Cyclical mastalgia	3 (3)
Non-cyclical mastalgia	24 (28)
Previous abnormal imaging	3 (3)
Location of symptom	
Right breast	38 (44)
Left breast	36 (41)
Both breasts	8 (9)
Left axilla	6 (6)
Right axilla	1 (1)
Clinical diagnosis	
Breast cancer	21 (24)
Suspected breast cancer	11 (12)
Completion ultrasound	2 (2)
Probably benign breast lesion	31 (36)
Indeterminate breast lesion	22 (25)
Mode of imaging	
Mammogram and ultrasound	81 (93)
Ultrasound only	6 (7)
Breast density on mammogram*	
Grade I	10 (12)
Grade II	8 (10)
Grade III	28 (35)
Grade IV	35 (43)

* 6 Patients did not have mammograms performed in our department.

Table 3. Breast biopsies.

Characteristic	No. (%) of patients
Time of breast biopsy	
Same day	22 (30)
Some day later but within 1 week	51 (70)
Biopsy performed by	
Radiologists	33 (45)
Pathologists	33 (45)
Breast surgeons	7 (10)
Mode of biopsy	
Fine-needle aspiration biopsy	93
Core biopsy	49
Excisional biopsy	5
Method of biopsy	
Ultrasound guidance	34 (47)
Under freehand palpation	39 (53)
Number of lesions biopsied	
0	14 (16)
1	43 (49)
2	15 (17)
3	15 (17)

dian number of lesions biopsied was 1 (range, 1 - 3).

Patients' Outcomes

Regarding the final diagnosis in these patients, 51 (59%)

Table 4. Outcome of patients attending the one-stop breast imaging service.

Characteristic	No. (%) of patients
Histological diagnosis	
Malignant lesions	31 (36)
Benign lesions with high correlation with malignancy	5 (6)
Benign lesions	51 (59)
Breast cancer staging	
0	2 (6)
I	3 (10)
II	19 (61)
III	5 (16)
IV	2 (6)
Subsequent follow-up	
For breast cancer	34 (39)
Routine follow-up	37 (43)
Discharge or follow-up by breast care nurse	16 (18)

Table 5. Patients' attitudes towards one-stop breast imaging service.

Characteristic	No. (%) of patients
Willingness for private mammogram	
Yes	18 (21)
No	69 (79)
Breast imaging should be provided in the same location as breast clinic	
Agree	82 (94)
Disagree	1 (1)
No opinion	4 (5)
One-stop breast imaging service should be extended to other public hospitals	
Agree	67 (77)
Disagree	11 (13)
No opinion	9 (10)

were benign and 31 (36%) were labelled as having breast cancer (Table 4). After exclusion of patients who received palliative treatment or neoadjuvant chemotherapy, 25 diagnosed to have breast cancer had surgery after a median time of 34 days following their first surgical visit (range, 2 - 55 days). This was significantly shorter than that in our historical controls in 2007, in whom the interval was 48 days ($p < 0.001$). Five (6%) of the patients had lesions which were benign but belonged to pathological entities with a high correlation with malignancy, including atypical ductal hyperplasia, papillary and fibroepithelial abnormalities. Therefore, a larger tissue sample taken by excision was required for a definitive diagnosis.

Among patients diagnosed to have breast cancer, 6%, 10%, 61%, 16%, and 6% had stage 0, I, II, III, and IV disease, respectively (Table 4). Thirty-four (39%) of

Table 6. Respondents' rating on the benefits and quality of mammographic service.

Patient's rating*	Average score (standard deviation)		p Value
	Patients with breast cancer (n=34)	Patients without breast cancer (n=53)	
Rating in terms of the following			
Overall benefit	3.5 (0.96)	4 (0.84)	0.0178
Psychological benefit	3.5 (1.04)	3.86 (0.95)	0.117
Reducing family impact	3.36 (0.71)	3.71 (1.03)	0.0998
Reducing impact of job	3.14 (1.06)	3.53 (1.18)	0.0856
Rating on mammography service			
Facilities	3.61 (0.79)	3.41 (0.72)	0.493
Staff attitude	3.89 (0.74)	3.75 (0.76)	0.438
Patient data privacy	3.64 (0.71)	3.49 (0.72)	0.472
Patient guideline clarity	3.72 (0.80)	3.53 (0.85)	0.466
Overall	3.97 (0.80)	3.76 (0.76)	0.35

* Patients' satisfaction and acceptance of the service were assessed on a scale of 1 to 5, with 1 being very dissatisfied or of no benefit and 5 being very satisfied or with great help.

all patients had breast cancer and were referred to the oncologist for further treatment after surgery; 16 (18%) were discharged (after the second visit) or followed up by breast care nurses.

Patients' Attitudes to One-stop Breast Imaging and Acceptance of Our Breast Service

Based on responses to our questionnaire, only 18 (21%) patients were willing to pay for a private mammogram and ultrasound examination (costing about HK\$1,000), while 69 (79%) were unwilling to pay for or unable to afford such testing (Table 5). The majority of our patients (n = 82; 94%) thought that the breast imaging service should be provided at the same location as the surgical breast clinic; most (n = 67; 77%) agreed that this one-stop breast imaging service was beneficial to patients and should be extended to other hospitals.

Patients without breast cancers gave a significantly higher score for the overall benefits of the one-stop breast imaging service than those with breast cancer confirmed (Table 6).

DISCUSSION

The majority of our patients come from lower socio-economic strata, many being housewives and unemployed. Not surprisingly most (79%) were either unwilling or unable to afford expensive private radiology services. Our study has also shown that most of our patients thought the breast imaging service should be provided at the same location as the surgical breast clinic, and agreed that this one-stop breast imaging service should be extended to other hospitals. With one-stop breast imaging service, patients did not have to worry about which private hospital or laboratory they should go for imaging. Moreover, they did not have to collect

their imaging and pathology reports, and hence avoided inconvenience and minimised anxiety. A prompt and thorough diagnosis was facilitated, which also increased patient confidence in our services and contributed to improving psychological outcomes in our breast cancer patients.

We think that this new one-stop patient referral system is superior to current Hospital Authority (HA) practice, whereby patients are usually prioritised based on their clinical diagnosis with very early appointments being reserved for those with suspicious or proven cancer. With our system, surgical colleagues would have a clearer idea as to who should be prioritised for imaging. Selecting patients most likely to benefit from fast-track imaging could expedite their work-up and facilitate the early discharge of those with benign breast lesions. Secondly, the provision of same day imaging can help avoid duplicate appointments (in the public and private sectors) and minimise defaults. Parallel analysis of the potential benefit of the one-stop breast imaging service compared to current HA hospital practice is recommended in the future.

Compared to historical controls, our patients with breast cancer proceeded to surgery more quickly. With the introduction of the one-stop breast imaging, the time required to complete the diagnostic work-up could be greatly reduced. Not only could patients have earlier surgery, those who were financially more advantaged could choose to have their operation in private hospitals. In this study, more than one-third of our patients were diagnosed to have breast cancer and were able to achieve a same-day biopsy rate of 30%, without any additional manpower. As patients attending specialist breast clinics in Hong Kong public hospitals are aware

of the long waiting time for imaging, this streamlined imaging service could reduce waiting times for surgery and is likely to be well-accepted and supported by end users.

The true one-stop breast clinic (running for example in the United Kingdom) includes: surgical consultation, breast imaging and biopsy, and pathological evaluation, but more importantly also involved disclosure of diagnosis and provision of treatment all in the same visit. Our one-stop breast imaging service would be the first step towards such a comprehensive service. The true one-stop breast clinics were designed to offer the service in a way that was most convenient and accessible to the patient, so as to cause as little disruption of their life as possible, whilst addressing their worries with the aid of experts. In which case, usually the results of the investigations could be explained to the patient before they left the clinic. Such an arrangement requires close collaboration among surgeons, radiologists, pathologists, and breast care nurses, and would also entail higher costs. However, previous studies have shown that this approach can only result in a reduction in short-term patient anxiety and may not be justified in terms of added costs.¹⁰ At present, although our one-stop breast imaging service is more like a fast-track breast imaging clinic for patients with suspected breast cancer, it could be a reasonable compromise as it did not require additional resources. At a later date a true one-stop breast clinic could be established in our locality.

We were also able to demonstrate that our one-stop breast imaging service brought about a significantly higher overall benefit perceived in patients without breast cancer (Table 6). Although the majority of women attending our clinic did not have breast cancer, any difference or unusual change in the breast should always be thoroughly investigated to rule out the possibility of cancer. Nowadays, mammograms together with ultrasound examination of the breasts have become the standard care for almost all patients attending breast clinics. A normal mammogram and ultrasound could be extremely reassuring for the patient, and without such information it may be difficult to decide on the management plan. In more than 90% of the cases, the radiologist would be able to tell whether something was suspicious based on breast imaging. Patients without breast cancer enjoyed a significantly higher score for overall benefit (were extremely reassured) after attending the one-stop breast imaging service than those with carcinoma of the breast. This is because upon comple-

tion of imaging, a preliminary result could be disclosed to the patient. Patients without breast cancer were informed by the radiologist that most likely their lesion was benign, although they might still need a biopsy in the fullness of time. Whereas, for patients with breast cancer, our one-stop breast imaging service only served to expedite imaging and facilitate patient management. It was of much less help in alleviating anxiety.

Of our patients, 18% could be discharged after the second visit or have their follow-up performed by a breast care nurse. The chance of having to re-visit the hospital more than once decreased, which also reduced follow-up workload and helped to save time for both patients and staff.

In addition to a better patient care, the one-stop imaging service was beneficial to all members of the breast team. Thus, for patients choosing to have imaging and pathological examinations performed in private hospitals to expedite management, the private films and findings of pathologists had to be reviewed and reported on again. All such cases also have to be discussed in a combined breast meeting. As different hospitals may have different protocols for patient management, the approach used by any single institution also has to be re-explained to the patients. Moreover, as patients often receive different messages from different parties, this often creates confusion. With the one-stop imaging service, all such unnecessary workload for surgeons, radiologists, and pathologists can be minimised.

Our study supports the one-stop breast imaging service, because when compared to historical controls, our patients with breast cancer proceeded to surgery more quickly. To increase the proportion of new breast cases imaged within the same day, in future we may have to start imaging our patients earlier in the morning or extend our service later than normal office hours. By this means, hopefully all new patients can have their imaging evaluation and biopsy performed within the same visit.

One of the major limitations of our one-stop breast imaging service was that the clinic could be cancelled due to unforeseeable circumstances such as typhoon and exhausted imaging quota. One way to overcome this problem might be that some patients attending the breast clinic could have breast imaging performed before being seen by surgical colleagues.

Our preliminary data show that the one-stop breast

imaging service is an efficient system that is well-accepted by our patients. In this clinic, a high percentage of patients had breast cancer and were rapidly worked up and could proceed to surgery very soon, with only a minimal increase in workload. This service should be extended to all such patients in the future. However, unless additional resources are deployed, there is a trade-off for the new arrangements: the provision of imaging slots for new patients must be derived from existing booking sessions.

REFERENCES

1. Hong Kong Breast Cancer Registry. Fast stats for female breast cancer 2007, Hong Kong. Hong Kong Cancer Registry. Hospital Authority website: http://www3.ha.org.hk/cancereg/e_breast.pdf. Accessed 22 Dec 2009.
2. Office for National Statistics. Registrations of cancer diagnosed in 1993-1996, England & Wales. *Health Stat Q.* 1999;4:59-70.
3. Biggs MJ, Ravichandran D. Mammography in symptomatic women attending a rapid diagnosis breast clinic: a prospective study. *Ann R Coll Surg Engl.* 2006;88:306-8.
4. Hermansen C, Skovgaard Poulsen H, Jensen J, et al. Diagnostic reliability of combined physical examination, mammography, and fine-needle puncture ("triple-test") in breast tumors. A prospective study. *Cancer.* 1987;60:1866-71.
5. Thomas JM, Fitzharris DM, Redding WH, et al. Clinical examination, xeromammography and fine-needle aspiration cytology in diagnosis of breast tumours. *BMJ.* 1978;2:1139-41.
6. Basnett I, Gill M, Tobias JS. Variations in breast cancer management between a teaching and non-teaching district. *Eur J Cancer.* 1992;28A:1945-50.
7. Sainsbury R, Haward B, Rider L, Johnston C, Round C. Influence of clinician workload and patterns of treatment on survival from breast cancer. *Lancet.* 1995;345:1265-70.
8. Gillis CR, Hole DJ. Survival outcome of care by specialist surgeons in breast cancer: a study of 3786 patients in the West of Scotland. *BMJ.* 1996;312:145-8.
9. Breast Imaging and Reporting Data System (BI-RADS). 3rd ed. Reston, Va: American College of Radiology; 2003.
10. Jiwa M, Saunders C. Fast track referral for cancer. *BMJ.* 2007;335:267-8.