



Adequacy of surgical pathology reporting of breast cancer in different hospitals

Fariba Abbasi^{1*}, Hushyar Azari², Arefeh Jafarzadeh³

¹ Associate Professor of Pathology, Solid Tumor Research Center, Cellular and Molecular Medicine Institute, Urmia University of Medical Sciences, Urmia, Iran

² Medicine Student, Urmia University of Medical Sciences, Urmia, Iran

³ Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

***Corresponding authors:** Fariba Abbasi, **Address:** Department of pathology, Urmia University of Medical Sciences, Urmia, Iran
Email: faribaak2002@yahoo.com, **Tel:** +989141452352

Abstract

Background & Aims: To determine how well the standard criteria were utilized in reporting breast cancer pathology and to compare the variability among a public teaching, a public nonteaching, and a private hospital in Urmia, Iran.

Materials & Methods: Three hundred and fifty pathology reports of mastectomy samples with diagnosis of primary breast cancer were retrieved from archives of pathology departments of three hospitals; one public teaching (121 reports), one public nonteaching (99 reports), and one private hospital (130 reports). The reports were assessed for tumor laterality, size, color, consistency, type and grade, sample size, description of prior biopsy site, specimen condition (fresh, or in fixative), number of excised and involved lymph nodes, previous frozen section (FS), surgical margins, lymphovascular invasion, and in situ carcinoma.

Results: None of the reports had all the suggested items. Specimen condition was the only item recorded in all of the reports. The teaching hospital reports had significantly higher number of reported items than the two other hospitals ($P < 0.001$). Key items (tumor size, type and grade, surgical margin, vascular invasion, and in situ carcinoma) were also indicated more frequently in teaching hospital ($P < 0.001$).

Conclusion: We showed evident variations in reporting breast cancer pathology in the studied different hospitals. It seems that the teaching program in the public-teaching hospital can be a reason for the better results in this hospital. So we suggest using standard universal protocols for cancer reporting as well as creating an effective audit system to evaluate complete utilization of the protocols.

Keywords: Cancer Protocol, Breast Pathology, Reporting

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Introduction

Breast cancer is the most common malignancy and also the leading cause of cancer-related death in women worldwide (1-3). Its incidence is very different among different countries, and North America and Northern Europe have the highest risk of developing this cancer (3). According to literature, breast cancer in Iran is responsible for almost 24% of all malignancies in women, and its incidence is reported about 22 cases per 100000 of Iranian women (1,2,4). Although breast cancer incidence is lower in Iranian women compared to the women of western countries, but it occurs at least one decade earlier (2).

Therapeutic planning and clinical outcome of patients with breast cancer are directly related to the information obtained from pathology reports such as status of surgical margins, tumor necrosis, grading, lymphovascular and perineural invasion, and lymph node involvement (5-7). Some of these items e.g. tumor size and surgical margins are mandatory but some others such as specimen weight are not considered very crucial (5,8).

Thus, pathology reporting of the cancer has a fundamental role in cancer-related healthcare (5,9,10). Incomplete pathology reports can mislead clinicians and cause patients suffer from inaccurate treatment (9). So, it is necessary to document the minimum criteria in each pathology report at least (11). International pathology associations have published guidelines to improve the quality of pathology reports (5-7, 12). However, different studies from different countries have shown that some pathology reports are incomplete and do not contain all the necessary items required for clinical decision (5,11). To our knowledge, there is only one published study in Iran which has evaluated the completeness of pathology reports and implementation of pathology reporting guidelines (13). So we decided to evaluate the quality of breast cancer pathology reports in Urmia, Iran in order to determine how well the standard criteria were utilized as well as to compare the variability of breast cancer pathology reporting among public teaching, public nonteaching and private hospitals.

Materials & Methods

In this retrospective study, we examined 350 pathology reports of mastectomy samples with diagnosis of primary breast cancer during a one-year period, retrieved from archives of pathology departments of three hospitals in Urmia, Iran; -one public teaching hospital, one public nonteaching hospital, and one private hospital-. 121 reports were from the public teaching hospital, 99 from the public non-teaching hospital, and 130 from the private hospital.

The completeness of pathology reports was assessed according to microscopic and macroscopic items mentioned in the guidelines of the College of American Pathologists (CAP) (6). These items were tumor laterality, sample size, tumor size, tumor color, tumor consistency, description of prior biopsy site (if present), specimen condition (fresh, in formalin, or in other fixative), the histologic change of non-tumoral breast tissue, number of excised lymph nodes, number of involved lymph nodes, diagnosis of previous frozen section (if present), histologic type of tumor, tumor grade, surgical margins, lymphovascular invasion, calcification, in situ carcinoma, and carcinoma extent (6).

It should be noted that in reviewing the reports, items were considered complete if a definite statement was mentioned about them; for example, the statement, "no previous frozen section (F.S) was done", was considered as a complete report about this item. A data collection form was completed for each pathology report.

The results were expressed as mean $\pm$ SD. Statistical analysis was performed using SPSS version 17. The statistical differences between proportions were determined using Chi-square analysis method. Numerical data were evaluated using ANalysis of VAriances (ANOVA), followed by Tukey's post hoc test. $P < 0.05$ was considered as significant.

The study was approved by the ethics committee of Urmia University of Medical Sciences, and has been registered with the code: IR.UMSU.REC.1395.5. For ethical reasons, we did not mention the names of these 3 hospitals.

Results

None of the 350 studied reports from 3 hospitals had all the suggested items. The only item commonly present in all the reports was specimen condition. Overall, four items including tumor laterality, sample size, number of excised lymph nodes, and number of

involved lymph nodes were indicated in more than 90% of reports (96.5%, 94.5%, 92.5% and 90.8%, respectively). Non-tumoral breast changes and previous frozen section were stated in less than 10% of reports. Completeness of reports from different hospitals are shown in [Table 1](#).

Table 1: Frequency of documented gross and microscopic items in 3 evaluated hospitals

Criteria	Teaching hospital NO(%)	Public nonteaching hospital NO(%)	Private hospital NO(%)	Total number (%)	P.value	*CI Teaching hospital	CI nonteaching hospital	Public CI Private hospital
Laterality	114(94.2)	99(100)	125(96.2)	338(96.5)	0.06	88-97	96-100	91-98
Sample size	121(100)	83(83.8)	126(96.9)	330(94.5)	<0.001	96-100	75-90	92-99
Tumor size	106(87.6)	66(66.7)	80(61.5)	252(72)	<0.001	80-92	56-75	52-69
Tumor color	67(55.4)	56(56.6)	78(60)	201(57.4)	0.744	46-64	46-66	51-68
Tumor consistency	54(44.6)	57(57.6)	13(10)	124(35.4)	<0.001	35-53	47-67	5-16
Site of previous biopsy	92(76)	30(30.3)	66(50.8)	188(53.7)	<0.001	67-83	21-40	41-59
Specimen condition	121(100)	99(100)	130(100)	350(100)	--	96-100	96-100	97-100
Nontumoral change	22(18.2)	2(2)	4(3.1)	28(8)	<0.001	11-26	0-7	0-7
Number of excised lymph nodes	114(94.2)	94(94.9)	116(89.2)	324(92.5)	0.2	88-98	88-98	82-93
Number of involved lymph nodes	115(95)	87(87.9)	116(89.2)	318(90.8)	0.17	89-98	79-93	82-93
Frozen section diagnosis	19(15.7)	5(5.1)	2(1.5)	26(7.4)	<0.001	9-23	1-11	0-5
Tumor histologic type	115(95)	69(69.7)	117(90)	301(86)	<0.001	89-98	59-78	83-94
Tumore grade	108(89.3)	56(56.6)	74(56.9)	238(68)	<0.001	82-94	46-66	47-65
Surgical margins	106(87.6)	15(15.2)	26(20)	147 (42)	<0.001	80-92	8-23	13-27
Vascular invasion	80(66.1)	50(50.5)	74(56.9)	204(58.2)	0.060	56-74	40-60	47-65
Lymphatic invasion	81(66.9)	1(1)	2(1.5)	84(24)	< 0.001	57-75	0-5	13-27
Insitu carcinoma	21(17.4)	8(8.1)	13(10)	42(12)	0.074	11-25	3-15	47-65

*CI: Confidence Interval

The mean number of reported items in pathology reports was significantly higher in the teaching hospital

compared to the other two hospitals ($P < 0.001$) ([Table 2](#)).

Table 2: Maximum and minimum number of documented items in 3 evaluated hospitals

Hospital	Number of reports	Minimum number of reported items	Maximum number of reported items	Mean	P.value
Private	130	5	13	8.9922	<0.001
Teaching	121	7	17	12.0932	
Public nonteaching	99	4	12	8.8854	

Seven key items (tumor size, tumor type, tumor grade, surgical margin, vascular invasion, carcinoma in situ, and histologic change of non-neoplastic breast

tissue) were indicated more frequently in the teaching hospital than the other two hospitals ($P < 0.001$) (Table 3).

Table 3: Maximum and minimum number of documented key items in 3 evaluated hospitals

Hospital	Number of reports	Minimum number of reported key item	Maximum number of reported key items	Mean	P.value
Private	130	0	6	3	<0.001
Teaching	121	0	7	45.9	
Public nonteaching	99	0	5	2.7	

In teaching hospital, minimum and maximum numbers of missing elements were 2 and 12 items,

which were seen in 0.8% and 2.5% of reports, respectively. Both of these reports were significantly higher in the other two hospitals (Table 4).

Table 4: Frequency of missed items in 3 evaluated hospitals

Hospital	Number of missed items	Pathology reports number(%)
Private	6	3 (2.3)
	7	6 (4.6)
	8	28 (21.5)
	9	22 (16.9)
	10	19 (14.6)
	11	15 (11.5)
	12	22 (16.9)
	13	11 (8.5)
Public, teaching	14	4 (3.1)
		130 (100)
	2	1 (0.8)
	3	3 (2.5)
	4	9 (7.4)
	5	19 (15.7)
	6	19 (15.7)
	7	28 (23.1)
	8	18 (14.9)

	9	12 (9.9)
	10	5 (4.1)
	11	4 (3.3)
	12	3 (2.5)
		121 (100)
Public, nonteaching	7	10 (10.1)
	8	28 (28.28)
	9	12 (12.12)
	10	13 (13.13)
	11	4 (4.04)
	12	4 (3.03)
	13	16 (16.16)
	14	11 (11.11)
	15	1 (1.01)
		99 (100)

It should be noted that as the extent of carcinoma in situ and calcification were stated in fewer than 5 reports in each of the 3 hospitals, statistical analysis was not done for them.

Discussion

Optimal treatment of breast cancer largely depends on pathologic features of the primary tumor (9,14). Our study demonstrated a significant variation in breast cancer pathology reports among the studied different hospitals. Some of these differences were included among key items of breast cancer. Our results revealed that none of the reports had all of the suggested key items. In comparison, only 3 (2.2%) of the evaluated reports in Atanda et al. study met all the required audit criteria (11). This figure was 11.4% in Kadivar et al. study (13). In our study, 100% of the reports had at least one missing element compared to 40.2% of the reports in Kadivar et al. study (13).

The most frequent reported key item in our study was histologic type of the tumor, which was reported in 86% of the cases in all 3 hospitals, which was reported higher in the teaching hospital than the other two hospitals ($P < 0.001$, 95% CI: 89-98%). In other studies, this item was reported in 94 to 100% of all reports (5,8, 14-16).

Histologic changes of non-neoplastic breast tissue were stated in only 8% of our reports, whereas Kricker et al. and Austin et al. reported it as 61% and 91.5%, respectively (7,15). Although, histologic changes of non-neoplastic breast tissue were reported only in 18.2% of cases in teaching hospital, but the difference among three hospitals was significant ($P < 0.001$).

Among the three hospitals we evaluated, pathology reports of teaching hospital had more key items. This difference was more prominent in reporting tumor margin and lymphatic vessel invasion ($P < 0.001$). However, it should be stressed out that even in the teaching hospital, these two items were not indicated in all of the reports (Total: 87.6%, 95% CI: 80-92% and Total: 66.9%, 95% CI: 57-75%, respectively).

Lymph node involvement is an important prognostic factor in breast cancer (3,6,17,18). However, in our study, it was reported in 89.2%, 87.9% and 95% of the cases in private, public nonteaching and teaching hospitals, respectively. This item was reported in 100% of the cases in the study of Bilous et al. and 99.7% in the study of Austin et al. (15,16).

Carcinoma in situ as one of the important key items, was frequently missed in most of the reports in our study. Its most frequent documentation was observed in teaching hospital (17.4% of cases, 95% CI: 11-25). This

figure was more than 70% in the studies of Wilkinson et al., Kricker et al., and Austin et al. (5,7,15).

Margin status and grading are also very important in breast cancer prognosis and treatment (6,8,12,19). These were documented respectively as 87.6% and 89.3% in the reports of the teaching hospital, although these reports were in a very lower percentage in the other two

hospitals. In comparison, these 2 items were reported in 87% and 84% of the reports in the Kricker et al. study, 98.6% and 86.3% in the Idowu et al. study, 94.5% and 96.8% in the Austin et al. study, and 77% and 96% in the study of Bilous et al. (7,13,15,16).

The compared results of our study with the other studies which have evaluated breast cancer pathology reports are listed in Table 5.

Table 5: Frequency of reported key items in different studies

Study Criteria	Bilous	Austin	Kricker	Wilkinson	Idowu	Apple	Atanda	Our study
Tumor size	93	99.5	89	40	90.7	100	93.7	72
Histological type	94	99.5	99	100	100	100	100	86
Grade	69	96.8	80	90	86.3		87.5	68
Margin status	77	94.5	83	94	98.6	76	82.3	42
vascular invasion	24	--		--	--	--	85.7	58.2
Lymphatic invasion	34	--	--	--	--	--	--	24
In situ component	--	97.5	75	71	--	--	--	12
Non- tumoral breast change	--	91.5	61	--	--	--	--	8

It has been showed that the frequency of key items in our study was lower than the other studies, except for tumor size which was documented in 72% of our reports but only in 40% of reports in the Wilkinson study, and vascular invasion which was indicated in 58.2% of our reports but only in 24% of the reports in the study of Bilous et al. (5, 7,8, 11, 14-16).

The missing rate of some important items such as tumor histologic type, tumor grade, and surgical margin in our study were 4%, 32%, and 58%, respectively, compared to 2%, 4.70%, and 6.10% in the study of Kadivar et al., which is the only similar study in Iran (13).

Conclusion

In summary, our study demonstrated evident variations in breast cancer pathology reporting in different hospitals. Unfortunately, a marked deficiency was observed in reporting even the key items. In teaching hospital, gross and microscopic items were reported more frequently than the public nonteaching hospital and the private hospital. The overall pathology

reports from the teaching hospital were more complete than the other two hospitals. This can be due to the fact that both residents and senior attendings examine pathology samples in teaching hospitals and the procedures are done in a more academic way. Pathologist-clinician collaborations are also more efficient in the teaching hospitals, and this could be another major reason that teaching hospital reports were more comprehensive than the others. However, similar to the results of Kricker et al., even in these hospitals the completeness of pathology reports was not satisfactory (7).

Our study was limited to a small number of hospitals (only three hospitals). So, it is possible that the findings of this study would not completely represent breast cancer pathology reporting in Urmia or in Iran. However, as we found significant differences and also marked incomplete reports, it should raise attention to use standard universal protocols for cancer reporting and also creating an effective audit system to evaluate complete utilization of the protocols. Our study also highlights the need for scheduled mandatory training

programs for pathologists regarding new updates in diagnosis and reporting protocols. We suggest including clinical notes in cancer reporting protocols containing diagnostic, therapeutic, and prognostic importance of each item's presence or absence to make pathologists aware of the importance of reporting every single item. We also recommend pathologists to have regular meetings with clinicians to better understand expectations of each other in the field of patient diagnosis and treatment.

We believe that making improvements in reporting breast cancer pathology will be accomplished if there were regular assessment and feedbacks as Onerheim found an overall improvement in conformity rate from 85% in 1999 to 92.5% in 2003 ($P < 0.001$) in breast cancer pathology reports after auditing reports adequacy and giving feedbacks to pathologists and laboratories (20).

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Conflict of interest

The authors have no conflict of interest in this study.

Ethical Statement

The study was approved by the ethics committee of Urmia University of Medical Sciences, and has been registered with the code: IR.UMSU.REC.1395.5.

References

1. Jazayeri, SB, Saadat, S, Ramezani, R, Kaviani, A, Incidence of primary breast cancer in Iran: Ten- year national cancer registry data report. *Cancer Epidemiol* 2015;39(4):519-27.
2. Mousavi, SM, Montazeri, A, Mohagheghi, MA, Jarrahi, AM, Harirchi, I, Najafi, M, et al, Breast cancer in Iran: An Epidemiological Review. *Breast J* 2007;13(4):383-91.
3. Lester SC. The Breast. In: Kumar V, Abbas AK, Aster JC, eds. *Robbins basic pathology* 9th ed. Canada: Elsevier Saunders; 2015:1043-50.
4. Kolahdoozan, S, Sadjadi, A, Radmard, AR, Khademi, H, Five common cancers in Iran. *Arch Iran Med* 2010;13(2):143-46.
5. Wilkinson, NW, Shahryarinejad, A, Winston, JS, Watroba, N, Edge, SB, Concordance with breast cancer pathology reporting practice guidelines. *J Am Coll Surg* 2003;196(1):38-43.
6. Cancer Reporting and Biomarker Reporting Protocols [available from: cap.org/protocols-and-guidelines/cancer-reporting-tools/cancer-protocol-template]
7. Kricker, A, Armstrong, B, Smith, C, Bilous, M, Camaris, C, Mayer, A, et al, An audit of breast cancer pathology reporting in Australia in 1995. *Br J Cancer* 1999;80(3/4):563-68.
8. Apple, SK, Variability in gross and microscopic pathology reporting in excisional biopsies of breast cancer tissue. *Breast J* 2006;12(2):145-9.
9. Masood, S, Vass, L, Ibarra, JA, Ljung, BM, Stalsberg, H, Eniu, A, et al, Breast Pathology Guideline Implementation in Low- and Middle-Income Countries. *Cancer* 2008;113(8 Suppl):2297-304.
10. Goldsmith, JD, Siegal, GP, Suster, S, Wheeler, TM, Brown, RW, et al, Surgical pathology report recommendations. *Arch Pathol Lab Med J* 2008; 132:1608-16.
11. Atanda, AT, Atanda, JO, Audit of Histopathology reports for breast cancer in Aminukano teaching hospital. *West Afr J Med* 2010;29(3):174-77.
12. Mathers, ME, Shrimankar, J, Scott, DJ, Charlton, FG, Griffith, CD, Angus, B, The use of a standard proforma in breast cancer reporting. *Clin Pathol* 2001; 54:809-11.
13. Kadivar, M, Kheirkhah Rahimabad, P, Missing elements in surgical pathology reports: breast, colon and stomach cancers. *Asian Pac J Cancer Prev* 2016; 17:1469-72.
14. Idowu, MO, Bekeris, LG, Raab, S, Ruby, SG, Nakhleh, RE, Adequacy of Surgical Pathology Reporting of Cancer. *Arch Pathol Lab Med* 2010; 134:969-74.

15. Austin, R, Thompson, B, Coory, M, Walpole, E, Francis, G, Fritschi, L, Histopathology reporting of breast cancer in Queensland: the impact on the quality of reporting as a result of the introduction of recommendations. *Pathology* 2009;41(4):361-65.
16. Bilous, M, McCredite, M, Porter, L, Adequacy of histopathology reports for breast cancer in New South Wales. *Pathology* 1995;27(4):306-11.
17. Soerjomataram, I, Louwman, MWJ, Ribot, JG, Roukema, JA, Coebergh, JW, An Overview of prognostic factors for long-term survivors of breast cancer. *Breast cancer Res Treat* 2008;107:309-30.
18. Ran, S, Volk, L, Hall, K, Flister, MJ, Flzter. Lymphangiogenesis and lymphatic metastasis in Breast cancer. *Pathophysiology* 2010;17(4):229-51.
19. Persing, S, James, TA, Mace, J, Goodwin, A, Geller, B, Variability in the quality of pathology reporting of margin status following breast cancer surgery. *Ann Surg Oncol* 2011;18(11):3061-65.
20. Onerheim, R, Racette, P, Jacques, A, Gagnon, R, Improving the quality of surgical pathology reports for breast cancer. *Arch Pathol lab Med* 2008;132:1428-31.

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