

Contribution of mammography in the diagnosis of breast tumours at the senology unit of the chu aristid le dantec hospital

Summary

Introduction: In Senegal, breast cancer is the second most common cancer in women after cervical cancer.¹ It is responsible for a high mortality rate of around 70% after five years,² as in many other developing countries. Mammography plays an important role in the screening and diagnosis of breast diseases. The unfavourable conditions in our regions are at the origin of the inaccessibility and unavailability of this diagnostic tool.

Objectives: The objective of our study was to evaluate the availability, accessibility and use of mammography in the diagnosis of breast diseases in the Senology Unit of the University Hospital Aristide Le Dantec in Dakar.

Materials and methods: This was a descriptive and analytical cross-sectional study of 120 patients followed at the Senology Unit of the Aristide Le Dantec University Hospital in Dakar, during the period from 1 January 2010 to 31 December 2014. The parameters studied were: the socio-economic profile of women, the geographical distribution of functional mammography centres, the time taken to perform mammography, its cost, its quality and its contribution to diagnosis.

Results: In our study, the majority of patientes lived in the suburbs of Dakar (67.5%). The average age was 44.2 years. More than half (54.2%) had no regular source of income. The rate of use of mammography was 8.9%. The average cost was 48,944 FCFA. The average time taken to carry out a mammogram after it was prescribed was 28.8 days. In 76.6% of cases, mammography was performed for diagnostic purposes. In no case was an additional examination performed. As regards the quality of the mammographic examination, in 17.5% of cases the usual marking was not respected and the transparency of the images was not optimal in 26.6% of cases. The validity criteria were not met in 18.3% of the results and the American College of Radiology (ACR) BIRADS classification was used in 95 patients (79.2%). Payment before the examination was carried out was in cash in the majority of cases (70.8%). However, the difference in cost was significant according to the type of imaging centre ($p = 0.015$).

Conclusion: Mammography was characterised by the unavailability of centres, a fairly long time to carry out the examination and a lower quality of the examinations.

Keywords: mammography, availability, accessibility, quality, use

Volume 14 Issue 6 - 2023

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Received: November 02, 2023 | **Published:** December 21, 2023

Introduction

Breast pathology, in its diversity, presents affections of which some, in this case malignant tumours, are formidable and constitute the main fear of patients and practitioners. Breast cancer is the most common cancer in women (23%);³ more than one million new cases are diagnosed each year worldwide.⁴ It is the third leading cause of cancer death worldwide,⁵ the second leading cause of cancer death among women in high-income countries and the leading cause of cancer death in low-income countries. In sub-Saharan Africa, breast cancer is the second most common cancer in women.^{6,7}

In Senegal, it is the second most common cancer in women after cervical cancer.¹ It is also responsible for a high mortality rate of around 70% after five years, as in many other developing countries.²

Because of its severity and high frequency, breast malignancy is a real public health problem. However, there are difficulties in performing mammography in relation to its availability, accessibility and use.

Materials and methods

This was a cross-sectional observational and analytical study

of 120 patients followed up at the Senology Unit of the Aristide Le Dantec University Hospital in Dakar, during the period from 1 January 2010 to 31 December 2014. The objective was to evaluate the availability, accessibility and use of mammography in the diagnosis of breast pathologies at the Senology Unit.

Patients admitted and receiving mammography and followed up in the Senology Unit during the study period were included.

Operational definitions

Quality of mammography: Mammography quality criteria were assessed by the senologist's review of the images to identify the presence or absence of marking, orientation, identification and transparency of the mammographic images, and to verify the completeness of the mammography report. At the end of this analysis, the quality of the mammogram is judged as good or poor.

Availability of mammography: This criterion is assessed on the basis of the availability of mammography and ultrasound services where the patients consulted: location, cost, private or public sector, number of images provided.

Mammography use: This is evaluated on the basis of the diagnostic contribution of the examination, i.e. the contribution of mammography to the diagnosis and the radiological and histological correlation obtained.

The SPSS version 20 software under Windows was used for statistical analysis of the data. The Chi-2 test was used.

Results

Descriptive results

Socio-demographic characteristics and history

The mean age of our patients was 44.2 years with extremes of 17 and 84 years and a standard deviation of 11.7.

Table 1 Socio-demographic characteristics

Patient characteristics	Number (n)	Frequency (%)
Age (year)		
17– 19	2	1,7
20 – 29	7	5,8
30 – 39	36	30,8
40 – 49	37	30
50 - 59	27	22,5
≥ 60	11	9,2
Place of residence		
Dakar-Plateau	6	5
Suburbs	81	67,5
Other regions	31	25,8
Mauritania	2	1,7
Marital status		
Single	15	12,5
Married	86	71,7
Divorced	10	8,3
Widowed	9	7,5
Level of education		
Not in school	41	34
Primary	30	25
Secondary	32	26,8
Higher	15	12,5
Other	2	1,7
Occupation		
No income	65	54,1
Paid work	14	11,7
Unpaid work	17	14,2
Trader	24	20
Gestivity		
Nulligest	23	19,2
Primigest	10	8,3
Paucigest	34	28,3
Multigest	53	44,2
Parity		
Nulliparous	23	19,2
Primiparous	15	12,5
Pauciparous	23	19,2
Multiparous	59	49,1

Of the patients, 81 were referred; only 39 had consulted the Senology Unit directly. The majority of them lived in the suburbs of Dakar; they numbered 81 (67.5%); 31 patients (25.8%) came from the regions and 2 patients (1.6%) came from Mauritania.

Of the patients, 86 (71.7%) were married and 15 (12.5%) were single. The lowest percentage was represented by divorcees and widows.

The uneducated patients numbered 42 (35%), 25% of whom had primary education.

In the majority of cases (54.1%), the patients had no source of income, 20% were traders and 11.7% had a paid job. Table 1 illustrates these socio-demographic data.

Gynaecological-obstetrical history of patients

The age of menarche was from 13 years onwards in 112 patients, i.e. 93.3% of the sample; 4.2% had an early onset of menarche, i.e. before 13 years. In 2.5% the age could not be specified.

The average gestational age was 4 with extremes of 0 and 14 and a standard deviation of 3.2. The average parity was 3.5 with extremes of 0 and 14 and a standard deviation of 2.9.

Eighteen (18) patients had their first pregnancy after the age of 35, i.e. 15% of the cases; the majority had had their first pregnancy before the age of 35.

Sixty-five (65) patients, or 54.2%, had breastfed their children for at least 18 months. Hormonal contraception was used by 31 patients, i.e. 25.8% of the women.

One woman in the sample had a personal history of malignant breast disease, i.e. 2.4% of the 42 benign breast tumour carriers.

A family history of breast cancer was found in 14 patients (33.3%). Postmenopausal women numbered 33 or 27.5% of our series. The average age of the postmenopausal patients was 58.9 years. None of them had used hormone replacement therapy for menopause.

Clinical aspects

The most frequent reason for consultation was the perception of a “lump” in the breast, followed by mastodynia as shown in Table 2.

Table 2 Distribution according to reason for consultation (N = 120)

Reasons for consultation	Number	Percentage
"Lump in the breast	58	41,1%
Mastodynia	45	32%
Discharge	13	9,2%
Other	25	17,7%

One patient out of the 120 women (0.8%) in the sample showed signs of secondary localisation by pulmonary involvement.

Mammography characteristics

General characteristics: During this study period, 1,346 patients had consulted the Senology Unit. Of these, 120 had received a mammography examination, this corresponds to a rate of 8.9%.

Seventy-six (76) mammograms out of the 120, i.e. 63%, were performed at public facilities, including 24 at the Hôpital Principal de Dakar and 21 at the Centre Hospitalier Universitaire Aristide Le Dantec. Table 3 illustrates these data.

Forty-four (44) of the 120 mammograms, or 37%, were performed at private facilities. These data are illustrated in Table 4.

Table 3 Distribution of public mammography centres

Mammography centres	Number	Pourcentage
Public imaging centres		
Dakar Main Hospital	24	31,6%
A. Le Dantec University Hospitalier Center	21	27,6%
Fann University Hospital	9	11,8%
Emergency Medical Service (SAMU)	8	10,5%
Grand Yoff General Hospital	6	7,9%
Saint-Louis Regional Hospital	3	4%
Thiès Regional Hospital	3	4%
Pikine Hospital	1	1,3%
Kébémér Regional Hospital	1	1,3%
Total	76	100%

Table 4 Distribution of private mammography centres

Mammography Centers	Number (N)	Pourcentage (%)
Imaging private centers		
Serigne Saliou Mbacké Medical Center	11	25%
Abdoulaye Ndoye Medical Office	6	13,6%
Carim Medical Office	5	11,3%
Aesculapius Medical Office	4	9,1%
Medical practice Dr Bara Dia	3	6,8%
Blue Cross Clinic	3	6,8%
Cabinet Dr Babacar Kebe	2	4,5%
IMODSEN (Modern Imagery of Senegal)	2	4,5%
Almaktoom Medical Office	1	2,3%
Sorim Radiology Practice	1	2,3%
Madeleine Clinic	1	2,3%
Cape Town Clinic	1	2,3%
Oasis Clinic	1	2,3%
Rahma Clinic	1	2,3%
Hamdalaye Medical Office	1	2,3%
St. John of God Hospital	1	2,3%
Total	44	100%

The price of the mammography examination ranged from 15,000 FCFA to 60,000 FCFA; the average was 48,944.9 FCFA.

Eighty-five (85) patients (70.8%) had paid cash and were not reimbursed for the mammogram. One patient had paid with a reduction through the support of a third party payer and 28.4% had paid through reimbursement.

Quality of the mammographic examination:

In our study, correct identification by the usual markings was not observed in 21 patients, i.e. 17.5% of cases.

The transparency of the mammography images was good in 88 patients (73.4% of cases), but needed to be improved in 32 patients (26.6%).

The validity criteria were met in 98 mammographic examinations (81.7%) and in the remaining 22 (18.3%) the criteria were insufficient.

The ACR BIRADS classification was performed on 95 mammograms, i.e. 79.2% of the examination reports, and on the remaining 25 (20.8%), this classification was not performed.

In 42 patients, i.e. 35% of cases, the diagnosis evoked on mammography was a benign lesion

In 42 patients (35%), the diagnosis evoked on mammography was a benign lesion and in 30 cases (25%) a malignant lesion was evoked. Figure 1 illustrates these data.

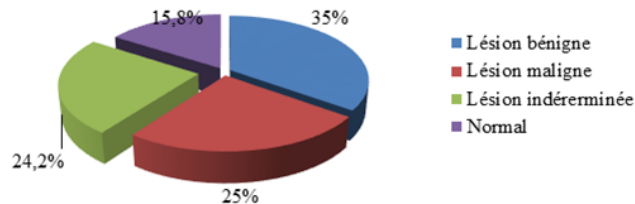


Figure 1 Distribution of diagnoses evoked at mammography (N = 120).

The average time from first contact to mammography was 28.8 days. Table 5 shows the time from first contact to mammography. This time ranged from 0 to 7 days for 92 patients (76.7%):

Table 5 Distribution of time taken to perform mammography

Delay	Frequency (n)	Pourcentage (%)
0 – 7 days	92	76,7%
8 – 30 days	16	13,3%
31 days and more	12	10%
Total	120	100%

In 92 patients (76.7%), mammography was requested to confirm a diagnosis, while the rest of the examinations were prescribed as part of screening.

In the majority of cases, i.e. 81 patients (67.5%), the three basic views were performed; in 25 (20.8%), only the craniocaudal and profile views were performed; finally, one patient (0.8%) had only the profile view. Figure 2 shows the different incidences performed.

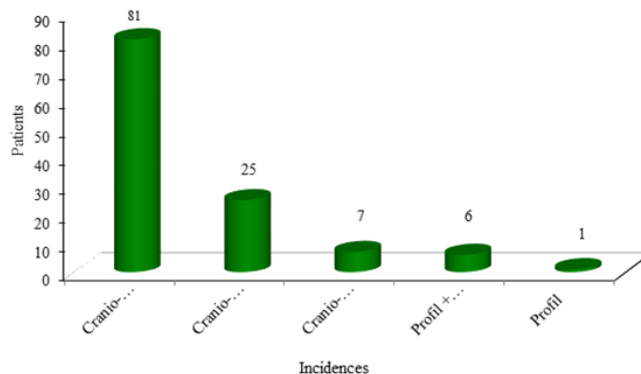


Figure 2 Distribution of incidences performed (N = 120).

One hundred and thirteen patients, i.e. 94.2% of the cases, had undergone mammography combined with ultrasound.

Anatomopathological aspects

Anatomopathological examination after breast sampling was carried out in 77 patients representing 64.2% of cases.

Radiological-anatomical-pathological conformity

Of the 77 patients who had undergone a histological examination, concordance of the results between the radiological and anatomical-pathological examinations was observed in 66 patients, i.e. 85.5%.

Therapeutic aspects

Table 6 shows the time between the mammographic diagnosis and the start of treatment. Thirty-one patients, i.e. 77.5%, had received treatment after a delay of more than one month:

Table 6 Distribution of delays between mammography and treatment (N = 80)

Time between the results of the mammogram and the therapeutic act	Number	Percentage
0 – 7 days	2	5%
8 – 30 days	7	17,5%
31 days and more	31	77,5%
Total	40	100%

Analytical results

Method of payment and type of mammography centre

In most cases, patients had their mammograms in public centres by paying cash.

In most cases, patients had their mammograms done in public centres by paying cash. The statistical difference was significant ($p = 0,015$).

Cost and mammography centres

In the majority of cases (85%), mammography was paid for between 40,000 and 60,000 FCFA, but with a significant preference for the public service over the private one ($p = 0.015$), as shown in Table 7.

In the majority of cases (85%), mammography was paid for between 40,000 and 60,000 FCFA, but with a significant preference for public over private service ($p = 0.015$), as shown in Table 8.

Table 7 Relationship between payment method and type of mammography centre (N = 120)

Mammography service	Cash payment		Payment with reimbursement		Total	
	N	%	N	%	N	%
Public	48	40%	28	23,3%	76	63,3%
Private	37	30,8%	7	5,9%	44	36,7%
Total	85	70,8%	35	29,2%	120	100%

$p = 0,015$

Table 8 Relationship between cost and location of mammography (N = 120)

Mammogram location	Cost of mammography in FCFA				Total	
	[15 000 – 40 000]		[40 000 – 60 000]		N	%
	N	%	N	%		
Public	16	13,3%	60	50%	76	63,3%
Private	2	1,7%	42	35%	44	36,7%
Total	18	15%	102	85%	120	100%

$p = 0,015$

Discussion

Availability of mammography

In our study, the majority of patients (67.5%) lived in the suburbs of Dakar, 5% lived in Dakar-Plateau, and 25.8% came from the regions

because Aristide Le Dantec Hospital was a reference institution given the lack of specialists and technical facilities required for the management of breast pathology in the peripheral regions.

The distribution of mammography facilities showed that almost all the imaging centres were located in the Dakar region and essentially in the city centre. Indeed, Gueye⁸ found that the majority of breast examiners were only available in Dakar and mainly in private facilities.

In Uganda, mammography was mainly performed for diagnostic purposes and many women could not access the mammography service because of its limited availability and cost despite its importance in the management of breast cancer.⁹

Eni¹⁰ in Nigeria had shown that diagnostic mammography remained the most common indication for mammography in their setting.

Shimelis¹¹ in Ethiopia found in a study a poor state of radiological infrastructure with radiology services less represented as mammography.

In Canada, Bierman¹² also emphasised that geographical location could be a barrier to accessing care. According to data from the Society of Rural Physicians of Canada, 21% of Canadians live in rural areas, while only 9.4% of family physicians and 3% of specialists live in rural areas.¹³

In terms of availability of images, in our study, 27 patients had a screening mammogram, all 21 had all three mammographic views and one patient had a single profile view.

Many screening programmes recommend two mammographic views to increase the sensitivity of breast cancer detection and decrease the recall rate of screened women instead of one view. The French situation, and in particular the use of radiology facilities not specialised in breast cancer screening, suggests that two mammographic images should be taken in the first and even the second wave,^{14,15} as recommended by Blanks and Young in the UK and England.^{16,17}

In our radiology centres, the number of images is not standardised according to the different recommendations, because the majority of patients who consulted for screening had three incidences instead of two.

For diagnostic mammography, the three standard views were respected in 55.1% of patients. Of the 93 patients who had undergone diagnostic mammography, 77.1% had done so. Of these 93 patients, 26 had received two views. The standard incidences for diagnosis were well codified: craniocaudal, oblique medial-lateral and lateral.¹⁸

However, in our study, the number of images taken for diagnostic mammography was insufficient in 26 patients (21.6%). In none of the cases were additional views taken, although the results showed the presence of micro-calcifications and/or architectural distortions in some patients.

The majority of patients had had their mammograms done at public services. The difference in the time taken to perform the examination was not significant between the public and private services ($p = 0.835$). The average delay between the first contact and the mammogram was 28.8 days, with extremes of 1 and 150 days.

Belguith¹⁹ in Tunisia found a shorter average delay in the private sector than in the public sector of 7 days and 144 days respectively.

Accessibility of mammography

The level of education did not influence the promptness of the mammography examination after the first contact ($p = 0.544$). In 2013, the National Agency for Statistics and Demography found a rate of women not attending school at 54.6%. This higher rate of uneducated women than the one observed in our study could be explained by the fact that most uneducated women from rural areas did not make it to Dakar.²⁰

With regard to economic status, 54.2% of our patients had no income. In fact, the rate of mammography use among our patients was estimated at 8.9%. In-depth analysis found a significant difference between cost and time to mammography (p -value = 0.037). Gueye⁸ in his study found that the cost of this examination was high, between 40,000 FCFA (60 Euros) and 80,000 FCFA (120 Euros), far beyond the financial possibilities of the average Senegalese.

The 2005 Senegalese poverty monitoring survey revealed that 50.8% of Senegalese still live below the poverty line, with significant geographical, spatial and gender disparities.²¹ Touré²² showed that a Senegalese person spends an average of CFAF 3,250 per year on various health services (consultation, medicines, care and other services) with a variation according to place of residence: CFAF 5,739 in urban areas compared to CFAF 1,943 in rural areas.

Studies by Leclerc, Olivier and Mossalios²³ had shown that the level of instruction and socio-economic level were determinants of access to health care. In a study on access to the health system, Leclerc²⁴ pointed out that 56% of women over 40 with secondary or higher education had had a mammogram in the last two years, compared to 40% of those with primary education.

In Cameroon Nko'o Amvene²⁵ found that 40.3% of the population were poor in his study of accessibility to medical imaging. The average individual annual health expenditure was 33 euros [10-83] or 21,615 FCFA, while the cost of mammography was 30 euros or 19,650 FCFA.

Breast mass was the most important reason for consultation (41.1%), followed by mastodynia. In the Togo study by Ogodakoussou, nodules represented 35%,²⁶ sometimes with ulceration. This rate is similar to that of our study. Diop²⁷ in his series had a higher percentage for nodules which was 76%. In a series in Nancy, the breast nodule represented 90% of the reasons for consultation.²⁸

The majority of patients, i.e. 70.8%, had paid cash to have a mammogram; 28.4% had been covered and only one had benefited from a substantial reduction in the framework of pink October with the Senegalese League against Cancer (LISCA).

The majority of patients had their mammograms done in the public or private sector and paid in cash; the difference was significant ($p = 0.015$).

We did not find a study on the method of payment for mammography before it was carried out, but we can state that in the majority of cases it was necessary to pay cash to have a mammogram. This is because health services in our countries suffer a lot from collection systems.

In our study, 76.6% of mammograms were performed for diagnostic purposes. Ksikes²⁹ in his study in a private centre in Dakar had a diagnostic mammography rate of 13.3%.

This difference in rate could be explained by the fact that patients who consulted the private sector had more possibilities of payment for preventive purposes, unlike those who consulted the public hospital.

Use of mammography

Mammography was coupled with ultrasound in the majority of our patients except for 5.8%.

In the French programme, a rate of 0.4% of cancers is reported for women with a normal clinical examination and mammography classified as BI-RADS 1 and 2 and abnormal ultrasound.³⁰

Lebris³¹ in a study concluded that clinical examination and conventional imaging (mammography/ultrasound) allowed the diagnosis of the majority (76%) of contralateral synchronous breast cancers.

In Berg's study,³² which looked at the results of the first ultrasound scan performed as part of screening or surveillance after a treated cancer, the value of ultrasound was clearly demonstrated, with the detection rate rising from 7.6% for mammography alone to 11.8% for the combination of mammography and ultrasound. Constitutional breast overdensity is a recognised risk factor for breast cancer,^{33,34} which is another reason to do everything possible to detect carcinoma.

Although mammography remains a key examination in breast cancer screening, it fails to recognise a large number of cancers, about 1 in 3 of which are subcentimetric infiltrating cancers in fatty breasts, cancers that are a priori detectable by ultrasound. In his article Balu Maestro³⁵ points out that the performance of ultrasound has made it possible to increase the specificity of mammography both in screening and in the presence of a palpable anomaly. Guégang³⁶ in his study in Cameroon in 2011 found that the combination of mammography and ultrasound was an excellent means of detecting breast lesions.

However, given that mammography has a sensitivity of 92%, in our study we found a lower sensitivity (85.5%). We therefore believe that it should be coupled with ultrasound as some tumours, even if clinically evident, may not be seen on mammography and furthermore breast tumours in Africa occur a decade earlier than in Western women,³⁷⁻³⁹ a period when breasts may still retain their high density. This is the opinion of Diop,⁴⁰ Cherel⁴¹ and Dilhuydy⁴² in breast exploration.

Mammography results were normal in 15.8% of our patients, compared to 40% in the Diop series.⁴⁰ This difference can be explained by the fact that more screening mammography was performed in Diop's patients.

The contribution of mammography in breast pathology remained fundamental in our series, the sensitivity was 85.5%. Diop⁴⁰ in his series found a sensitivity of 80% with a false negative rate of 28% and a false positive rate of 8%. In the Ogodakoussou series in Lomé, the sensitivity of mammography was 71.7%.⁴³

Our results are similar to those of Diop and Ogodakoussou.

In the study by Diallo in Mali, the sensitivity of mammography was 61.1%.⁴⁴ The rate in our study was higher than that of Diallo in his series, which is probably related to a better technicality, although insufficient compared to the literature.

With regard to the quality of the mammograms in our study, the correct identification of the mammograms by the usual markings was not respected in 17.5%. A non-significant relationship was found between the place where the mammogram was performed and the correct identification of the mammograms (p -value = 0.727). We had 18.3% of images where the validity criteria were not met and 26.7% where the transparency was not good.

In breast cancer screening in France, the rate of technically correct images was in line with European standards for each type of device, analogue or digital: analogue mammography, 99.53%; digital DR, 99.82%; digital CR, 99.75%.⁴⁵ In the radiologists' workbook, the percentage of technically inadequate images (TIA) is defined as the number of women with a mammogram judged technically inadequate by the second reader, as a proportion of the number of mammograms re-read at the second reading, for information purposes. It is desirable that this rate should not exceed 1%.⁴⁶

The rates of technical insufficiency that we found in our study were therefore very high compared to the French reference.

In the study by Prisse,⁴⁷ the introduction of an evaluation form in 2003 led to a clear improvement in the quality scores of the images compared with the 2002 mammograms, both in terms of positioning and density. Progin and Zbinden,⁴⁸ in a series that evaluated the influence of the patient on the quality of the images, found that 78% of all craniocaudal images were rated "Moderately Good". For the oblique mediolateral views, the average score was Moderately Good in 91% of cases.

Wagnon⁴⁹ had listed situations that caused non-detection such as the technical reason of insufficient technical quality of the image, masking or not revealing the cancer signal by inadequate positioning that does not place the signal on the film in such a way that it can be detected. In 31 cases out of the series of 172 undiagnosed cancers (18%), it was the technical quality that was at fault.

Our results (18.3%) are comparable to those of Wagnon. Mammography is a demanding technique, so very high quality images improve both the sensitivity and specificity of the result.⁵⁰

In our series, the ACR BI-RADS classification⁵¹ was not adopted in 20.8% of images. Gonsu Kamga² concluded in his study that users of the BI-RADS classification were reliable in predicting malignancy of breast lesions with an efficiency of 77.3%, but there were shortcomings in the evaluation and interpretation of some lesions resulting in the high prevalence of malignant lesions in the ACR2 and ACR3 categories.

In the Journal of Radiology in 2014 radiologists such as Thomassin-Naggara recommended the use of the elements of the BI-RADS lexicon that should appear in a breast imaging report.⁵²

Barreau,⁵³ in a study exploring radiological practices and behaviours in the face of the discovery of a "probably benign" abnormality on mammography, found that, on the whole, radiologists practised in accordance with the teaching given during training, but they seemed to have difficulty "finding the right words" to explain this practice to women.

The principle of radiology practice is based on the principle of the principle of radiology practice being based on the principle of "primum non nocere", the BI-RADS reference framework also allowed for a common and consensual attitude.

However, in our study, a large percentage of results were not given according to the ACR BI-RADS classification, which was probably related to a large number of imprecise diagnoses (24.2%), hence the need to adopt it.⁵⁴

Conclusion

In view of these results in our study, it would be important to set up imaging centres with qualified personnel in the peripheral regions of Senegal, to ensure a maintenance system and to subsidise the cost

of mammography. It is also important to respect the indications for additional imaging, to always couple mammography with ultrasound and finally to adopt the ACR BI-RADS classification.

Acknowledgments

None.

Funding

None.

Conflicts of interest

All authors declare that they have no conflict of interests.

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