

**QUALITY ASSURANCE GUIDELINES
FOR RADIOGRAPHERS**

NHSBSP Publication No 30

March 2000

First published by:

NHSBSP Publications
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First edition 1994

Second edition, revised 2000

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ISBN TO BE SUPPLIED

CONTENTS

	Page No
Acknowledgements	iv
1. Introduction	1
2. Radiographic Quality Assurance Objectives	5
3. Acceptability and Uptake	9
4. Mammography	11
5. Training and Continuing Professional Development	18
6. Radiographic Staffing Levels	20
7. Working for Quality	21
8. Definitions	25
Appendix 1: List of Training Centres and Associated Universities	30
Bibliography for the Standards Table	32
References	33

ACKNOWLEDGEMENTS

The guidelines have been produced by the NHS Breast Screening Programme (NHSBSP) Radiographers' National Quality Assurance Coordinating Group.

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The working party gratefully acknowledges the comments received from the members of the Radiographer's Quality Assurance Group, and the work of Peter Briggs and Susan Gray in the development and editing of this document. They also wish to record their thanks to Linda Read, Debbie Smith and Caroline Rowbotham for their work in processing the final report.

1. INTRODUCTION

1.1 Background

In 1986, the Forrest Report recommended the introduction of breast screening in the United Kingdom.¹ It emphasised that all aspects of the programme would have to be of a very high quality in order to achieve the anticipated reduction in mortality. The radiographer is central to the success of the NHSBSP by ensuring that a high standard of mammography is carried out in a manner that is acceptable to women. These guidelines focus on the radiographic aspects of breast screening quality assurance but are complementary to the quality assurance guidelines produced by other groups involved in the screening process.

With the publication of *The New NHS: Modern and Dependable*² and *A First Class Service*,³ the environment for health care delivery is changing. Clinical governance is expected to provide comprehensive programmes for quality improvement and safeguards for high standards of care.

Following the report to the Secretary of State for Health on breast cancer services in Exeter and quality assurance in the breast screening programme,⁴ an executive letter EL(97)67 was issued.⁵ This requires health authorities that commission breast screening services and trusts that host breast screening to deliver the breast screening programme to national standards. At regional level, EL(97)67 strengthens the role of the quality assurance network in the NHSBSP.

1.2 Definitions of quality

1.2.1 Quality assurance

Quality assurance has been an intrinsic part of the NHSBSP in establishing and maintaining a service that meets national standards and the requirements of all women invited for screening. Quality assurance is a philosophy that aims to harness the efforts of all staff in order to ensure that every aspect of their work is directed towards the achievement of high quality performance. There are two main aspects of quality assurance:

- quality management
- quality control.

1.2.2 Quality management

Quality management is a management philosophy that applies to all parts of the organisation. It involves managing all functions and activities in a timely and consistent manner in order to continually raise standards.⁶ It aims at continuous improvement and involves all members of the team. Strong leadership is essential for the success of a quality management system.

The key requirements for quality management in breast screening are:

- teamwork
- effective communications within the team, as well as with women, commissioners and providers
- organisational planning including contingency planning
- a framework for risk management and clinical governance
- an environment for continuous improvement

- the management of quality in a systematic way to ensure consistency, reproducibility and reliability (including clear and concise documentation)
- a clear understanding of accountability
- action for improvement
- clear professional performance standards
- monitoring and feedback on performance (appraisals and personal development plans)
- staff training and development.

1.2.3 *Quality control*

Quality control is controlling and monitoring the processes to produce quality systems and services. Quality control in breast screening facilitates the production of high quality images with as low a radiation dose as reasonably possible and minimises the adverse effects of the screening process.

1.2.4 *Radiographic quality control*

Radiographic quality control involves policies and procedures that are succinct, understood and undertaken by all radiographers in line with quality management requirements and allocated resources for quality control procedures.

Radiographic quality control requires:

- a nominated quality assurance radiographer in each unit
- schedules for routine testing of equipment
- procedures for reporting of system failures and corrective action
- procedures for the notification of equipment faults to the regional quality assurance radiographer (RQAR) and National Coordinating Centre for the Physics of Mammography
- criteria for limits of acceptability
- clearly defined responsibilities for the suspension of mammographic equipment
- good communication with medical physics staff
- maintenance contracts for all equipment
- equipment replacement programmes
- staff training and development

Quality control is discussed further in a separate NHSBSP publication, *Radiographic Quality Control Manual for Mammography*.⁷

1.2.5 *Clinical governance*

Clinical governance is a statutory duty for quality improvement at local level. It is defined as 'a framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish'.²

1.3 **Purpose of the guidelines**

The purpose of the quality assurance guidelines for radiographers is to facilitate the achievement of the NHSBSP objectives and standards, in order to contribute to the overall long-term aim of a reduction in mortality from breast cancer in women invited for screening.

Quality Assurance Guidelines for Radiographers

The guidelines give clear and detailed information on how the radiographic aspects of the service are organised and controlled. They:

- provide a mechanism for auditing, identifying, reporting and resolving problems
- drive continuous improvement in quality for all radiographic aspects of breast screening service delivery
- promote and encourage the development of a learning culture for radiographers
- support the promotion of best practice, training and continuous professional development.

1.4 Who are the guidelines for?

They are specifically for:

- all radiographers in the NHSBSP
- radiographic line managers
- unit and regional quality assurance radiographers
- clinical directors.

They are also useful to:

- trust management
- quality assurance reference centres
- professional bodies.

They are of interest to:

- commissioners
- primary care consortia
- training organisations
- community health councils/women's groups
- women's advocate groups, e.g. Age Concern
- legal advisers.

1.5 How the guidelines will be used

At unit level, the guidelines will be used:

- for self-appraisal
- for peer review
- for the audit of individual radiographer performance and appraisal
- for the development of personal development plans
- for induction and training
- to inform organisational development and business management processes
- for general reference.

At regional level, the guidelines will be used:

- for the audit of unit radiographic performance by the RQAR
- for the RQAR to report unit radiographic performance following informal and formal quality assurance visits
- for RQARs to give support, information and advice to screening radiographers

Quality Assurance Guidelines for Radiographers

- for the identification of resource issues to inform the organisational development and business planning processes.
- by RQARs to encourage their use in the everyday working practice of breast screening radiographers.

2. RADIOGRAPHIC QUALITY ASSURANCE OBJECTIVES

2.1 Introduction

The quality assurance programme in the NHSBSP provides a framework for radiographers to develop their performance in all areas. It helps to identify educational and development needs, enabling radiographers to develop to their full potential. Radiographers should be involved in all aspects of the breast screening programme in order to develop a full understanding of their role within the team. They should regularly see their own work and participate in the assessment of films. In this way, they are able to monitor their own performance and recognise their need for continuing development. The assessment of the quality of the mammograms is an educational and developmental exercise that facilitates continual improvement of mammographic standards through discussion and teamwork.

Radiographic quality assurance within the unit is the responsibility of all radiographers and is monitored by the superintendent radiographer/radiographer in charge. The radiographers in the unit should discuss radiographic standards regularly with the RQAR as part of the overall regional quality assurance data set for radiographers.

Quality assurance within the unit requires time and dedication. Each unit should allow a minimum of 3 hours per week to undertake radiographic quality assurance. This allows for equipment testing, film monitoring, data collection, collation, analysis and discussion.

The radiographic quality assurance objectives are given in Table 1. The objectives, criteria and outcome measures are discussed in more detail in subsequent chapters. The table is also provided as a separate poster, which should be displayed in a prominent place.

Quality Assurance Guidelines for Radiographers

Table 1 Quality assurance objectives

Objective	Criteria	Outcome measure
1. Radiographers should be up to date with current issues in all aspects of screening and breast care. They must be well informed and able to respond knowledgeably and with confidence to women's questions	All radiographers must keep up to date with current issues in breast care and have a reasonable knowledge of other issues relating to women's health	Women should report that the radiographer responded to their questions and enquiries in a responsible and appropriate manner
2. Radiographers working in the NHSBSP must endeavour to ensure maximum acceptability with minimum anxiety and discomfort during the screening process	Radiographers must have an awareness of the needs of the individual woman	All radiographers know of, understand and adhere to The College of Radiographers' Code of Professional Conduct (publication date May 1994, revised 1996) ⁸
	All radiographers must ensure that women receive a comprehensive explanation about the mammographic examination, including the use of compression and the method and expected time for receiving results. The recall to assessment system should also be explained in a manner that does not provoke anxiety	The following standards should be achieved: <ul style="list-style-type: none"> • ≥ 70% acceptance rate⁹ • < 7% of women find the mammographic examination painful¹⁰ • 100% of women receive an explanation about the examination, test results procedure and possibility of recall to assessment • > 95% of women report that their needs regarding breast screening have been appropriately addressed
	Regular client satisfaction surveys for both screening and assessment clinics and waiting time audits should be carried out, interpreted and acted upon when necessary	
	All complaints must be brought to the attention of the line manager as soon as possible and dealt with according to unit and host trust policy	
3. Radiographers should ensure that accurate messages are given about breast screening and breast care	Waiting times must be kept to a minimum in line with the host trust policy and the Patient's Charter	<ul style="list-style-type: none"> • > 95% of women are examined within 30 minutes of their appointment time except in exceptional circumstances
	Radiographers should participate in health promotion/education activities relating to breast screening, breast care and breast awareness	Radiographers give accurate messages about the risks and benefits of the breast screening programme
	Radiographers should network with other healthcare professionals and women's groups and organisations to provide accurate information about breast screening and breast care services	Radiographers remind women to be breast aware
	Radiographers should participate in meetings and study sessions which encourage links with general radiography colleagues to assist in the dissemination of information regarding the breast screening and breast care services	Radiographers in general radiography are well informed about the breast screening/ breast care service and its role within the profession

Quality Assurance Guidelines for Radiographers

Objective	Criteria	Outcome measure	
4. Radiographers should ensure that all radiographic systems are working at optimum levels. They should ensure that health and safety and radiation safety regulations, policies and procedures are understood and adhered to	All radiographers should be fully conversant with health and safety policies and procedures	The working environment is safe and satisfactory according to health and safety and radiation safety regulations	
	Health and safety audits and risk assessment should be carried out regularly		
	All radiographers should be fully conversant with current radiation safety regulations		
	Tests should be carried out to an acceptable standard with results correctly recorded, monitored and evaluated		Radiographers have a knowledge of NHSBSP Publication No 21 and IPSM Report 59(2) ^{7,11}
			All radiographic quality control and quality assurance procedures are carried out in line with the documents above
	Adequate time should be available to undertake quality control and quality assurance procedures		A minimum of 3 hours per week per screening/assessment unit is allocated for radiographic quality control and quality assurance procedures
	Equipment faults should be recorded appropriately		Equipment fault forms are correctly completed and collected regionally
	Protocols should be in place for cessation of screening when equipment is out of tolerance	The criteria for cessation of screening and who is responsible for the decision are clearly understood	
5. Radiographers should participate fully in the activities of the breast care team and contribute their expertise where appropriate	Radiographers should: <ul style="list-style-type: none"> • rotate through screening assessment and symptomatic clinics¹² • have an opportunity to attend clinical multidisciplinary meetings • have appropriate staffing levels to enable full participation in the activities of the breast care team 	Radiographers: <ul style="list-style-type: none"> • participate in clinical multidisciplinary meetings • participate in all assessment procedures • have the staffing levels as recommended below: <ul style="list-style-type: none"> – units with 66–75% uptake 1.1 whole-time equivalent (WTE) per 10,000 eligible population – units with 76–85% uptake 1.2 WTE per 10,000 eligible population – units with 86–90% uptake 1.3 WTE per 10,000 eligible population¹³ 	
6. Radiographers should receive feedback on their performance	All radiographers should participate in appraisal schemes and peer review	Radiographers: <ul style="list-style-type: none"> • participate in an appraisal scheme • have personal development plans • identify training needs and seek to address these wherever possible • participate in review of films and audit of the mammographic standards including repeated films 	

Quality Assurance Guidelines for Radiographers

Objective	Criteria	Outcome measure
7. Radiographers should acquire and maintain the necessary skills in order to maximise the number of high quality images	<p>Radiographers in the NHSBSP should be properly trained</p> <p>Radiographers should participate in image quality monitoring procedures and audit of technical repeat examinations</p> <p>Radiographers must participate in continuing professional development in order to continually acquire skills and knowledge and to maintain and develop their competencies</p>	<p>Radiographers:</p> <ul style="list-style-type: none">• hold or be training for the Certificate of Competence in Mammography• participate in screening and assessment processes for a minimum of 2 days per week• carry out $\geq 95\%$ of mammography examinations in a manner which the women find acceptable• have a repeat examination rate for technical reasons of $< 3\%$• carry out mammographic examinations that are adequate for radiological interpretation in $\geq 97\%$ of cases• have a portfolio with documented continuing professional development (CPD) activities and a personal development plan (PDP) and evidence of involvement in research and audit activities• initiate and participate in appropriate research projects

3. ACCEPTABILITY AND UPTAKE

3.1 Definition

High quality screening demands high quality mammography carried out in a manner that is acceptable to women. The needs of individual women and their circumstances need to be recognised in order to ensure a satisfactory and positive experience. The acceptability of breast screening to women is of the utmost importance to the success of the NHSBSP. The uptake among the eligible population may be the single most important determinant if the programme is to be successful in its aim to reduce breast cancer mortality in the screening population.

Uptake is defined as the percentage of women who, having been sent an invitation for screening, attend a screening unit and undergo mammography in response to that invitation. It takes no account of women who do not attend or those who do not receive their invitation.

3.2 Consent

Women who attend for breast screening, following invitation or as a result of self-referral, should be informed about the risks and benefits of the test as explained in an information leaflet sent with the invitation.¹⁴

The radiographer taking the mammogram is responsible for ensuring that women are informed about the mammographic examination and must be up to date with current issues and be able to answer appropriate questions. The radiographer must give a full explanation of the procedure, including the reasons for the use of compression, which some women may find uncomfortable. Women should feel confident that they have the ability to stop the procedure at any point. The radiographer should follow the guidance given in *Information and Advice for Radiographers*.¹⁵ When women comply with the procedure, valid consent is implied.

3.3 Objectives

For the majority of women attending for breast screening, the radiographer is the only health professional they encounter. Radiographers therefore have a key role to play in women's experience of, satisfaction with and continued acceptance and uptake of the service. The best opportunity to detect breast cancer when it is potentially curable comes with women willing to attend for regular screening combined with high quality images produced in a manner that is acceptable and satisfactory for women.

All radiographers in the NHSBSP should endeavour to ensure a satisfactory screening episode for each woman.

The radiographer should ensure that:

- the woman's demographic details are confirmed, e.g. name, address, date of birth
- women with special needs, including those with breast implants, are appropriately informed and adequately supported
- privacy and confidentiality are maintained

- an adequate explanation of the mammographic test (including the use of compression) is provided
- valid consent is obtained¹⁴
- the screening test is undertaken with minimal waiting times, according to local trust policy
- all women receive a comprehensive explanation about receiving results, second-stage screening and breast awareness
- the screening environment is clean and tidy and local protocols are followed in respect of infection control
- complaints are addressed according to local trust policy.

Radiographers should be involved in discussions relating to the content of invitation letters, information leaflets and other literature. Radiographers should participate in health promotion/education activities relating to breast screening and breast care. They should give accurate messages about the risks and benefits of the breast screening programme. They should answer accurately and sensitively questions from women who are currently not invited in to the breast screening programme and give the reasons why. They should be aware of the research being conducted in this area within the breast screening programme. All radiographers should remind women to be breast aware and to report any changes noticed between screening episodes to their GP.

3.4 Monitoring

The radiographer should participate in measuring the performance of the unit and also receive feedback from:

- regular client satisfaction surveys
- waiting time audits
 - time of appointment to time of examination
 - time between screening and results available
 - time between screening and assessment
- compliments and complaints
- acceptance rates for prevalent and incident screening rounds
- early recall rates.

4. MAMMOGRAPHY

4.1 Introduction

Mammography has been described as the science of imaging and the art of positioning. Successful mammography is dependent on the performance of the equipment, the expertise of the radiographer and the cooperation of the woman. The skill of the radiographer and various factors associated with the woman undergoing the examination affect the quality of the mammogram. These include the composition and size of the breast and the stature of the woman as well as her the physical and psychological attributes. A good-quality mammogram shows all the breast tissue with optimum image detail.

Since 1995, the NHSBSP has had a policy of two-view mammography for the first attendance for screening, as this has been demonstrated to improve the cancer detection rate in these women.¹⁶ A single mediolateral oblique (MLO) view of each breast is still the recommended method for screening at all subsequent screening visits.

The NHSBSP sets standards for mammography. These are that more than 97% of mammograms are adequate for radiological interpretation and that less than 3% of examinations are repeated for technical reasons.⁹

4.2 Criteria for assessment of images

The criteria used to judge whether or not an image is adequate for radiological interpretation are given in Figure 1 (mediolateral oblique images) and Figure 2 (craniocaudal images).

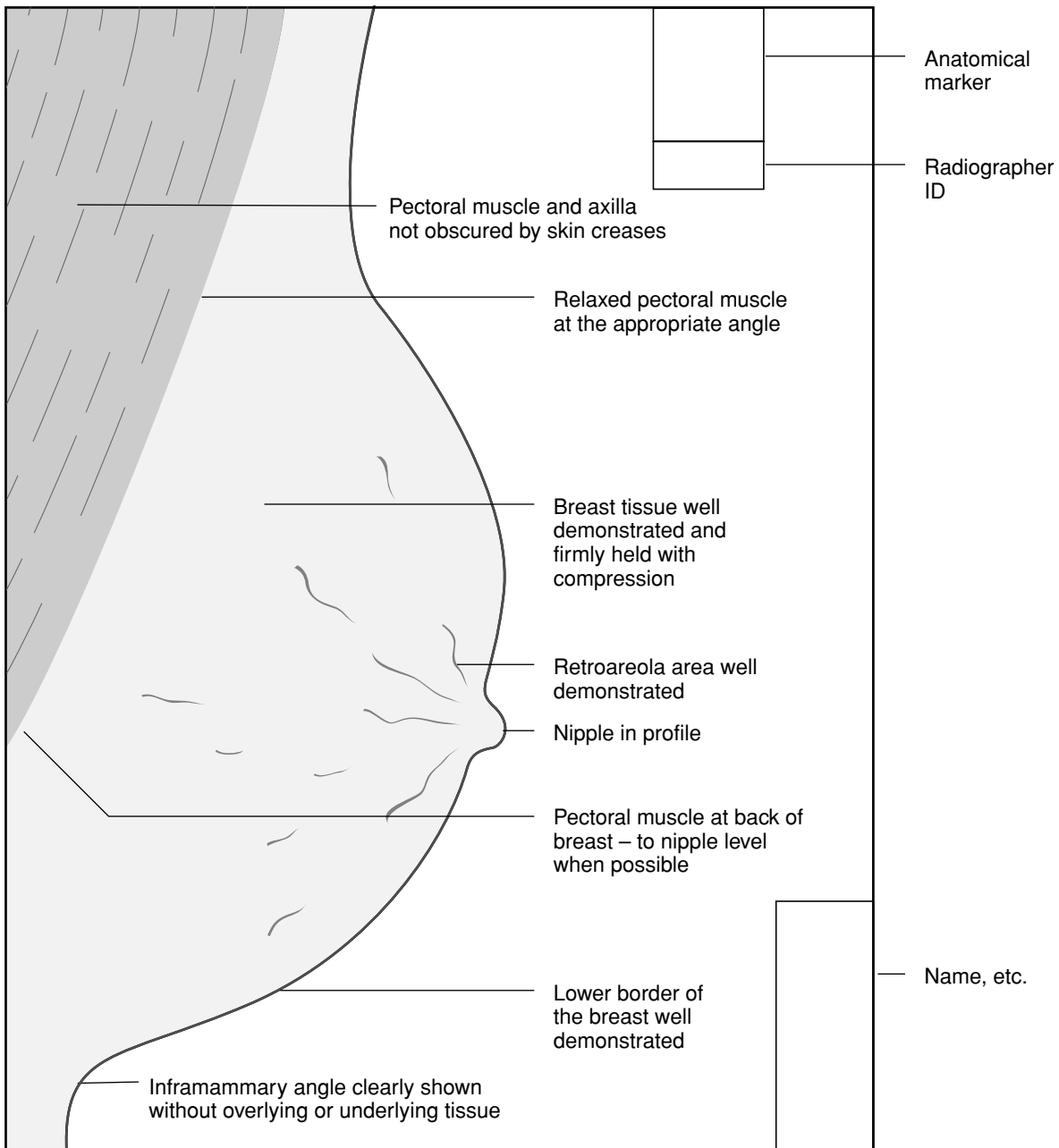


Figure 1 Criteria for assessment of mediolateral oblique images.

Summary of criteria for assessing MLO images

- whole breast imaged
- nipple in profile
- correct annotations
- appropriate exposure
- appropriate compression
- absence of movement
- correct processing
- correct film handling
- skinfold free
- absence of artefacts covering the image
- symmetrical images.

Quality Assurance Guidelines for Radiographers

<i>Whole breast imaged</i>	<p><i>Pectoral muscle shadow to nipple level.</i> The lower edge of the pectoral muscle shadow should reach nipple level whenever possible, to ensure that the posterior aspect of the breast is satisfactorily included on the image.</p> <p><i>Pectoral muscle at appropriate angle in accordance with good practice.</i> This angle varies depending on the physical build of the individual. The pectoral muscle should be at an appropriate angle to enable the axillary tail of the breast to be demonstrated clear of the muscle shadow on the mammogram.</p> <p><i>Inframammary angle clearly demonstrated.</i> The inframammary angle should be clearly shown without overlying or underlying tissue. This indicates that the breast has been lifted and that the inferior–posterior part of the breast has been correctly imaged.</p>
<i>Nipple in profile</i>	<p>This is important in order to demonstrate the retroareola area of the breast clearly on the mammograms.</p>
<i>Correct annotations</i>	<p>The correct annotations are clearly shown.</p> <ul style="list-style-type: none">• woman identification• anatomical markers• positional markers (if used)• radiographer identification• date and time of examination.
<i>Appropriate exposure</i>	<p>The exposure varies according to local practice and preference. Research into the optical density (OD) for the standard breast when measured with 4 cm PMMA (Perspex) currently suggests that an OD of between 1.4 and 1.8 inclusive of base plus fog should be achieved. It is now accepted that an OD of below 1.4 would be inappropriate.¹⁷ Other factors that influence exposure are:</p> <ul style="list-style-type: none">• processing• compression• performance of automatic exposure control (AEC)• selection of appropriate position of automatic exposure control detector• inappropriate film quality (variation in film batches, poor film stock control).
<i>Appropriate compression</i>	<p>Compression is important in reducing radiation dose, movement blur, geometric unsharpness and overlapping tissue shadows. The compression should be applied slowly and gently to ensure that the breast is held firmly in position. The breast should be lifted and the tissue separated while compression is applied to enable better visualisation on the mammogram. The force of the compression on the X-ray machine should not exceed 200 N or 20 kg.</p>
<i>Absence of movement</i>	<p>Movement blur can be due to patient movement, cassette movement or inadequate compression. Image blur can occur if there is insufficient dwell time for the cassettes.</p>
<i>Correct processing</i>	<p>Sensitometry should be carried out daily to monitor the film processor and ensure optimum processing conditions.⁷</p>
<i>Correct film handling</i>	<p>Film handling systems should be operating at optimum levels to avoid film artefacts.</p>
<i>Skinfold free</i>	<p>Skin creases and folds should be removed prior to compression and exposure.</p>
<i>Absence of artefacts covering the image</i>	<p>Radiographers should ensure that there are no extraneous objects in the image field.</p>
<i>Symmetrical images</i>	<p>Right and left breast radiographs should match as mirror images when mounted on the film viewer.</p>

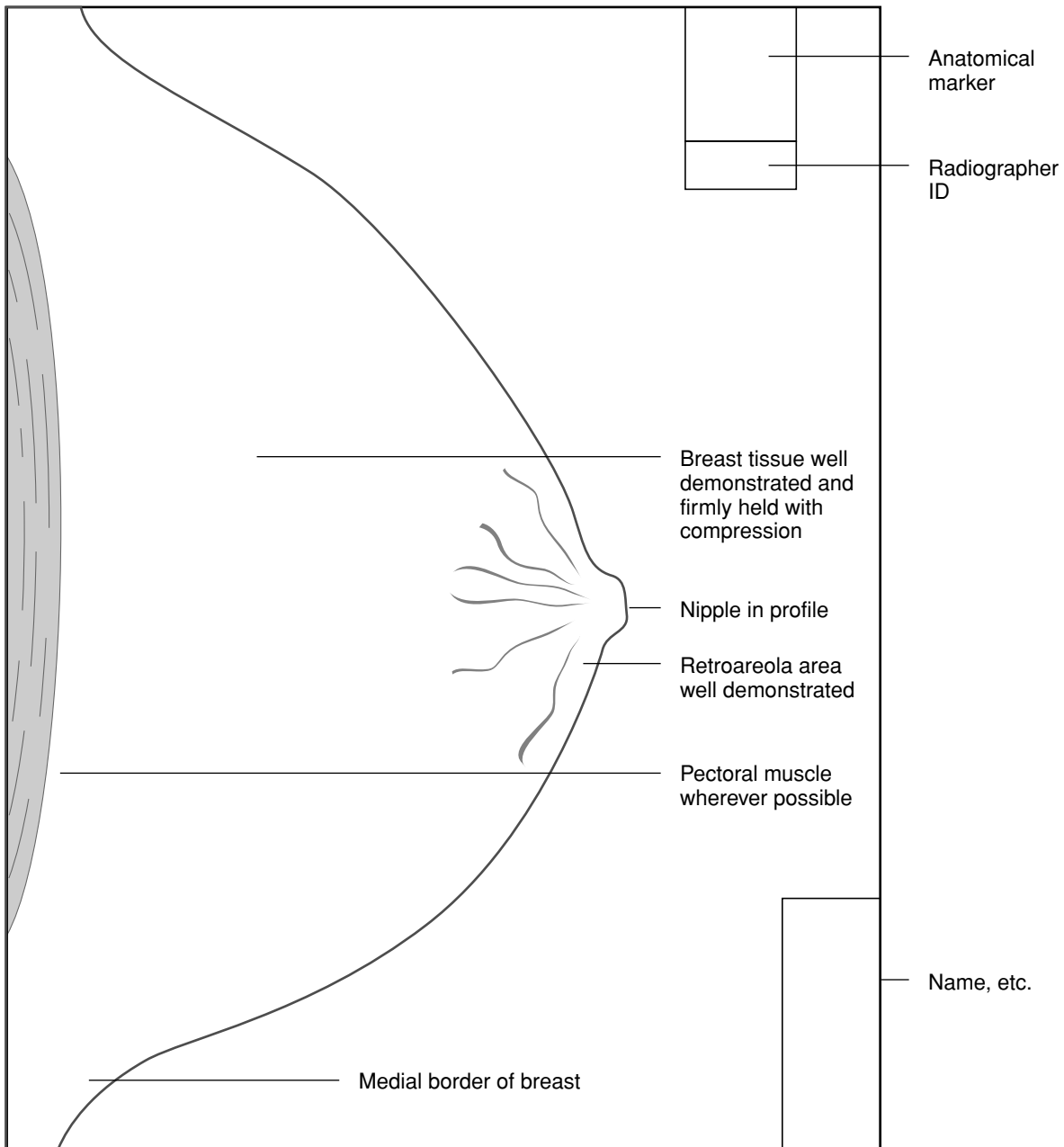


Figure 2 Criteria for assessment of craniocaudal images.

Summary of criteria for assessing CC images

- medial border imaged
- some of the axillary tail of the breast visible
- pectoral muscle shadow may be shown
- nipple in profile
- correct annotations
- appropriate exposure
- appropriate compression
- absence of movement
- correct processing
- correct film handling
- skinfold free
- absence of artefacts covering the image
- symmetrical images.

Quality Assurance Guidelines for Radiographers

The craniocaudal (CC) view should show as much of the breast as possible. A correctly taken CC view will show virtually all except the most lateral and axillary part of the breast. Specifically, the CC should show:

1. medial border of the breast
2. some of the axillary tail of the breast
3. pectoral muscle shadow on the posterior edge of the breast on some views
4. nipple in profile
5. correct annotations
6. appropriate exposure
7. appropriate compression
8. absence of movement
9. correct processing
10. correct film handling
11. absence of skinfolds
12. absence of artefacts covering the image
13. symmetrical images.

4.3 Inadequate images

Images (MLO or CC) are judged to be inadequate for radiological interpretation for one or more of the following reasons.

1. part of the breast is not imaged
2. there is inadequate compression, leading to poor-quality images
3. the image is blurred
4. processing is incorrect
5. exposure is incorrect
6. artefacts obscure breast tissue
7. skinfolds obscure breast tissue
8. annotation is inadequate or incorrect
9. film fogging.

4.4 Technical recalls and technical repeats

4.4.1 Definitions

A *technical recall (TC)* is when a woman is asked to reattend for the same projection(s), whether MLO or CC, to be repeated because the first screening examination is technically inadequate for radiological interpretation. This is usually a decision made by the radiologist. Any additional views for the purpose of *diagnosis* should be recorded as assessment.

A *technical repeat (TP)* is when the radiographer makes the decision to repeat the same projection(s) after identifying an error. This may be during or immediately following the screening examination and/or processing. The woman is still present in the unit.

Supplementary projections may occasionally be required to complete the mammographic screening examination. These are taken while the woman is still present either on the mobile unit or at the static unit. Such images are not classed as technical repeats. The need for supplementary projections is a professional judgement made by the radiographer.

4.4.2 Objective

The NHSBSP national objective is to minimise the number of women undergoing repeat examinations. The national minimum standard is that < 3% of examinations should be repeated, and the target is < 2%.

Radiographers have a responsibility for regular audit of technical repeat and technical recalls and should review their own performance against personal, unit, regional and national objectives and standards.

4.4.3 Key requirements

Each breast screening unit should ensure that:

- there is good communication between film readers and radiographers
- there is sufficient time for audit and peer review
- a proforma for recording TC/TP events is available
- a method of recording all TC/TP events on to a computer database is available
- training is provided to identify what constitutes a TC or a TP.

4.4.4 Monitoring

At unit level, the superintendent radiographer should monitor TC/TP rates. This may reveal equipment problems or indicate a training need. Information should be collected and monitored on the reasons for women undergoing technical repeat examinations. Collecting and analysing this

information is the responsibility of the superintendent radiographer, who should discuss this with the RQAR at regular intervals.

At regional level, the RQAR should monitor the rates and report the regional rates to the Radiographers' National Quality Assurance Coordination Group. A Good Practice Guide on collecting, recording, monitoring and reporting TCs and TPs is in preparation.

4.5 Monitoring radiographic technique

Regular monitoring and audit of radiographic technique is essential, with radiographers carrying out image assessment against the criteria laid down for MLO and CC images.

4.6 Performance review

Regular review of professional performance is essential. The radiographers in the breast screening programme should receive regular feedback on their performance. This is achieved by participation in formal appraisal and performance review schemes, through informal discussions within the breast screening team and by peer review. Regular peer review should be conducted in order to offer support and encouragement to colleagues to maintain high standards of mammography.

Radiographers should develop a personal development plan (PDP) in discussion and agreement with their local line managers. PDPs should take account of different learning pathways and identify and take full advantage of opportunities for learning on the job. It is the superintendent radiographer's responsibility to ensure that regular performance review is undertaken and underperformance is highlighted and resolved.

4.7 Underperformance

Where underperformance by an individual is identified, the superintendent radiographer should:

- initiate informal discussions with the individual concerned to identify any possible underlying causes, such as working practices or personal or health problems
- identify and discuss possible solutions
- set out and agree an action plan with a specified timescale, which may include:
 - additional training
 - mentoring
 - review of working practices
 - advice from occupational health on health-related issues
- document, review and feedback with the member of staff within the specified timescale
- where actions do not succeed, seek further advice from, for example, the human resources department of the host trust, quality assurance reference centre, quality assurance radiographer or training centres.

4.8 Multidisciplinary teamworking

Radiographers should participate fully in the activities of the multidisciplinary breast care team and contribute their expertise where appropriate. All radiographers in the breast screening programme are expected to rotate through the screening, assessment and symptomatic clinics. They should also have an opportunity to attend clinical multidisciplinary meetings.

5. TRAINING AND CONTINUING PROFESSIONAL DEVELOPMENT

5.1 NHSBSP training programme

In order to achieve the level of expertise required to produce consistently high quality mammograms and to be a fully participating member of the breast care team, radiographers in the NHSBSP must participate in the training programme. Training will ensure that radiographers are technically expert and well informed in order to respond to the individual needs of the woman, and influence service outcomes.

Training courses are available at one of the national training centres or appropriate satellite training centres, and these lead to the College of Radiographers' Certificate of Competence in Mammography. This is, in most training centres, a postgraduate course that is part of university postgraduate education programmes. A list of the national training centres with the associated universities is shown in Appendix 1. Details of the training courses offered are available from the training centres and universities listed.

5.2 Training objectives

Radiographers in the NHSBSP will acquire and maintain the appropriate skills and knowledge.

The objectives for training are that:

- the radiographer is an effective member of the breast care team and provides a service that is acceptable to the population
- the radiographer acquires the necessary expertise to reach the standard that is required in mammography to aid diagnostic accuracy
- the radiographer becomes a fully participating member of the decision-making team for the planning and organisation of breast screening and breast care units
- the radiographer keeps up to date with technological developments and participates in research programmes.

5.3 Continuing professional development

Radiographers must take every reasonable opportunity to sustain and improve their knowledge and professional competence. They should promote the professional development and education of students and colleagues.⁸ Continuing professional development is defined as the systematic maintenance, improvement and broadening of knowledge, skills and personal qualities in order to perform professional activities throughout the working life (*Synergy*, January 1997). Continuing professional development (CPD) should both meet the learning needs of individual radiographers and inspire public confidence in radiographers' skills. It enables the practitioner to embark on a programme of lifelong learning that is an investment in quality.

Continuing professional development should be a partnership between the individual and the organisation; its focus should be the delivery of high quality NHS services. Continuing professional development also needs to meet individual career aspirations and learning needs.^{2,18}

All individuals:

- must be proactive in developing themselves and their career
- should develop continuously in that they should constantly be seeking to improve themselves as a professional and the quality of care they deliver
- should regard investment of time in learning as being important.

Continuing professional development (lifelong learning) follows a circular pathway through assessment, personal development planning, implementation and evaluation (Figure 3).³

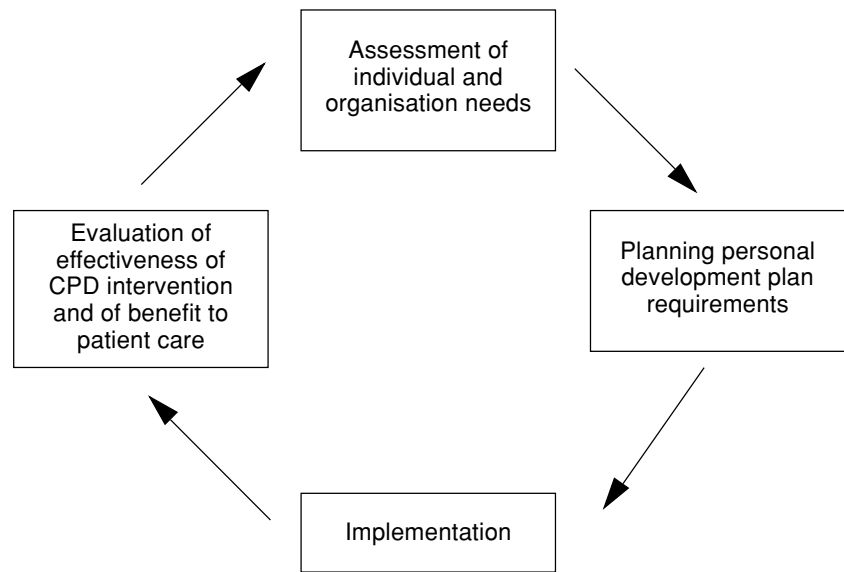


Figure 3 Pathway of lifelong learning.

6. RADIOGRAPHIC STAFFING LEVELS

6.1 Staffing levels

Staffing levels should be sufficient and suitable to allow radiographers' time to be utilised effectively and efficiently. Radiographers should rotate through breast screening and assessment clinics and also participate in symptomatic mammography. They should have the opportunity to participate in statistical data collection, collation, analysis and research.

Radiographic staffing levels are suggested below for the current NHSBSP screening policy of two-view prevalent screening visits and single-view subsequent screening visits with a 3-year screening interval. If two-view screening is introduced for all visits, further guidance will be issued.

Units with 66–75% uptake: 1.1 WTE per 10 000 eligible population
units with 76–85% uptake: 1.2 WTE per 10 000 eligible population
Units with 86–90% uptake: 1.3 WTE per 10 000 eligible population.

Uptake rate is defined as the number of women taking up their invitation and attending for breast screening, expressed as a percentage of the invitations sent out. No consideration is made for those women who do not attend, who may not have received an invitation. Uptake rate should be assessed across a full screening cycle. Eligible population is defined as the number of women aged 50–64 on the health authority register.

Units with an uptake of less than 66% may wish to consider the most appropriate staffing level needed for the population, given that radiographers are expected to staff the clinics whether women attend or not. Shorter appointment times may be more appropriate than reduced staffing levels.

The suggested staffing levels for the current NHSBSP screening policy should allow for:

6.2 Assessing staffing requirements

- rotation through screening and assessment clinics
- participation in continuing professional development activities
- participation in quality control and quality assurance activities including audit and review procedures
- sufficient flexibility to cover sickness and holiday absence
- attendance at multidisciplinary meetings
- participation in research projects.

Screening units, when evaluating their current staffing levels and assessing their future requirements, are advised to estimate their eligible population numbers for the next screening cycle, assuming that there are no changes in the current policy of 3-year screening, two views for the prevalent round and a single view for the incident round. If units are experiencing self-referral rates of more than 10% of the eligible population, this also may need to be taken into consideration together with the predicted uptake rates.¹³

7. WORKING FOR QUALITY

7.1 Local responsibilities

Radiographic quality assurance is the responsibility of all radiographers and is monitored by the superintendent radiographer in conjunction with the unit quality assurance radiographer. Guidance on the role of the unit quality assurance radiographer is given below. Radiographers have a responsibility for regular audit and should review their own performance against personal, unit, regional and national standards and objectives.

7.1.1 *Role of the unit quality assurance radiographer*

Responsible to the superintendent radiographer and/or clinical director, the role of the unit quality assurance radiographer is:

1. to oversee the sampling of the radiographic image quality in the unit – this should be an educational and development exercise (all radiographers should participate)
2. to monitor technical recall and technical repeat examinations, audit the findings and take appropriate action where necessary
3. to ensure compliance with quality control guidelines^{7,11}
4. to liaise with the medical physics department and discuss outcomes of equipment testing
5. to know who is responsible for the authorisation of suspension from use of equipment when tolerances are exceeded¹⁹
6. to maintain strong links with the RQAR and regional quality assurance network
7. to identify their own educational and development needs and seek to address those needs
8. in conjunction with the health and safety representative, to assist the radiographers in the unit to work in an environment conducive to their health and welfare.

7.2 Regional responsibilities

A regional quality assurance radiographer represents the radiographers in the region and provides support and advice and acts as the coordinator for radiographic activities in the breast screening programme.

7.2.1 *Role of the regional quality assurance radiographer*

Responsible to the regional quality assurance director, the role of the regional quality assurance radiographer is:

1. to take the lead in setting, monitoring and reviewing quality assurance standards for radiographers undertaking breast screening
2. to coordinate the implementation of quality assurance standards across the profession in conjunction and liaison with other disciplines
3. to represent the radiographers in the region on regional and national committees
4. to act as a resource for other regional quality assurance radiographers as well as other colleagues and professions
5. to strengthen communication links and work with the Joint UK/ College of Radiographers' Mammography Committee
6. to identify, together with radiographers and managers within the breast screening programme, training and development needs and advise the national training providers

7. to develop robust communication networks across the NHSBSP and foster links with the private and symptomatic sector, commissioner/provider groups, primary health care teams and charitable organisations
8. to be aware of, encourage and support relevant research projects to identify further activities that would merit consideration.

7.3 National responsibilities

7.3.1 Radiographers National Quality Assurance Coordinating Group

The Radiographers' National QA Coordinating Group represents radiographers working within the NHSBSP. This group consists of representatives from each of the English health regions, and one from Wales, Scotland, Northern Ireland and the private sector. In addition, there is a representative from The College of Radiographers, the national breast screening training centres and the national coordination team.

The core purpose of the group is to inform and influence the national strategy on radiographic excellence in breast care. Its remit is:

- to coordinate activity across the profession
- to set out professional quality assurance standards
- to monitor and review professional quality assurance standards
- to identify the training and development needs of radiographers and advise the NHSBSP on how they may be met
- to identify research needs and monitor activity
- to advise the NHSBSP on professional matters
- to identify ways in which links with the private sector can be maintained and strengthened
- to encourage the acceptance of NHSBSP standards by the symptomatic sector.

The group is committed to ensuring that the delivery of radiographic services in breast screening is of the highest quality. This should contribute to achieving a reduction in the rate of breast cancer deaths in line with national targets.

7.3.2 National coordination team

The role of the national coordination team includes:

- developing quality assurance through the national coordination groups
- advising regional directors of public health as necessary on the effectiveness of quality assurance in their region
- monitoring the effectiveness of quality assurance systems nationally
- liaising with professional associations and colleges.

The national coordination team is accountable to the medical director of the NHS Executive and provides a formal annual report on the NHSBSP, including quality assurance. The national radiographic adviser is part of the national coordination team.

The national coordination team, in conjunction with the national quality assurance coordination groups, sets national minimum standards and targets for the NHSBSP. These are given in Table 2.

Quality Assurance Guidelines for Radiographers

Table 2 Standards for the NHSBSP (updated August 1998)

Domain	Objective	Criterion	Minimum standard	Target
D2	1. To maximise the number of eligible women who attend for screening	The percentage of eligible women who attend for screening	≥ 70% of invited women to attend for screening	
D1	2. To maximise the number of cancers detected ¹	a) The rate of invasive cancers detected in eligible women b) The rate of cancers detected which are in situ carcinoma c) Standardised detection ratio (SDR)	Prevalent screen ≥ 2.7 per 1,000 Incident screen ≥ 3.0 per 1,000 Prevalent screen ≥ 0.4 to ≤ 0.9 per 1,000 Incident screen ≥ 0.5 to ≤ 1.0 per 1,000 ≥ 0.75	Prevalent screen ≥ 3.6 per 1,000 Incident screen ≥ 4.0 per 1,000 ≥ 1.0
D1	3. To maximise the number of small invasive cancers	The rate of invasive cancers less than 15 mm in diameter detected in eligible women invited and screened	Prevalent screen ≥ 1.5 per 1,000 Incident screen ≥ 1.65 per 1,000	Prevalent screen ≥ 2.0 per 1,000 Incident screen ≥ 2.2 per 1,000
D3, D4	4. To achieve optimum image quality	a) High contrast spatial resolution b) Minimal detectable contrast (approx) 5–6 mm detail 0.5 mm detail c) Standard film density	≥ 10 lp/mm ≤ 1% ≤ 5% 1.4–1.8	
D3	5. To limit radiation dose	Mean glandular dose per film to standard breast using a grid	≤ 2 mGy	
D5	6. To minimise the number of women undergoing repeat examinations	The number of repeat examinations	< 3% of total examinations	< 2% of total examinations
D5	7. To minimise the number of women screened who are referred for further tests ¹	a) The percentage of women who are referred for assessment b) The percentage of women screened who are placed on early recall	Prevalent screen < 10% Incident screen < 7% < 1%	Prevalent screen < 7% Incident screen < 5% ≤ 0.25%
D4, D5	8. To ensure that the majority of cancers, both palpable and impalpable, receive a non operative tissue diagnosis of cancer	The percentage of women who have a non operative diagnosis of cancer by cytology or needle histology	≥ 70%	≥ 90%
D4, D5	9. To minimise the number of unnecessary operative procedures	The rate of benign biopsies	Prevalent round < 3.6 per 1,000 Incident round < 2.0 per 1,000	Prevalent round < 1.8 per 1,000 Incident round < 1.0 per 1,000

Quality Assurance Guidelines for Radiographers

Domain	Objective	Criterion	Minimum standard	Target
D3	10. To minimise the number of cancers in the women screened presenting between screening episodes ¹	The rate of cancers presenting in screened women a) In the two years following a normal screening episode b) In the third year following a normal screening episode	Expected standard 1.2 per 1,000 women screened in the first two years 1.3 women per 1,000 women screened in the third year	
D1, D2, D6	11. To ensure that women are recalled for screening at appropriate intervals	The percentage of eligible women whose first offered appointment is within 36 months of their previous screen	≥ 90%	100%
D2, D3, D5	12. To minimise anxiety for women who are awaiting the results of screening	The percentage of women who are sent their result within two weeks	≥ 90%	100%
D2, D3, D5	13. To minimise the interval from the screening mammogram to assessment	The percentage of women who attend an assessment centre within one week of the decision that further investigation is necessary and within three weeks of attendance for the screening mammogram	≥ 90%	100%
D2, D3, D5	14. To minimise the delay before examination by the surgeon who will have care of the woman ²	Time interval between the first assessment appointment and surgical assessment	≤ 5 working days	Same day (surgeon present at an assessment clinic)
D2, D3, D5	15. To minimise the interval between a surgical decision to operate for diagnostic purposes and the first offered admission date ²	The percentage of women who are offered an admission date within two weeks of the surgical decision to operate for diagnostic purposes	≥ 90%	100%
D2, D3, D5	16. To minimise the interval between a surgical decision to operate for therapeutic purposes (i.e. where there is a preoperative definitive diagnosis of cancer) and the first offered admission date ²	The percentage of women who are admitted within three weeks of informing the patient that she needs surgical treatment	≥ 90%	100%

DEFINITIONS

Domain

In the new NHS national performance framework there are six areas of performance focussed upon. They have been selected to capture what really counts for patients and for staff. Each of the standards has been allocated a domain. This covers all the areas listed in *The New NHS: Modern and Dependable*.⁵ The domains are:

- D1 Health improvement
- D2 Fair access
- D3 Effective delivery of appropriate healthcare
- D4 Efficiency
- D5 Patient/carer experience
- D6 Health outcomes of NHS care

Objective

These are the aims of the NHSBSP in its operation in relation to specific quality issues.

Criteria

These are the parameters by which the achievement of the objective (or not) will be measured.

Minimum standard

These figures represent the levels of performance which are the minimum acceptable for any breast screening unit. Where the minimum standard is shown as 'greater than or equal to', any level of performance below that standard should be **investigated by the quality assurance team**.

Where the minimum standard is shown as 'less than or equal to', any level of performance above that standard should be **investigated by the quality assurance team**.

Targets

These are the quantitative targets that are achievable individually by one-third of units within the NHSBSP. All units should aim to achieve these targets. If the specified cancer detection rates etc. are achieved, then the programme will be on target to replicate the mortality reduction achieved in trials.

Eligible women

These are women aged 50–64 who are included in the call and recall system.

Proportion of women invited who attend for screening

The percentage of women who, having been sent an invitation for screening, attend a screening unit and undergo mammography in response to that invitation. No allowance is made for letters returned or refusals. This is calculated from KC62 and represents uptake not coverage.

Cancers detected

This includes both invasive and in situ cancers. For this purpose, multiple cancers in one patient are counted as one cancer.

Small cancers

The size of the cancer is determined by pathological measurement.

Repeat examinations

Repeat examinations include both those films repeated in the same view while the woman is still present in the unit, and those occasions where a woman is required to attend a second time to have a film repeated (same view), because of a technical inadequacy.

Further tests

These include all second appointments where further procedures (including further views and/or clinical examination) beyond those normally undertaken at the first appointment are carried out.

Assessment

This is defined as 'further tests' above and does not include repeat examinations (qv).

Operative procedures

These are open surgical biopsies (for diagnostic reasons) where definitive histology proves benign. More than one procedure on the same occasion on one patient will be counted as one biopsy.

Benign biopsy

A benign biopsy is an open surgical biopsy which results in a benign diagnosis histologically.

Prevalent screen

These are women who are being screened for the first time by the NHSBSP (usually those aged 50–52.9).

Incident screen

These are women who have had a previous screening episode within the NHSBSP and are now being rescreened at the routine (three year) interval.

Week

Five working days.

Early recall

A second screening invitation at less than the routine screening interval.

Notes

1. The expected effectiveness of the NHSBSP is based on a target uptake of 70% of eligible women being screened. Current national data indicates that this target is being achieved across the UK. However, it is recognised that in some localities the target is very difficult to attain. Indeed, even in those regions which do attain well over 70% there may be districts or GP practices where to achieve considerably less than 70%, for example 50%, may still be regarded as a considerable achievement. In these cases it could be considered that the objective of maximising the number of eligible women attending for screening in that GP practice has been achieved. This target relates to women aged 50–64 called or recalled for screening as part of the NHSBSP.

2. The criterion used to measure whether the number of cancers detected is being maximised is the rate of invasive cancers detected in women both invited and screened, every three years, in the 50–64 age group. Microinvasive disease is excluded. The numbers of in situ carcinomas expected includes ductal carcinoma in situ (DCIS), lobular carcinoma in situ and microinvasive disease. There is a geographical variation in the incidence of breast cancer, although no consistent pattern has emerged which would allow different standards to be set for different parts of the country.

The standardised detection ratio (SDR) measures a unit's performance and takes into consideration variable age distributions between screening units. For investigative purposes it can be corrected for the geographical variations in background incidence. The minimum standard and the target are a guide to the levels to be achieved based on the underlying incidence and the average age of the women screened.

If a high DCIS rate is reported the overall cancer detection rate and pathology reporting should be investigated.

3. This refers to the number of invasive cancers measuring less than 15 mm in diameter, microinvasive carcinoma is excluded. Size is determined by pathological measurement.
4. For discussion of assessment of image quality, see section 6.5.1 of the Pritchard Report³ and IPEM Report 59.⁴ It should be noted that:
 - i) the measurement of image quality is subjective and due allowance should be made for observer variability
 - ii) the standards specified are guidelines based on current knowledge and may need to be revised as better methods of measuring image quality are developed
 - iii) test films should be evaluated under appropriate viewing conditions with the use of ocular aids where necessary.
 - a) The value given refers to the limiting high contrast resolution which would be obtained by radiographing a high contrast resolution grating placed on top of approximately 4 cm Perspex and approximately 6 cm from the chest wall edge.

The value given should be met in directions both parallel and perpendicular to the tube axis. The measured high contrast resolution in the direction perpendicular to the tube axis will normally be greater than that parallel to the tube axis. The test film should have a sufficient dwell time in the cassette prior to exposure to ensure good screen–film contact (the time will depend on the type of cassette but will often be at least five minutes). The film should be evaluated under appropriate conditions with the aid of a high power magnifier.

- b) The figures given for threshold contrast are based on measurements with the TOR(MAS) or TOR(MAX) test object placed on top of 4 cm Perspex and the contrast values are those quoted by the manufacturer (nominal radiation contrast calculated at 28 kVp using a molybdenum target and filter). However, the threshold contrast limits can be applied using different makes of test object provided that due allowance is made for the different definitions of contrast used by the manufacturer and the amount of scatter material used.
- c) Standard film density is taken to mean the gross optical density measured 4 cm from the chest wall edge on the midline of a radiograph of a 4 cm thick Perspex block exposed using the automatic exposure control (AEC) at the current clinical settings. The standard optical density should lie within ± 0.2 of the target values.

Quality Assurance Guidelines for Radiographers

5. Mean glandular dose for a 45 mm thick standard breast. For definition and method of measurement, see section 6.5.2 of the Pritchard Report and IPEM Report 59. The value given should not normally be exceeded and typically, values are in the range 1–2 mGy. Values lower than 0.8 mGy should be investigated to ensure that the image quality obtained is acceptable.
6. Repeat examinations should be avoided both to minimise radiation dose and, particularly where second appointments are needed, to minimise anxiety.

The decision to repeat a film while the woman is present in the unit is generally the radiographer's decision. The decision to recall a woman for a second appointment in order to repeat a film is the radiologist's decision. Both types of repeat examination need to be monitored, and the combined rate of both types of repeat examination should be less than 3% of total examinations.

7. The minimum standards and targets for the number of women referred for assessment relate to women aged 50–64 called or recalled for screening as part of the NHSBSP.
9. If a particularly low benign biopsy rate is reported, this might be due to a high non operative diagnosis rate in the context of an on target cancer detection rate. If this is not the case, then further investigation would be needed particularly looking at cancer detected amongst women placed on early recall. This target relates to women aged 50–64 called or recalled for screening as part of the NHSBSP.
10. The criterion for measuring whether the number of cancers presenting between screening episodes is being minimised is the rate of cancers which presents in screened women in the first 24 months subsequent to screening. It is recognised that these will not all be false negatives; some will have developed in the interval since screening and some will be mammographically occult cancers. In addition, it is recognised that some false negative cancers will present in the third year after screening. As interval cancers are an expected part of breast screening, and have to be considered over either a number of years or on a regional, large population basis, no minimum or target level is given.
11. The long term effectiveness of the screening programme is dependent on women in the target age group continuing to be screened at regular intervals. Currently the screening interval is 36 months. Women should be offered an appointment which ensures that they are screened at an interval of not more than 36 months. In order to keep women within their screening batch, this may on occasion necessitate a screening interval of less than 36 months.
- 14, 15 & 16. Where the recommended intervals between the surgical decision to operate and admission are not achieved, this should be drawn to the attention of the appropriate hospital managers and steps taken to improve the situation.

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APPENDIX 1: LIST OF TRAINING CENTRES AND ASSOCIATED UNIVERSITIES

Scottish Mammography Training Centre (Glasgow/Edinburgh)

Training Coordinator
105 Calder Street
Glasgow G42 7PH

Queen Margaret University College
Division of Radiography
Edinburgh EH6 8HF

Breast Test Wales

Mammography Training Centre
18 Cathedral Road
Cardiff
South Glamorgan CF1 9SJ

University of Wales
College of Medicine
Department of Radiography Education
School of Health Care Studies
Heath Park
Cardiff CF4 4XN

Nottingham National Breast Screening Training Centre

City Hospitals NHS Trust
Hucknall Road
Nottingham NG5 1PB

University of Derby
School of Health and Community Studies
Mickleover
Derby DE3 5GX

Jarvis Breast Screening, Diagnostic and Training Centre

Stoughton Road
Guildford
Surrey GU1 1LJ

Kingston University
Faculty of Healthcare Sciences
School of Radiography
Penrhyn Road
Kingston-upon-Thames KT1 2EE

Quality Assurance Guidelines for Radiographers

Kings College Hospital Mammography Training Centre

Breast X-ray
West Two
Kings College Hospital
Denmark Hill
London SE5 9RS

South Bank University
Division of Imaging and Radiotherapy
103 Borough Road
London SE1 0AA

North West National Training Centre

The Nightingale Centre
Withington Hospital
Nell Lane
Manchester M20 0PT

University of Salford
Department of Radiography
Frederick Road Campus
Salford M6 6PU

Mammography Training Centre

BUPA Health Screening Centre
Battlebridge House
300 Gray's Inn Road
Kings Cross
London WC1X 8DU

University of Hertfordshire
Hatfield Campus
College Lane
Hatfield
Herts AL10 9AB

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