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THE COLLEGE OF RADIOGRAPHERS
INDUSTRY PARTNERSHIP SCHEME
SUPPORTING RADIOGRAPHY RESEARCH

College of Radiographers Industrial Partnership Research Grants
Final Report

1. Principal Investigator	Dr Julie Nightingale
2. Project Title	'Compression behaviours' – An exploration of the beliefs and values influencing the application of breast compression during screening mammography
3. Amount of Grant	£9799.00
4. Did you spend the money as indicated in your proposal (if not why)?	
The project team members changed during the life of the project (one staff member retired, one moved posts and one stepped down from the project for personal reasons). The funds were therefore spent as intended but to support new staff coming in to the project.	
5. Did you reach your intended project outcomes (if not why)?	

a) Principal Aim of the study

The project presented here is a qualitative study aiming to investigate 'compression behaviours' of mammographers - exploring the individual and collective beliefs and values that influence compression practice. The findings helped us to gain an insight into the underpinning knowledge of mammographers, and the practical approaches adopted across the range of clients that they encounter routinely in clinical practice.

b) Primary Research Question

What are the personal and professional beliefs and values that influence the application of compression during a mammography examination?

The six focus groups yielded a wealth of information about the beliefs and values of a range of assistant practitioners, mammographers and advanced and consultant practitioners. 28 different units of meaning (categories and themes) were identified within the transcripts, and a number of interconnections were made between them. With further analysis these units of meaning were merged into 9 themes which explored the emerging culture of mammography practice. A decision tree is being created to outline the complexity of decisions needing to be made by the mammographers within an exceptionally short 'screening' examination time. This decision tree can help to educate new mammgraphers of the future. Additional analysis is being undertaken regarding the spectrum of challenges between the need to gain compliance and the need to empower the client.

c) Secondary Research Questions

What formal guidance is currently available to practicing mammographers regarding breast compression? What education and training do trainee mammographers receive within the university and clinical environments regarding breast compression?

Interviews with 6 educators suggested that there was a lack of guidance about the application of compression within formal documents, text books and reference literature. No education programmes offered lectures or alternative teaching specifically about compression, because it was purposefully subsumed within a more general technique lecture. Educators stressed the importance of not seeing compression in isolation, but integral with good positioning and client information. Educators and focus group participants agreed that the fundamentals of compression practice is best taught in the clinical environment during practical sessions.

Outcomes

a. Identification of the range of individual and collective values and beliefs of mammographers that may influence their application of compression.
This was achieved through analysis of focus group transcripts (see Appendix 1).

b. Identification of the knowledge base and variation in educational approaches
This was achieved through literature review, focus group analysis and interviews with educators. It was also supported by documentary analysis where training materials were supplied to the research team.

c. Determine whether mammographers practice is at variance with current guidance and educational practice.
This was achieved by comparing our focus group findings to the literature and to the educator findings.

d. Disseminate the findings to the wider mammography compression research team, to identify any links with other emerging research findings (quantitative approaches).
On-going dialogue has taken place between quantitative and qualitative arms of the wider study, and this has been facilitated by the lead for the 'quantitative' breast research who is a member of the 'qualitative' project steering group. A project outline and initial findings were discussed externally to the University within a qualitative breast research seminar (December, 2012). The full findings will be reviewed by the project steering group (including service user review) and a final report will be discussed at our Breast Research Steering Group in May.

e. Disseminate the findings directly to centre participants, and more widely via peer reviewed conference and published journal articles.
A report is being prepared for the screening centres and educators. We have offered to visit these sites to present the information to their staff if they wish. We have presented initial findings to a Breast Imaging Research Seminar at the University of Salford, and an abstract has been submitted to UKRC. Journal articles are being prepared.

f. Develop the research skills of two of the co-investigators (Doreen Seddon and Jackie Gallagher), and the research leadership skills of the Principal Investigator.
Jackie Gallagher contributed to initial design of the project and focus group interview schedules, as well as undertaking an initial literature review, but she then left the project for personal reasons. Doreen Seddon jointly conducted all of the focus group interviews jointly with a more experienced colleague - it was invaluable to have her insight into the mammography career pathway. Julie Nightingale gained excellent experience in project management, managing 3 staff leaving the project and another two staff joining the study (Dr Fred Murphy at data collection phase, and Dr Leslie Robinson at analysis phase). While this change of personnel was not ideal, we have made the very best use of the different skills that these staff bring. It has been particularly valuable having Leslie join the analysis at a late stage, as she had not participated in data collection. She therefore was viewing the transcripts without any preconceived ideas or bias, and this was found to be extremely helpful in discussions.

6. What are your significant findings?

Focus group interviews were carried out at 6 centres across England, and included a total of 41 participants (including assistant practitioners, practitioners and advanced and consultant practitioners). In addition interviews with 6 mammography educators informed the study.

Phenomenological analysis identified 28 units of significant meaning, supported by verbatim quotations from the participants. These units were validated and agreed by 3 researchers, who then through further analysis reduced the units of meaning to 9 emerging themes. The 'essence' of these emerging themes was captured, agreed and documented.

Emerging Themes:

1. First Impressions

2. Assessing appropriate compression
   - physical and verbal feedback
   - numerical feedback

3. When to apply more compression

4. When to apply less compression

5. Influence of Technique
   - blurring
   - breathing techniques
   - manual versus pedal compression

6. Influence of Technology

7. Assessment of patient psychology and stereotypes
   - empowerment
   - assessment patients and technical recalls
   - first time attenders
   - previous attenders
   - younger patients (age extension)
   - socio-economic influences
   - disabled clients
   - ethnicity and language barriers

8. Underpinning influences for compression practice
   - ethical decision-making
   - conflicting influences
   - limited time

9. Culture
   - culture of isolated practice
   - lack of in-house guidance
   - training culture
   - variation in compression practice

Appendix 1 details a brief description of each theme, and the interconnections between them are currently being developed by the research team into models of practice. These models of practice are exploring:

1. The complexity of the decision-making process regarding the application of compression. In a very time-pressured environment mammographers learn to work intuitively and respond to key physical and emotional triggers during the examination to produce the desired outcome. (See Appendix 2 for a work-in-progress model of the decision-making processes within the examination).

2. The competing influences on practice of the need for compliance against the desire to empower the client. The culture of the screening centre appears to have a pervasive effect on the beliefs and values of the mammographers. Staff need to balance the immediate, tangible consequences of a sub-standard image with the longer term, relatively hidden consequences of a screening patient not returning for their next screen.

7. Have you submitted the work for publication (if so where)?

Presentations:

Murphy F. Nightingale J, Robinson L, Hogg P, Mackay S, Seddon D. University of Salford, School of Health Sciences, Research Seminar. Monday 3rd December, 2012.
Under pressure: A national qualitative study to investigate how and why practitioners apply pressure and what factors are used to decide when to cease applying pressure

Murphy F, Nightingale J, Robinson L, Hogg P, Mackay S, Seddon D
UKRC 2013, Liverpool, 10th - 12th June, 2013. 'Compression behaviours' - An exploration of the beliefs and values influencing the application of breast compression during screening mammography".

Publications:
Journal article dissemination are currently being discussed, potential papers include (working titles):

1. 'Compression behaviours' - An exploration of the beliefs and values influencing the application of breast compression during screening mammography". Proposed journal - Radiography. An overview of the findings.

2. Compliance versus Empowerment in Mammography. Proposed journal (Breast imaging focus)

3. Decision-making in mammography - 6 minutes and counting. Proposed journal (Breast Imaging focus).

8. Please provide an executive summary of your work (two sides of A4 maximum)
N.B. If you already have a draft or final version of the proposed publication can you please attach.

Executive Summary

Background

Breast compression during routine screening mammography contributes to image quality by bringing the entire breast as close as possible to the image receptor, thereby decreasing the potential for motion blur and geometric unsharpness (Tucker and Ng, 2001). In addition, well applied compression decreases the overlap of breast tissues resulting in a reduction in breast thickness and radiation dose to the breast (NHSBSP, 2006). The application of compression is an important skill (Kopans, 2007). Insufficient compression force may reduce image quality, with increased risk of missed pathology. There is an optimum level of compression beyond which additional forces cease to have any effect on image quality or significant reduction in image dose (Lee et al, 2003). However the additional force applied does have a marked effect on the woman's tolerance of the procedure and related discomfort or even pain (Lee et al, 2003), which may influence their decision to respond to future invitations for breast screening (Drossaert et al, 2002).

While there is overwhelming acknowledgement that compression is an essential component of the mammography examination, there is a large variability in applied compression force used (Myklebust et al, 2009), and there is sparse and conflicting guidance available for practitioners as to how to apply compression, for how long, and to what pressure. While authors agree on a slow and steadily increasing application of pressure to reduce pain, the traditional measures of checking that adequate compression has been applied (e.g. blanching of the skin and tautness of the breast) have been questioned (Poulos and McLean, 2004). Various studies have contradicted each other, finding in some cases that compression is often insufficient (Poulos and McLean, 2004), and in others that it is too rigorously applied (Poulos et al, 2003).

Recent pilot work in one mammography unit (Mercer et al, 2011) identified that there is surprising variability between practitioners in the amount of compression applied for similar breast types (inter-practitioner variability). Results showed no correlation between compression force used, breast size, and breast type (BIRADS classification). Practitioners appeared to fall into one of three groups, consistently low, medium or high compressors. Of more concern is that individual practitioners are also inconsistent in their application of compression to similar breast types (intra-practitioner variability).

The literature review highlighted a lack of consistency in formal advice and guidance regarding compression, and a lack of standardisation of compression techniques within clinical practice. No previous studies have attempted to explore the application of compression force from a cultural perspective, whereby the values and norms of mammography practitioners themselves are investigated.

Aims of the study

This project investigates one aspect of compression behaviour via a phenomenological approach, with the primary aim to 'scope the beliefs and values of mammographers that influence their application of compression force in current clinical practice'.

Primary Research Question - What are the personal and professional beliefs and values that influence the application of compression during a mammography examination?

Secondary Research Questions - What formal guidance is currently available to practicing mammographers regarding breast compression? What education and training do trainee mammographers receive within the university and clinical environments regarding breast compression?

Methodology

Following appropriate ethical approval and participant informed consent, semi-structured interviews were conducted with 6 mammography educators and lead clinical trainers covering three different breast screening regional centres and their associated universities. Additionally, focus group interviews were carried out at six centres - 3 at regional mammography 'training' centres and 3 at 'local' screening units. The centres were selected primarily for their geographical spread (South East, Midlands, North West). Each focus group of between 5-8 staff of different grades lasted approximately 60 minutes, and was facilitated by two researchers who invited discussion following a pre-determined set of questions. One researcher was experienced in qualitative data collection, and was a mammography subject specialist.

Data Analysis

The interview data and focus group discussions were captured on a digital recorder and later transcribed and analysed by categorising data and developing themes. The three researchers (two female, one male) involved in data collection were all HCPC registered radiographers and academics. The two women had not experienced mammography as a patient / client.

Data analysis for the educator interviews followed the traditions of a thematic content analysis as described by Burnard (1991). Focus groups were analysed following a phenomenological enquiry approach (Hycner methodology), looking for units of meaning amongst the data. These methods have been widely utilised and extensively cited within health care research, and a number of 'checks and balances' were employed to ensure highest possible levels of validity and reliability. The project adopted the principles of rigorous 'trustworthiness' criteria (Guba and Lincoln, 1989), which can be divided into four discrete areas: credibility, dependability, transferability and confirmability (Murphy and Yielder, 2009).

Findings

Focus groups were carried out at 6 centres, and included a total of 41 participants - 6 assistant practitioners (Band 4), 24 practitioners (Band 6), 10 advanced practitioners (Band 7) and 1 consultant practitioner (Band 8). All participants were female with an average age of 46.5 years (groups varied from a mean of 35 years to 53 years). Participants reported an average of 10.1 years mammography-specific experience (group means from 6.4 years to 13.6 years).

Nine themes have emerged from the data which give a detailed picture of the culture of mammography practice and the often competing influences on the practice of mammography. The themes are outlined within Appendix 1, and are currently being developed into a series of models to explain decision-making in mammography (appendix 2) and the culture of mammography in more detail.

Potential Impact of the study

The study findings are providing a rich understanding of the factors that influence mammographers' decisions to apply compression in a particular way, including how they have adapted their practice following

initial education and training. This is providing an insight into some of the important cultural aspects of mammography. The impact of this work would be most apparent in informing educational curricula and learning and teaching strategies, but we also anticipate that our findings will cause mammographers to question their practice and this may ultimately lead to improved patient care. However the most significant potential impact will be in combining the findings of this study with the wider breast compression project findings, This larger project is investigating compression from an experimental and quantitative perspective, and the qualitative 'lived experience' of the mammographers will be essential in balancing the findings and relating them to 'real' clinical practice.

Reference - http://people.usd.edu/~mbaron/edad810/Phenomenology%20Hycner.pdf

APPENDIX 1 – Essence of Emerging Themes

Significant Meaning / Themes	Essence of Theme
First Impressions	Decision-making (about technique and compression requirements) sometimes takes place before the lady enters the room (request card / questionnaire information) – e.g. if a recall, symptomatic vs screening. Decision-making continues as lady enters the room – immediate assessment and assumptions of size, shape, mobility, age and level of anxiety. Paddle size requirements often determined (and actioned) before lady undresses to preserve dignity. Further 'physical' information is collated as patient undresses. There is a strong acknowledgement of patient variation – both physical and emotional. Explanations and seeking consent are a cue for 'emotional' input to decision-making Handling the breast further influences decision-making regarding positioning and compression. They are assessing 'feel' and 'consistency' – is it a soft or dense breast, or a heavy breast? At this stage they are receiving immediate feedback on patient tolerance to handling, pain and sensitivity.
Assessing appropriate compression	Physical and verbal feedback - Mammographers stated that they can't judge compression from the images. They are working from both visual and tactile feedback – texture and tension, taut breast, evenness of compression across breast, no wrinkles, skin tone changes. They are also receiving feedback from the patient – both verbal and non-verbal. Signs of too much compression include shrivelled skin, blanching skin, pain and patient movement Numerical feedback (compression values) - All focus groups noted that touch, feel and visual feedback are main indicators of correct compression, however different 'cultures' were apparent, with some breast units using numerical pressure reading feedback to inform their compression to a greater or lesser extent. One unit (London 1) had no awareness of their individual compression values, though they understood that the equipment would give an audible warning or fail to expose at certain preset values. Only if an image was inadequate might they investigate the compression value. Another unit (London 2) used 'numbers' as a double check, and often only on 'difficult' clients or where there had been a previous problem. NW 1 unit did have 'department recommended' values to reach, but stressed again that touch and feel were more important. NW 2 unit also were influenced by 'personal' values but they were not necessarily recommended by the department. They were sometimes surprised by the values. Midlands units 1 and 2 were aware of numbers as a check after positioning. Some individuals did have values but they did not directly aim for them.

When to apply more compression	Certain breast types require increased compression - large ladies and breasts that are softer or fatty or floppy. Higher compression may be used as an immobilisation aid - ladies with large but dense breasts, Oblique projection and stereo and with ladies with physical and mental disability Compression influenced also by equipment – higher when using flexible paddles (more 'give' in them), and when in the mobile units (shake) Assessment clinics (eg investigating calcification) and when patients have been recalled for previous poor images, though some note that there is no 'directive' to increase compression. Assessment clinic and symptomatic ladies are more tolerant of compression and this may be why more is applied. However mammographers understand they are treading on a 'fine line' – to squash or not to squash. Noted a large influence of previous technical recalls – fear of TRs increases compression (potentially beyond required amount)
When to apply less compression	Particular breast types may require less compression – dense breasts, very small breasts (difficult to apply) Post surgery, radiotherapy or symptomatic patients may experience more pain – radiotherapy can cause breasts to become 'hard'. Similarly those with a pacemaker of central line inserted are often tender. Augmented breasts / implants – generally less compression (often patient anxiety and worry of damage to implants), but this is questioned due to conflicting evidence Compassion and care is noted for some anxious patients or those with a poor previous experience
Technique	Many mammographers made a strong link between good technique and lower compression. The images must be adequate, but positioning correctly (patient relaxed and shoulders down) and applying compression slowly will help in this regard. Constant feedback from patient during application of compression is essential – they acknowledge that a compliant patient will tolerate more and that individual pain thresholds vary. One unit also mentioned the male patient perspective. <u>Blurring</u> - Causes of blurring are multi-layered and not fully understood – poor positioning (compressing wrong part), too little compression, magnification (affects visualisation of blur), heartbeat and breathing, equipment itself? Observer variation (reporting) and observer tolerance of blur noted by mammographers, this causes confusion. More blurring is noted with mobile vans (due to instability as patients ascend stairs) and with digital units, though the latter is contested by one focus group. Contradictions between practitioners. Confusion following audits of blurring – individuals noted to have higher blur but no advice given to

	reduce it Breathing Techniques - Breath-hold techniques employed by some practitioners in some circumstances to reduce blur, but much uncertainty about its value (little evidence). More breath-hold value noted in the oblique projection, and where movement is more likely (e.g. when compression has to be low). Manual versus pedal compression - Many mammographers reported using the foot pedal to apply most of the compression, then switching to manual compression for the final application of pressure. There were a number of reasons for this, including greater control and sensitivity for the mammographer, and a gentler application of pressure for the client. Newer machines have a larger and more obvious manual compression knob which encourages staff to use it. Anxious patients were generally more accepting of manual, seeing it as more gentle. Visual feedback of compression being applied helped clients to feel in control, compared to 'sneaky' application of pressure via the foot pedal which is unseen by the client. The foot pedal is noisy as it compresses, compared to the manual, so switching to manual may reduce anxiety. Some saw manual as a safety net, as they were less likely to put too much on and have to go back, than with the foot pedal. However some mammographers with RSI noted that manual compression was a problem, and preferred to use the foot pedal. They felt they were able to apply more compression as it is unseen. They noted that application of smooth compression is better than it being jerky. The effect of being right or left-handed was also noted, with the dominant side being more 'forceful'.
Technology	As technology and equipment has changed, the mammographers' techniques have changed with it – more of a subtle drift rather than a conscious decision to change, but this was acknowledged by several staff. There was thought to be little influence of different machines on compression values, though some thought the readouts of some machines were 'suspect' – others though noted that there is regular QA so compression force should be standardised. Some felt that the advent of digital technology resulted in lower compression values and less blur. One of the disappointments of digital technology was that the viewing conditions on mobile vans were inadequate to check for blur, so while TRs for positioning reduced with digital, they did not reduce for image quality. The result of not being able to visualise blur is that the mammographers put on more compression than they felt was necessary, 'just in case'. Tilting paddles had been introduced and these were welcomed as it was easier to compress, though fixed paddles were often felt better for small ladies. Saddle seats have also changed techniques slightly.
Assessment of Patient Psychology and Stereotypes	Empowerment - The overriding belief was that good explanation upfront will result in a more compliant patient. However where there was very high anxiety, a strategy of 'putting the client in control'

	(empowering the patient) was adopted, including ensuring they know they can say 'stop' at any time. They were trying to create a partnership, rather than a professional-client relationship. Other strategies include 'visual' explanations of the action of the compression plates, the use of reassurance by touch (hand between breast and plate), constant two-way feedback, gentle application of compression, and gentle 'coaxing'. However where patient tolerance was poor, there was potential for withdrawal of consent, and mammographers had to know when to stop the examination. However they would ensure the client is making an informed choice, by explaining the benefits of the procedure and the need for compression. Assessment patients / technical recalls - Awareness that assessment clinics have an impact on psychology of clients – they have awareness of potential seriousness of their condition and are in a different frame of mind. This means they are prepared to tolerate more compression and discomfort. More compression is often applied to 'do what they have to do'. First time attenders - Acknowledgement of need for greater explanation and reassurance, and requirement to make this a good experience to facilitate return in the next screening round. However they have limited time for these explanations. They may apply less compression than previous attenders. Previous attenders - In theory explanations can be brief, but acknowledge that some clients may have forgotten important information. Ladies are often more compliant on their subsequent visits, but they compare one visit to another. Often have different experiences of pain with the same lady, and often the same mammographer. This is not always associated with high compression values, and may be a real phenomenon or perceptual, given the 3 year timeframe between attendances. However some of the older ladies do appear to have more breast pain. Mammographers will sometimes tell 'white lies' to reassure an anxious returner – the ladies often comment on 'new' equipment, so mammographers reassure the anxious client that their experience will be better with this equipment. They also apply the compression very subtly, and 'kid' the lady into thinking not much has been applied. Younger patients (age extension) - Younger clients are found to be more knowledgeable and more demanding, asking more questions and requiring through explanations. Anxiety is associated with the fear of being called too early (lack of understanding). They often experience more pain and discomfort due to cyclical breast changes and hormonal influences, and tenderness due to denser breasts. Denser breasts may incur a higher dose penalty. Mammographers would not compromise on compression, just be more gentle in its application. Socio-economic influences - Most units had experience of mobile vans working across very different socio-economic areas. Social factors were found to influence patient expectations and attitude. In more affluent areas the clients often had greater knowledge of the procedure and distrusted the professionals. They often are used to being in control and are not afraid to be assertive and 'stop' the procedure. Sometimes they appear rude to the staff, which can be difficult to deal with. Conversely in less affluent

	areas the clients often had trust in the professional and were more tolerant of the procedure. However the mammographers stress their professionalism in all of these circumstances. Disabled clients - Mammographers have a lot of respect for disabled clients bothering to turn up, despite the challenges. They don't compromise on the examination, and find that disabled clients are very stoical and tolerant. Learning disability clients pose additional challenges, but careful visual explanations help. Ethnicity and language barriers - Language barriers can pose problems for informed consent, but use of sign language can be helpful. Generally non-english speaking ladies are very tolerant and compliant, but sometimes more compression is applied as an immobilisation device as they don't understand that they must not move. Some ladies have not understood the purpose of the wider screening programme, and this makes compliance a problem, with resultant poorer images. Chinese ladies posed a particular problem as their small breasts are difficult to position.
Underpinning influences for compression practice	Ethical decision-making - Mammographers describe a '3 fold' reason for compression – reducing blur, preventing superimposition of tissues, and reducing dose. Communication of the 3 fold reasons to the client improves their compliance. Dose reduction is sometimes used to incentivise the client to accept more compression. Dose is not a significant factor in their decision-making, assuming their unit dose audits are satisfactory. There is some uncertainty regarding the link between compression and dose – while generally the dose should reduce with higher compression, it is noted that higher compression values do not always mean less dose, as it is dependent on size and texture of the breast. However 'ethical' decision-making was discussed – if insufficient compression is applied, it would not be ethical to expose the breast tissue. Conflicting Influences - Mammographers recount underpinning influences on their practice. For most, this includes a potentially conflicting requirement of the need to produce a high quality image (with potential discomfort), with the need to give the patient a good experience to encourage them to return next time. Other influences are an awareness of avoiding complaints (high force=high complaints), and pressure to avoid technical recalls. Patient influences include friends and family, often giving them inappropriate expectations. Limited Time - The restrictions of time are noted by all units, and this limits the explanations and reassurances that they can give to the client. They note this is counter-productive, as they could achieve greater patient tolerance (and improved images) if they had more time for the procedure. Where there is a clinic backlog, the patient receives a poorer experience. Winter is a particular problem if clients are undressing in the room. Lack of time also means they are unable to check each individual image apart from a quick check for positioning.

Culture	Culture of Isolated Practice - Mammographers very rarely had the opportunity to witness the practice of others, being isolated when in the examination room. There were no formal peer observations, and little opportunity for informal observations. Some questioned their own practices. Lack of in-house guidance - Variation in practice is high. A general lack of guidance related to what constitutes 'best practice' is acknowledged, and coupled with lack of opportunity to observe the practice of others, leads to some staff having self-doubts. A lack of guidance and variation from film readers was noted – they have the power to be influential but variation in feedback leads to confusion. Audits have been carried out but the significance of the results have not always been communicated to the staff. Training Culture – The importance of the early training period is not to be underestimated, as this is when most changes to practice are likely, implying that later on they are more resistant to change. The early period is when they are most likely to be exposed to other people's techniques (as their practice is supervised). Experiential learning includes personal experiences of compression (eg. hand or breast), and learning from others. Staff had found their own technique within two or three years of training. Experiential and 'on the job' training was often confusing, and trainees welcomed explanations that they could understand. Training was noted to be on-going to maintain their CPD, and included study days and conferences, and applications training. However as they were more experienced they were more critical of what they were being taught. Advantages and limitations of using different trainers were acknowledged, with perhaps the best model being one trainer early on, then exposed to a range of supervisors. The initial trainer was pivotal in the training process, establishing good or bad habits early on. Many were initially taught to compress to a minimum value (which they subsequently decided was inappropriate). Trainees were influenced heavily by their supervisors and local custom and practice, but acknowledged there was a limited evidence base. There was acknowledgement of the influence of different training centres and department cultures. Most agreed that inexperienced mammographers and trainees tend to be too gentle and give inadequate compression, though one had noted that following feedback they can over-compensate and become 'too rough'. Inexperienced staff followed objective (protocol-driven) decision-making processes, but these became more intuitive with experience. Trainees find it daunting, both touching an intimate body part of a client, and then having to compress it – they are overwhelmed with the need not to hurt their lady. Trainees want to be told compression values. Variation in compression practice - Variation in practice of compression is noted, both between practitioners and also assumed that a single practitioner may vary her practice. Some awareness of staff labelled as 'high compressors' or 'low compressors' – this is particularly noticeable in one unit where related research is taking place, but also noted to a lesser extent in other units, where some staff had been labelled as 'hurters'. These seemingly very high compressors were never questioned about their practice.

	Similarly the ‘low’ compressors were anecdotally thought to have achieved good images. However a lack of evidence about ‘correct’ compression means that the staff cannot identify what is acceptable or unacceptable variation in compression values. Variation is not necessarily bad practice – some had a strong belief in their professionalism and that they will do the right thing in each situation. Also noted was variation in other aspects of practice, including compassion, empathy, communication ability. Empathy was increased when a mammography had experienced having a mammogram herself. Audits identified more variation that mammographers had imagined. However some staff assumed there would be very little variation in practice, because they had all been trained in one unit and this implied consistency of approach. They also stated that audits showed that variation was minimal in some units.

Notes

- This is based on the collective reports of relatively experienced practitioners.
- It is focussed primarily to the screening situation, rather than symptomatic patients
- Less experienced staff are likely to respond differently (often fearful of applying too much compression)
- Training and department cultures will influence compression behaviour (eg. influence of numerical values; 'fear factor' of technical recalls and blurring)
- Equipment factors also may influence compression behaviour (over-compensate for inadequate viewing conditions for blur; potential 'wobble' on vans)

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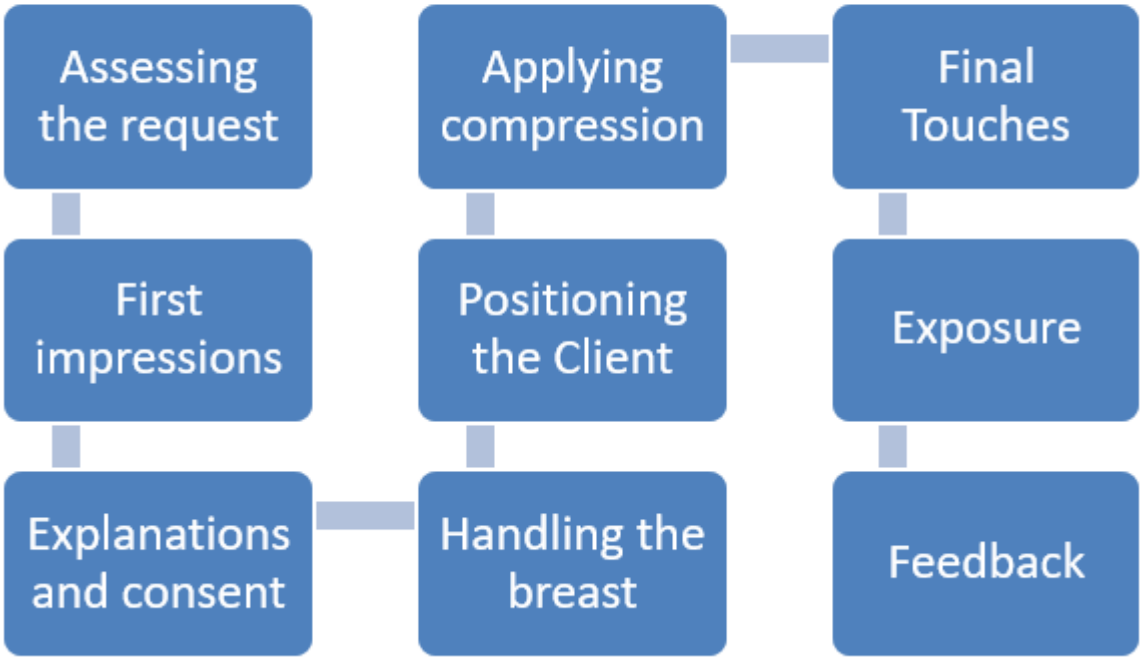
The nine stages of decision-making during a mammography examination



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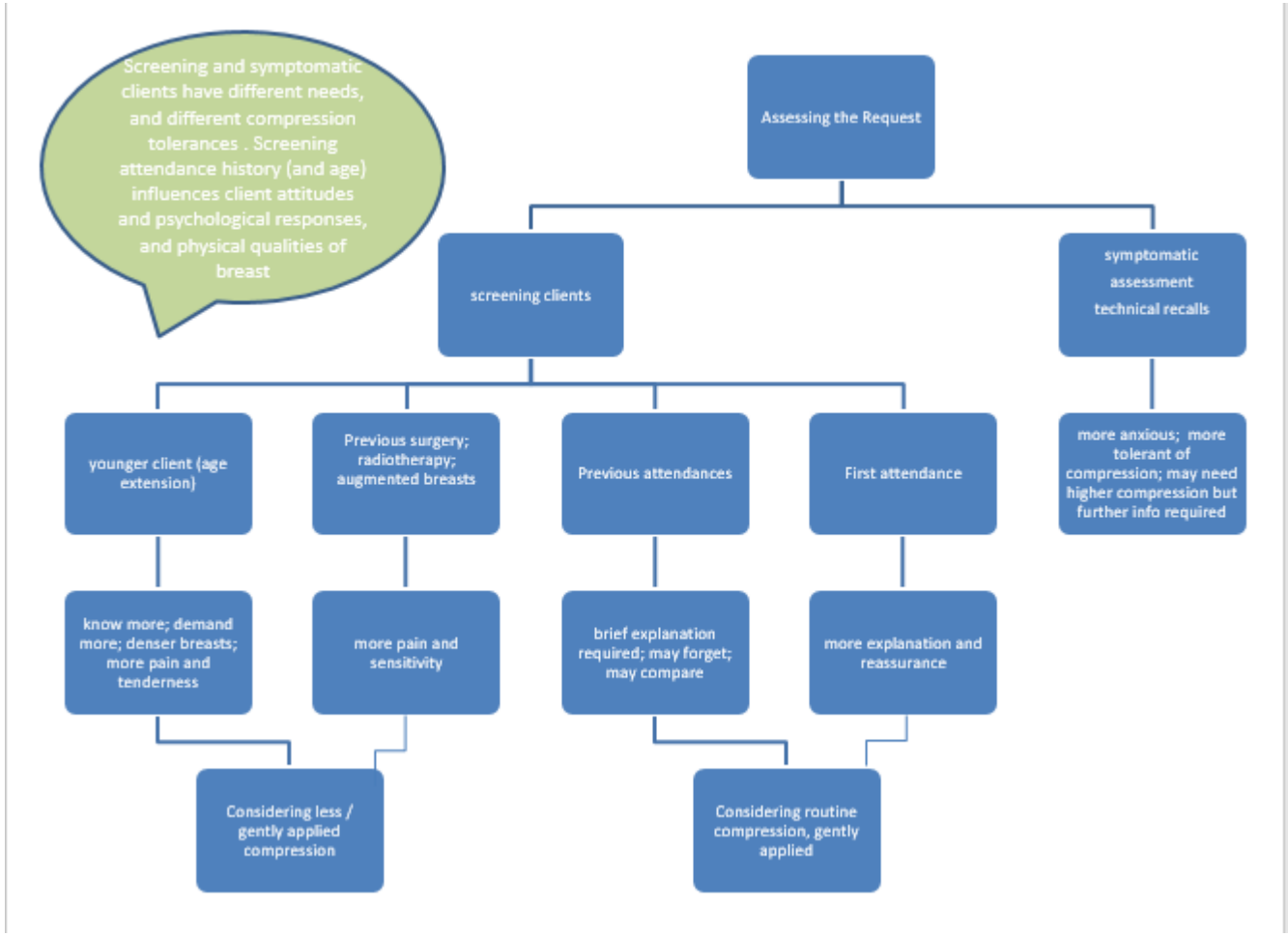
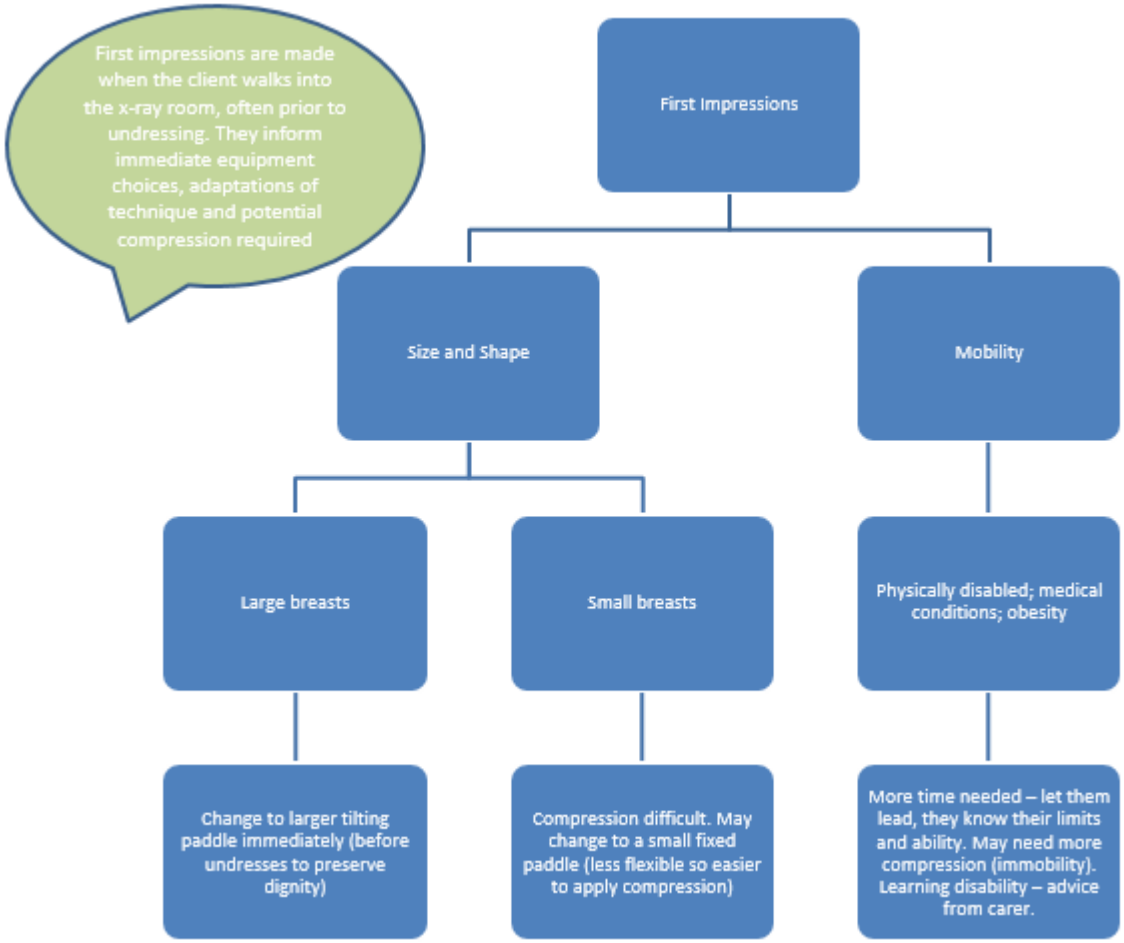
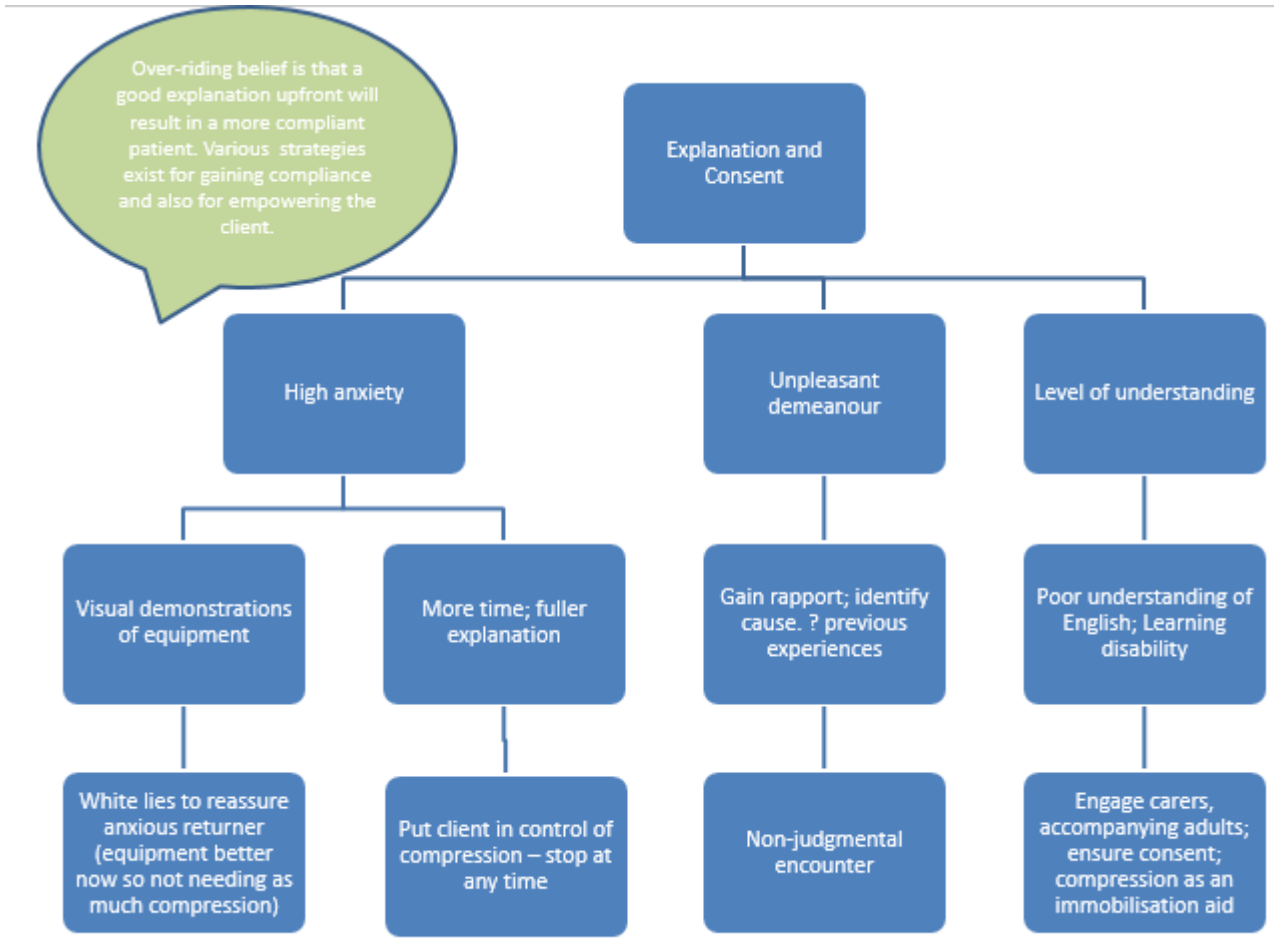
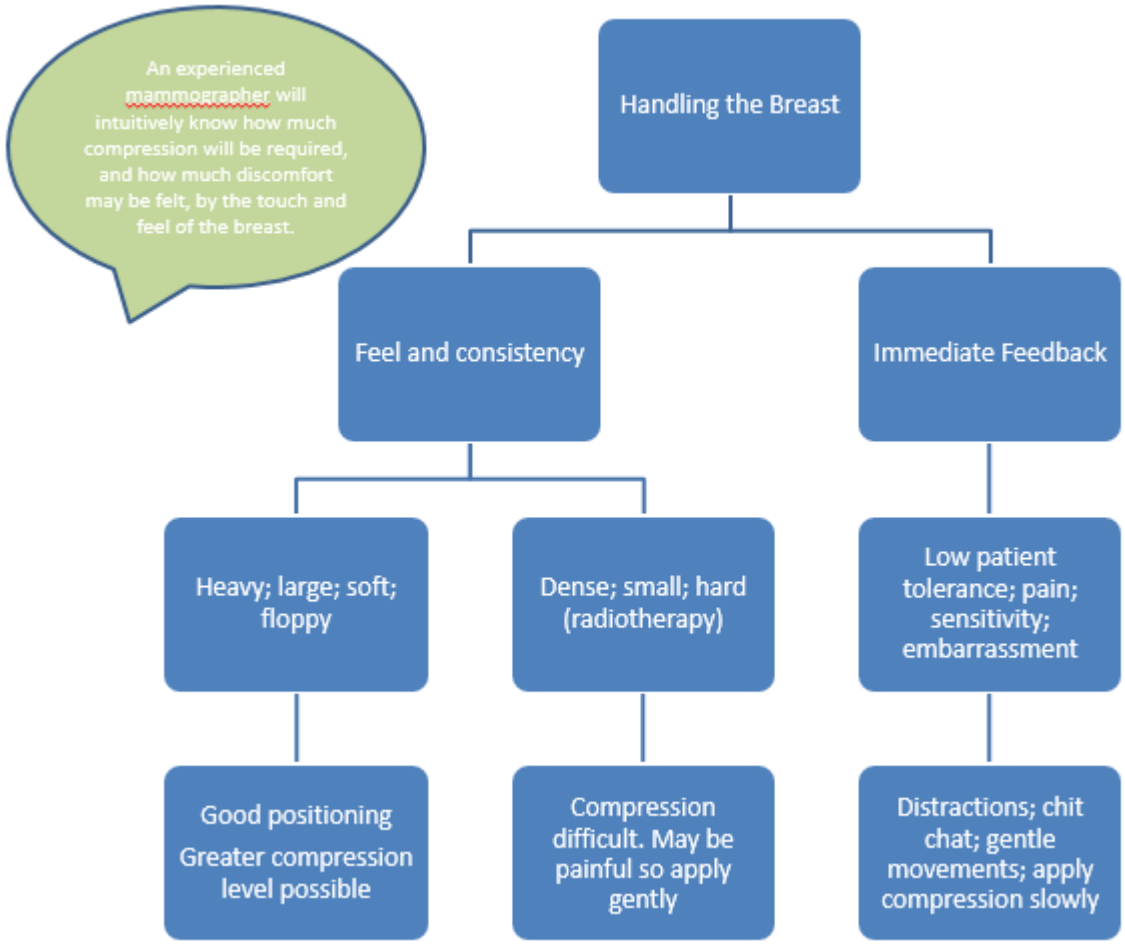

Screening and symptomatic clients have different needs, and different compression tolerances . Screening attendance history (and age) influences client attitudes and psychological responses, and physical qualities of breast
Assessing the Request
screening clients
symptomatic assessment technical recalls
younger client (age extension)
Previous surgery; radiotherapy; augmented breasts
Previous attendances
First attendance
more anxious; more tolerant of compression; may need higher compression but further info required
know more; demand more; denser breasts; more pain and tenderness
more pain and sensitivity
brief explanation required; may forget; may compare
more explanation and reassurance
Considering less / gently applied compression
Considering routine compression, gently applied

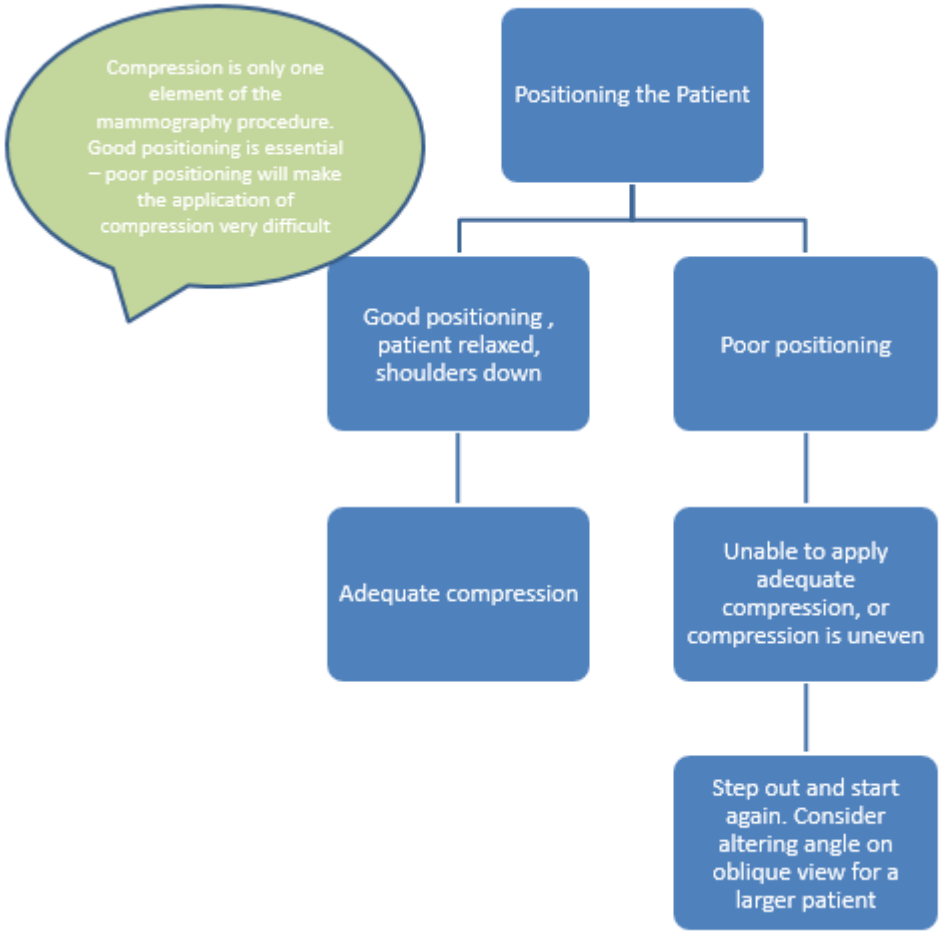

First impressions are made when the client walks into the x-ray room, often prior to undressing. They inform immediate equipment choices, adaptations of technique and potential compression required
First Impressions
Size and Shape
Mobility
Large breasts
Small breasts
Physically disabled; medical conditions; obesity
Change to larger tilting paddle immediately (before undresses to preserve dignity)
Compression difficult. May change to a small fixed paddle (less flexible so easier to apply compression)
More time needed – let them lead, they know their limits and ability. May need more compression (immobility). Learning disability – advice from carer.


Over-riding belief is that a good explanation upfront will result in a more compliant patient. Various strategies exist for gaining compliance and also for empowering the client.
Explanation and Consent
High anxiety
Unpleasant demeanour
Level of understanding
Visual demonstrations of equipment
More time; fuller explanation
Gain rapport; identify cause. ? previous experiences
Poor understanding of English; Learning disability
White lies to reassure anxious returner (equipment better now so not needing as much compression)
Put client in control of compression – stop at any time
Non-judgmental encounter
Engage carers, accompanying adults; ensure consent; compression as an immobilisation aid

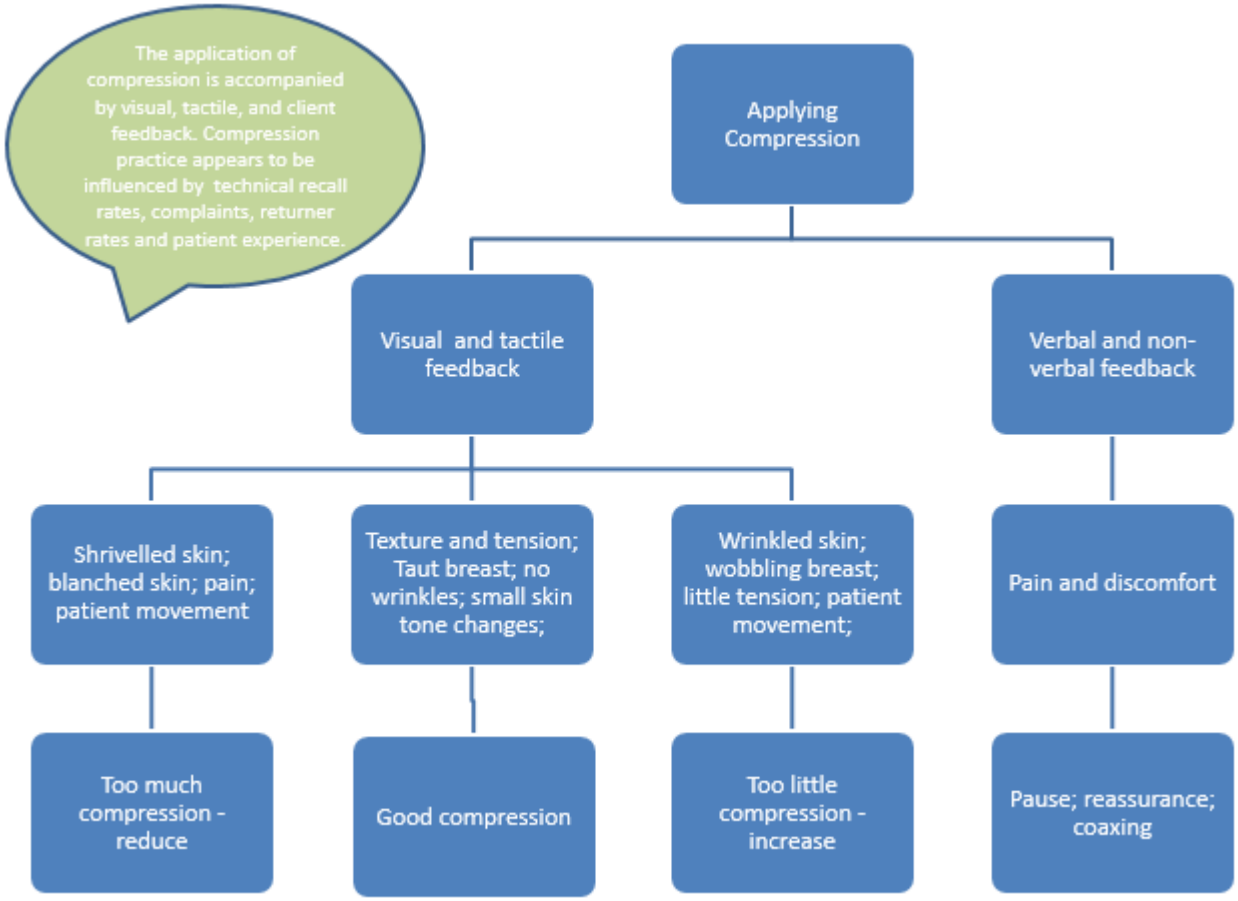
5/11


An experienced mammographer will intuitively know how much compression will be required, and how much discomfort may be felt, by the touch and feel of the breast.
Handling the Breast
Feel and consistency
Immediate Feedback
Heavy; large; soft; floppy
Dense; small; hard (radiotherapy)
Low patient tolerance; pain; sensitivity; embarrassment
Good positioning
Greater compression level possible
Compression difficult. May be painful so apply gently
Distractions; chit chat; gentle movements; apply compression slowly

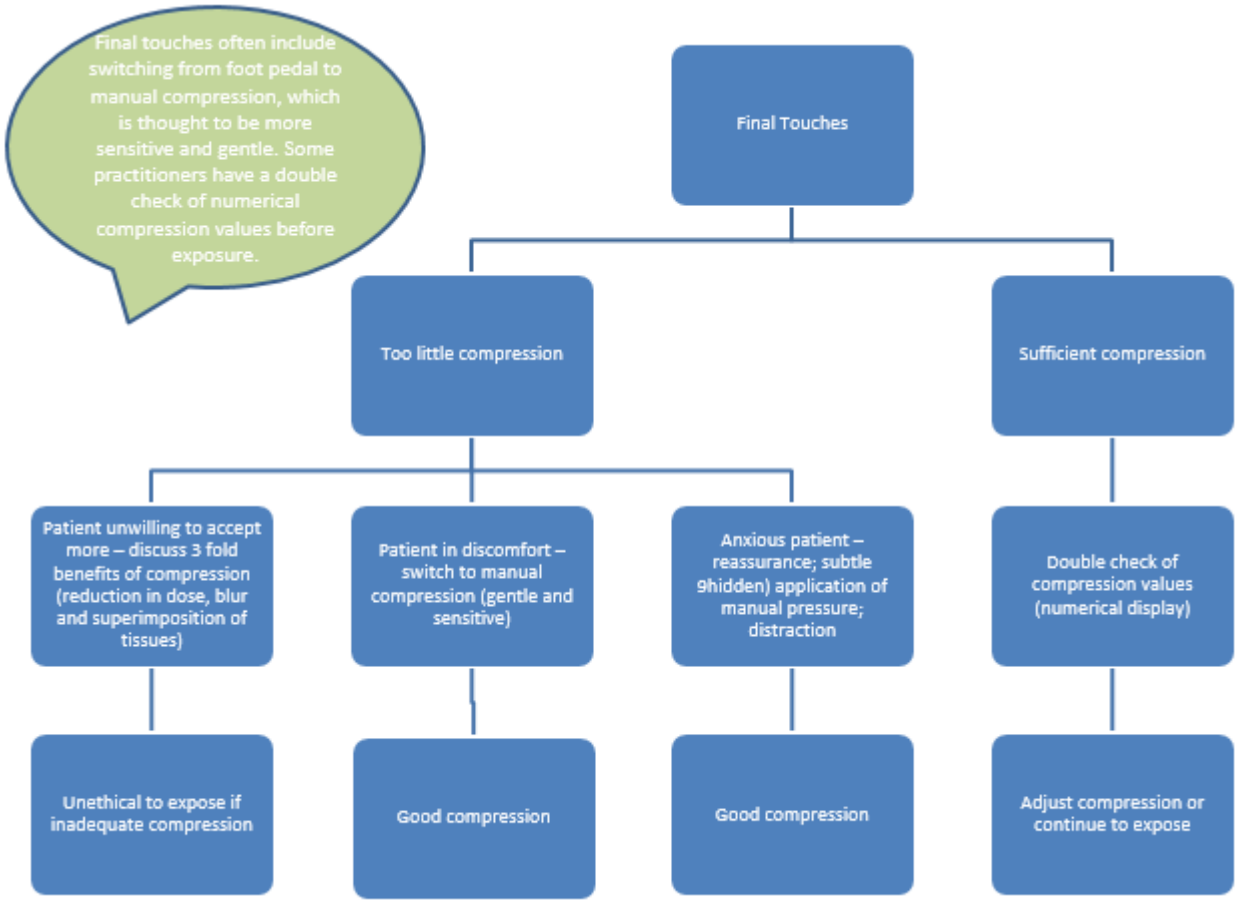
6/11

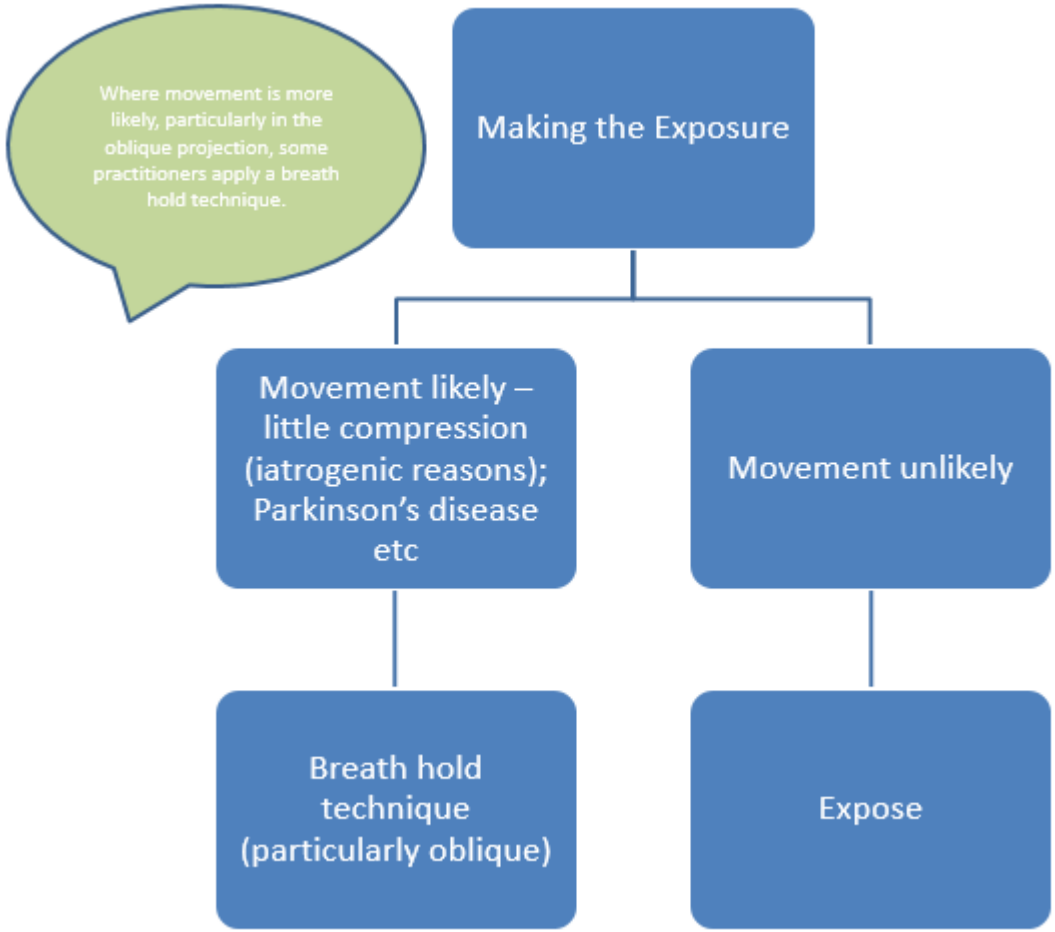

Compression is only one element of the mammography procedure. Good positioning is essential – poor positioning will make the application of compression very difficult
Positioning the Patient
Good positioning , patient relaxed, shoulders down
Poor positioning
Adequate compression
Unable to apply adequate compression, or compression is uneven
Step out and start again. Consider altering angle on oblique view for a larger patient

7/11

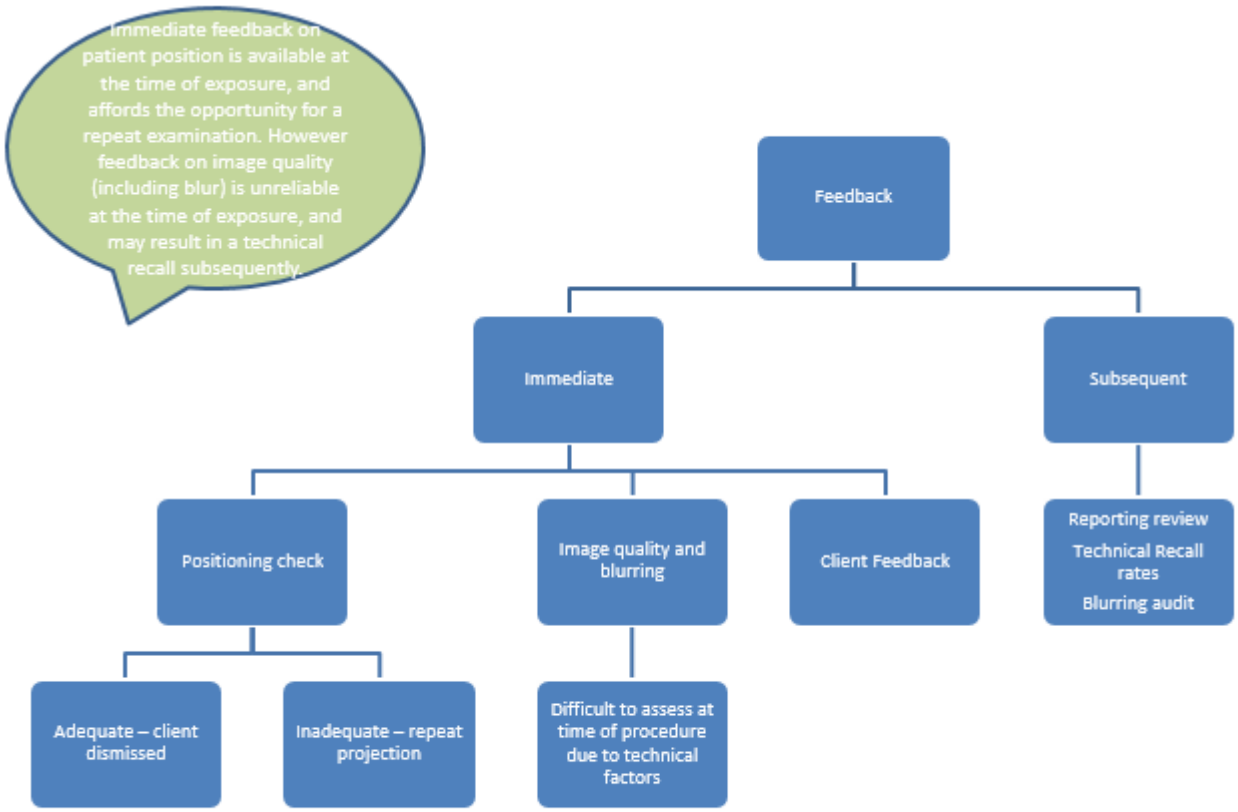

The application of compression is accompanied by visual, tactile, and client feedback. Compression practice appears to be influenced by technical recall rates, complaints, returner rates and patient experience.
Applying Compression
Visual and tactile feedback
Verbal and non-verbal feedback
Shrivelled skin; blanched skin; pain; patient movement
Texture and tension; Taut breast; no wrinkles; small skin tone changes;
Wrinkled skin; wobbling breast; little tension; patient movement;
Pain and discomfort
Too much compression - reduce
Good compression
Too little compression - increase
Pause; reassurance; coaxing

8/11


Final touches often include switching from foot pedal to manual compression, which is thought to be more sensitive and gentle. Some practitioners have a double check of numerical compression values before exposure.
Final Touches
Too little compression
Sufficient compression
Patient unwilling to accept more – discuss 3 fold benefits of compression (reduction in dose, blur and superimposition of tissues)
Patient in discomfort – switch to manual compression (gentle and sensitive)
Anxious patient – reassurance; subtle 9hidden) application of manual pressure; distraction
Double check of compression values (numerical display)
Unethical to expose if inadequate compression
Good compression
Good compression
Adjust compression or continue to expose


Where movement is more likely, particularly in the oblique projection, some practitioners apply a breath hold technique.
Making the Exposure
Movement likely – little compression (iatrogenic reasons); Parkinson's disease etc
Movement unlikely
Breath hold technique (particularly oblique)
Expose

10/11


Immediate feedback on patient position is available at the time of exposure, and affords the opportunity for a repeat examination. However feedback on image quality (including blur) is unreliable at the time of exposure, and may result in a technical recall subsequently.
Feedback
Immediate
Subsequent
Positioning check
Image quality and blurring
Client Feedback
Reporting review
Technical Recall rates
Blurring audit
Adequate – client dismissed
Inadequate – repeat projection
Difficult to assess at time of procedure due to technical factors