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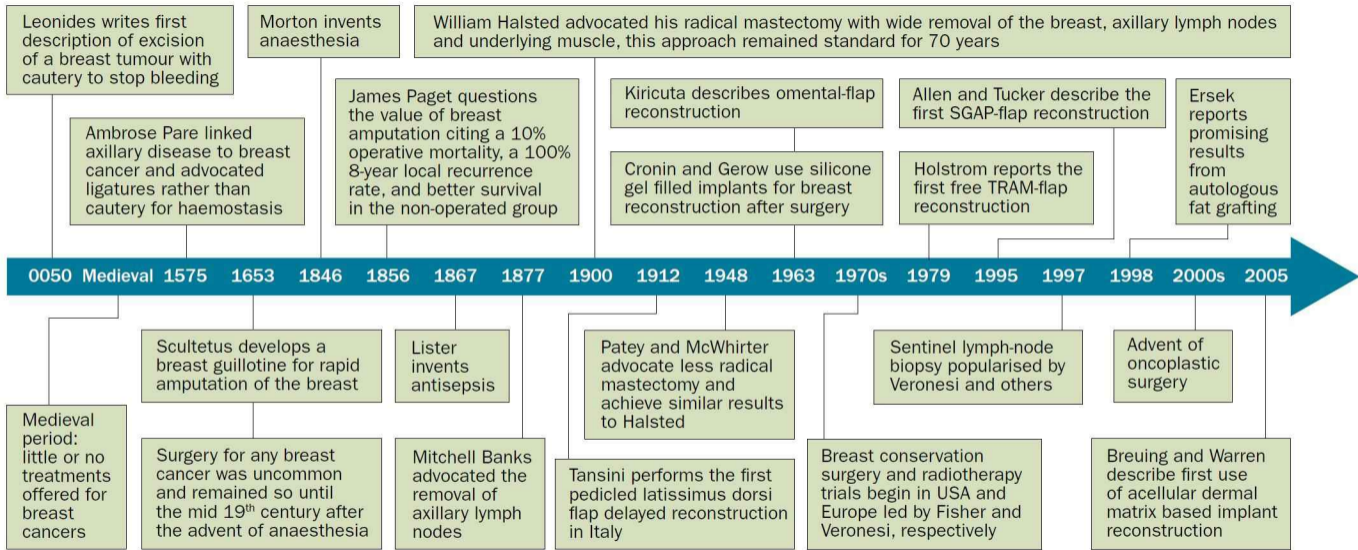
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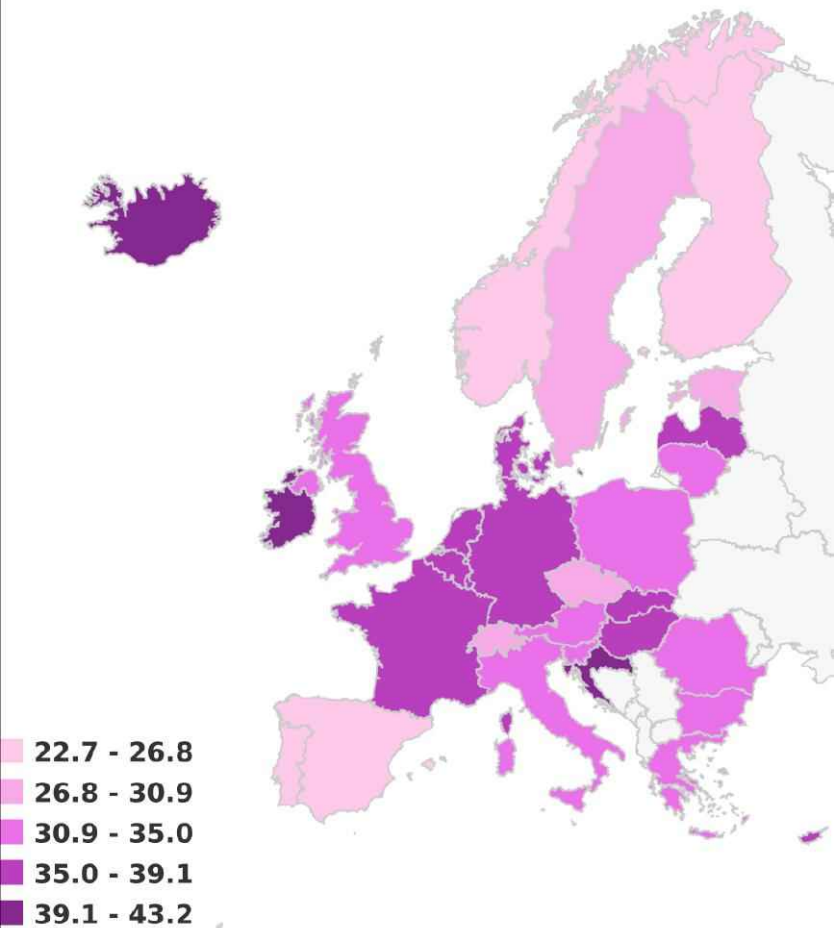


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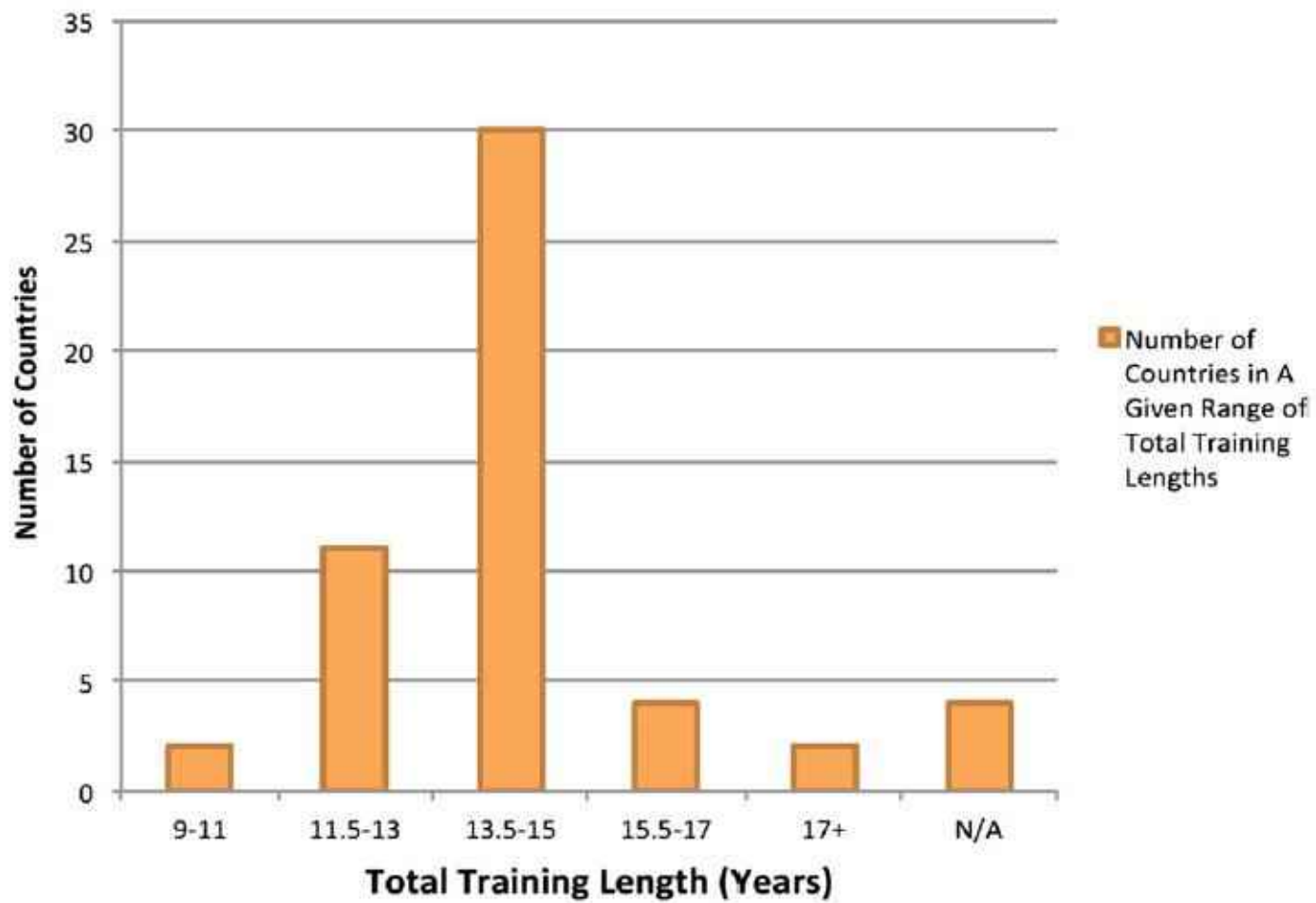
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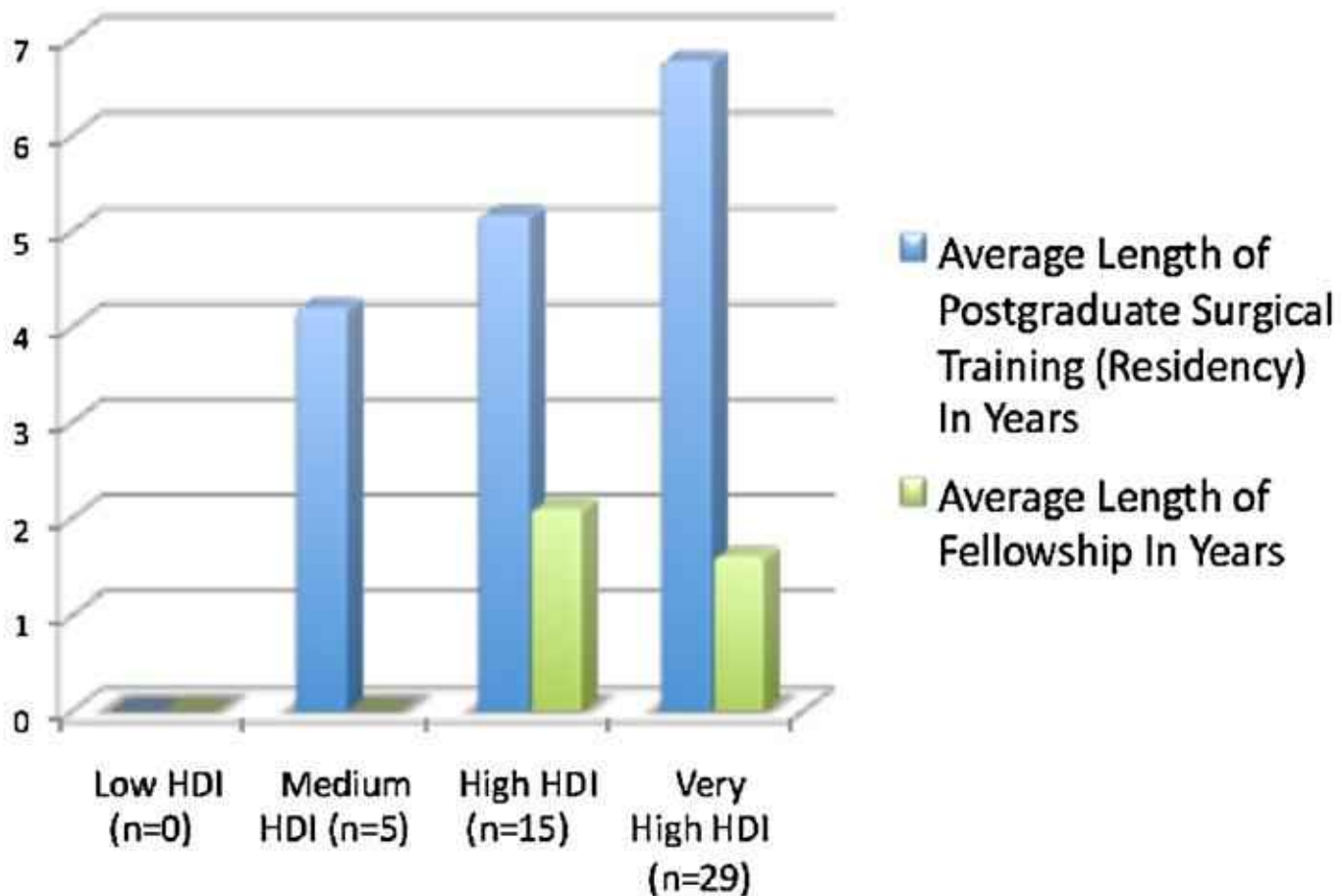




Europe Region Surgical Training Lengths



Europe Region Surgical Oncology Training



Education and Training in Breast Cancer Surgery in Europe

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Short Title:

Education and Training in Breast Care

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1 **Abstract**

2 **Background**

3 The substantial increase in the complexity of breast cancer care in the last few decades has resulted
4 in significant improvements in survival rates and also in the quality of life of breast cancer survivors.
5 However, across Europe there are variations in outcomes and access to the latest techniques. Whilst
6 much of this variance is due to differences in health economies between European member states,
7 training variation may also play a part. Training in breast cancer surgery varies greatly across
8 Europe, not only in its basal discipline (general surgery, gynaecology or plastic surgery) but also in the
9 length of training and whether there is any requirement for specialist training. Several countries
10 have been leading the way in training breast specialist surgeons (the USA, the UK, Australia and New
11 Zealand) with dedicated 1 or 2 year fellowships either within or in addition to standard training.
12 Access to such training is limited and consequently many women in Europe are still treated by
13 generalists, potentially denying them access to the best care. This paper reviews the issues
14 surrounding training provision in breast surgery and some of the challenges which need to be
15 addressed to improve the current situation.

16 **Summary**

17 Breast surgery training in Europe is of variable quality and duration which may result in variations in
18 the quality of care received by patients with breast cancer. Specialist training standards are urgently
19 required which should be adopted by all European member states. Excellent models are available in
20 the USA, the UK and Australia and New Zealand on which to base this training.

21 **Key messages**

22 The quality of training in breast surgery needs to be upgraded and harmonized across Europe.

23

24

25

26 **Introduction**

27 Breast cancer treatment has evolved substantially in the past 40 years resulting in an
28 improvement in both survival rates and the quality of life of breast cancer survivors.
29 Improvements have been across the spectrum of therapies, including diagnostics (both
30 imaging and pathology), surgery, radiation oncology, medical oncology, genetics and
31 psychological support. Perhaps more than with any other cancer, treatment is multimodal
32 and cross disciplinary, requiring multidisciplinary expertise and interdisciplinary training[1].
33 Surgery in particular has seen a revolution in practice over the past 40 years. In the 1970s
34 there was only one operation for breast cancer: mastectomy and full axillary node clearance.
35 In present day practice, as a result of surgical de-escalation, there have been progressive
36 increases in rates of breast conservation surgery[2] and sentinel node biopsy[3]. More
37 complex axillary management algorithms in primary surgery and neoadjuvant settings (such
38 targeted axillary dissection[4]) have further added to the need for advanced level training.
39 Similarly, the roll out of screening, necessitating a range of different guided breast
40 conservative surgeries[5], such as radioactive seeds, intraoperative ultrasound and magnetic
41 seeds, has all contributed to a substantial increase in the complexity of oncologic breast
42 surgery. Running parallel to this has been a shift towards preservation of the aesthetics of
43 the breast with the rise of post-mastectomy reconstruction and oncoplastic conservation
44 techniques. As a result there are whole atlases[6] and algorithms[7] for different oncoplastic
45 conservation techniques to suit every breast size, shape and tumour location. In addition the
46 range of techniques for total breast reconstruction is expanding, ranging from an expanding
47 armamentarium of free and pedicled tissue transfers to the use of implants and biological
48 and synthetic meshes. The temporal progression of breast surgery is shown in figure 1[8].
49 The modern breast surgeon must therefore have a wide range of surgical techniques at their
50 disposal. Add to this the requirement to integrate and coordinate an expanding range of
51 increasingly sophisticated and effective adjuvant and neo-adjuvant therapy regimes and it is
52 clear that breast surgery should no longer be provided by a generalist, but by a specialist
53 surgeon[9]. There is evidence that surgeon specialization is associated with both enhanced
54 survival outcomes (up to 8% improvement at 10 years)[10] and higher levels of patient
55 satisfaction[11]. There is also evidence that case load correlates positively with outcomes,

56 again supporting specialization at both surgeon[12] and hospital level[13]. Such skills
57 require adequate training, certification and ongoing re-accreditation to ensure practitioners
58 keep up to date with the rapid pace of change in this discipline. Whilst some countries have
59 moved ahead in this regard, developing training programs, curriculae and examinations,
60 many countries have no specific breast surgery training. This means that many women still
61 receive care from a non-specialist and may be denied the full range of modern treatment
62 options and consequently suffer inferior outcomes. Breast cancer survival outcomes
63 across the EU are highly variable, ranging from 74% 5 year survival in Eastern Europe to 85%
64 in Northern Europe (figure 2)[14]. The causes of this variance are complex, reflecting
65 differences in screening, breast awareness and health service funding variance and access to
66 the latest therapies. However, training variation is probably also a factor.

67 Globally, training in surgery varies markedly in duration and the level of specialization
68 (uptake of specialist fellowships for example). A recent global survey of cancer surgery
69 training found wide variation between countries globally and within Europe. Training
70 duration in Europe varied between 9 and 17 years and the median duration of specialist
71 fellowship training varied from 0 to 2 years (figures 3a and 3b[15]).

72 A recent survey of breast surgeons across Europe[16] revealed wide variation in training and
73 specialization in breast surgery with 12% of surgeons treating fewer than 25 cases per year
74 and only a third of surgeons self-identifying as breast specialists. Whilst 77% have had some
75 focused Oncoplastic training, 8% had none at all.

76 At present breast surgery as a specialist discipline does not exist in any country and
77 practitioners are usually trained in general, gynaecological or plastic surgery. In most
78 countries such generalist training will last between 4 and 6 years, resulting in certification in
79 general, gynaecologic or plastic surgery. The breast component of this training will be
80 variable and may be as little as a few months in a non-specialist breast unit. This
81 certification gives the holder a license to treat breast cancer and many women are treated
82 by surgeons treating very small numbers of cases per year, sometimes outside of a formal
83 multidisciplinary team[16].

84 **Breast surgery as a specialist discipline**

85 In the UK, the General Medical Council (GMC) is currently reviewing the status of breast
86 surgery and whether to recognize it as a specialist discipline in its own right or as a
87 recognized sub-specialism of general surgery requiring a specific training pathway distinct
88 from other areas of practice. At present, breast surgery is classed as a special interest
89 within general surgery. The end of training examination (FRCS) permits a special interest to
90 be designated and the exit exam tailored to this interest. Progress towards breast
91 specialization in the UK has seen the majority of UK breast surgeons move away from
92 provision of emergency surgery[17] and the establishment of a National Oncoplastic Training
93 (TIG) fellowship scheme in 2002 which has trained 9 fellows per year via a centrally funded
94 and appointed program[18]. The purpose of this was to pump prime the UK surgical
95 workforce with skilled Oncoplastic trained surgeons who would themselves cascade their
96 skills across all UK units as they themselves became trainers. This system however is too
97 numerically small to include all UK trainees with a breast interest. This means that many
98 surgeons complete their certified training without acquiring the necessary skills set and have
99 to undertake post-certification fellowships which are unregulated. Much of the 6 year
100 training time is spent acquiring the full range of general surgery skills which will not be
101 necessary for breast practice and may be viewed as wasted training time, largely providing
102 emergency service for the units they work in. As a result, the UK training authorities and
103 the GMC are undertaking a review of breast surgery training with a view to creating either a
104 hybrid model of training, giving more weight to specialized breast training and certification,
105 or recognizing breast surgery as a separate surgical discipline. The current system is
106 recognized as flawed and the majority of UK trainees with a designated breast interest feel
107 that their breast surgery training is impeded by the necessity of general surgery training and
108 would prefer a more specialized training pathway[19].

109 **Global Training Models**

110 Elsewhere in Europe in 2019 it is still the case that the majority of women are treated by a
111 non-specialist trained general or gynaecological surgeon, sometimes with input from plastic
112 surgery to provide reconstructive and Oncoplastic input. Many women are therefore
113 denied access to the latest advances in care, a fact which has drawn condemnation from
114 patient advocacy groups. Until breast surgery is recognized as a specialist discipline this is

115 not likely to change because most sovereign member states of the EU regulate the training
116 of surgeons within historically well-defined groups: general surgery and gynaecology.
117 Accreditation is therefore as a general or gynaecological surgeon and there is no
118 requirement and often no mechanism for the attainment of these specialist skills. Within
119 these disciplines, European law (European Specialist Medical Qualifications Order 1995[20])
120 recognises and sets professional minimum standard of doctors across Europe, (which
121 permits freedom of movement) but as breast surgery is not recognised as a discipline in its
122 own right, there is no such requirement at the high level modern breast surgery requires. A
123 directive from the EU, in support of some degree of specialization, would be helpful and the
124 European Commission has recently taken an interest in a range of issues relating to the
125 quality and harmonization of breast care provision across Europe, of which training is hoped
126 to be one element[21]. Recognition of breast surgery as a specialist discipline would be very
127 helpful in moving this forwards.

128 Global models of breast surgery training are varied and address this issue with varying levels
129 of success. Some of these models are reviewed below.

130 **The United States of America**

131 In the USA breast surgery is part of general surgery but is recognized as a sub-specialism.
132 Fellowships in breast surgery are available. These are not mandatory and many women still
133 undergo treatment for breast cancer with non-specialist surgeons. In the majority of cases,
134 breast oncology surgery is performed by general surgeons and reconstructive surgery by
135 plastic surgeons, usually working closely together. The American Society of Breast Surgeons,
136 the American Society of Breast Diseases and Society of Surgical Oncology (SSO) have
137 developed guidelines for breast fellowship training and numerous fellowships are available
138 to provide high level training for those wishing to do so[22]. The SSO developed its first
139 breast fellowship program in 2004 and currently there are over 50 US centres offering over
140 60 breast fellowships. The scheme has a defined curriculum and sets out its training
141 requirements in detail[23]. Candidates are Nationally ranked and matched via a central
142 process. The centres themselves have to be quality assessed and re-accredited every 5
143 years. The feedback from the fellows is excellent[24].

144 **United Kingdom**

145 In the UK in 2002 a new national training scheme commenced. Trainees with an interest in
146 breast surgery with a background in general or plastic surgery were placed in centrally
147 approved, high quality training centres for 12 months to acquire high level Oncoplastic skills.
148 The initiative was established by the Association of Breast Surgeons (ABS), The British
149 Association of Plastic and Reconstructive Surgeons (BAPRAS) and UK training authorities
150 which provided full funding for these posts. The intention was that these individuals would
151 then pass on this skill set and upskill the entire breast surgery workforce over the
152 subsequent decade. Nearly 200 fellows have now completed the scheme and the majority
153 of UK breast units now provide Oncoplastic services so women may undergo both their
154 oncology and reconstructive surgery in a seamless way. As a result, rates of immediate
155 breast reconstruction have increased from 10 to 25% over the same time period[25],
156 although rates are highly variable between UK regions[26]. Certification in breast surgery as
157 a distinct entity is not yet a reality, however the UK final training certification (certificate of
158 completion of training in general surgery) requires passing the FRCS examination which
159 allows the candidate to specify a breast special interest wherein the exam focuses on breast
160 surgery to a higher level. There is the option to undertake an on-line UK master's degree in
161 breast surgery, but the degree course is quite costly[27]. There is presently discussion with
162 the medical regulator (the General Medical Council, GMC), to allow breast surgery to be
163 partially, or fully, separated from general surgery part way through training to allow all
164 breast trainees, not just TIG fellows, to have more of their senior training focused on high
165 level breast surgery skill acquisition. The preferred option for most UK breast surgical
166 trainees is to work towards full separation in the future with breast recognized as a separate
167 specialty[17].

168 **Australia and New Zealand.**

169 In Australia and New Zealand breast surgery is part of general surgery but in 2010, in
170 recognition of the increased complexity of breast surgery, a fellowship scheme was
171 established to provide 1 or 2 year training posts on Oncoplastic surgery[28]. This was led by
172 'Breast Surgeons of Australia and New Zealand' (BreastSurgANZ). These posts are centrally
173 advertised and appointed with up to 30 units offering training posts[29]. The first year of a
174 2 year program covers the intermediate level skills such as mastectomy and axillary

175 clearance and the second year covers higher level Oncoplastic and reconstructive surgery
176 based around a standardized curriculum. Fellows have access to training days, covering
177 elements of Oncoplastic surgery, ultrasound and communication skills. At present there is
178 no exit examination.

179 In 2016 an optional on-line course, based on a standard curriculum, was launched to support
180 these fellowship posts[30]. This was developed by the University of Sydney and may be
181 taken to certificate or masters level, although it is quite costly, which is a deterrent to higher
182 uptake rates amongst fellows. Feedback from trainees has been largely positive[30, 31],
183 although there are clearly some issues with variation between the different training
184 posts[30].

185 **Portugal**

186 At present, breast fellowship training is limited in Portugal with few fellowships available at
187 present (for example a 3 to 6 month breast fellowship is available at Champalimaud in
188 Lisbon) but plans to develop a specific curriculum and examination are in development but,
189 to date, specialist training is not mandatory [32].

190 **France**

191 Breast surgery is usually provided by gynaecologists. France has well developed Oncoplastic
192 surgery training which usually follows completion of training in Gynaecology. There is no
193 formal examination.

194 **Canada.**

195 Oncoplastic and specialist breast surgery training is not well developed in Canada with just a
196 handful of fellowships in existence[33], however these are of high quality.

197 **Germany**

198 There are two levels of regulation. The first is that of the German Cancer Society, which
199 mandates that all surgeons who treat breast cancer in a certified center, (which covers about
200 90% of all cases of breast cancer) must treat at least 50 primary cases per year. In addition
201 the German Association of Reconstructive Surgery in Gynecology (AWO-Gyn) specifies that a

202 certain number of cases need to be documented in a log book (including oncoplastic and
203 reconstructive techniques) and there is also a practical examination.

204 As can be seen from the above, provision of high quality training is possible but review of
205 training across all European countries shows that the majority have no specific training
206 system for breast surgery as shown in table 1 (reproduced with permission from Rubio et al
207 2019).

208 **Examination and other formal qualifications in breast surgery.**

209 ***The UEMS examination.***

210 In 2010, a joint initiative by the Union of European Medical Specialists (the UEMS), the
211 European Society of Breast Cancer Specialists (EUSOMA) and the European Society of
212 Surgical Oncology (ESSO) led to the creation of a European Breast Exam. The exam is
213 designed to test a candidate's expertise in breast cancer management at the level of
214 completion of training. The exam has 3 parts:

- 215 • An initial eligibility assessment to ensure that the candidate has undergone at least 2
216 years of specialist training in a high quality breast unit, has undertaken a specified
217 number of index procedures and has published or presented a paper related to
218 breast disease management.
- 219 • A written examination in the format of a multiple choice exam with 50 questions
220 which may be taken at a range of locations on-line.
- 221 • An oral examination which tests higher order skills in both the management of
222 complex cases and also the interpretation of research data to ensure candidates are
223 able to understand the latest developments in practice.

224 The popularity of the exam has been increasing with up to 70 candidates per year sitting for
225 the exam. The exam has a detailed syllabus[34] which is updated every 2 years and a
226 textbook that mirrors the curriculum[35]. Examiners are drawn from senior members of the
227 European Breast Fraternity. At present the exam is not recognized for certification purposes
228 in any European country, for the simple reason that breast surgery is not a recognized
229 specialty at present, although it is accepted as evidence of expertise by in some jurisdictions.
230 The hope is that formal specialist recognition of the exam will eventually occur in some

231 member states and in the interim, increasing numbers of breast surgeons will wish to sit the
232 exam to increase their knowledge and testify to their expertise.

233 ***University qualifications***

234 There are several Universities offering degree courses focused on breast surgery/breast
235 cancer management. The two most widely established are those of the University of
236 Ulm/European School of Oncology (ESO) Certificate of Competence in Breast Care and the
237 University of East Anglia Master's degree course.

238 ***Continuing Medical Education Certification***

239 The majority of European countries operate mandatory requirements for doctors to show
240 evidence of continuing professional development, although only a minority mandate full re
241 accreditation. Because breast surgery is not yet a recognized discipline in surgery, there is
242 no requirement for any specific educational content that relates to breast surgery. There
243 are numerous good quality courses available across Europe and Globally.

244 Each year there are many high quality breast congresses which may focus on either show-
245 casing the latest research, educational updates on best practice or a combination of the
246 two. These are often focused on the oncological aspects of care or on Oncoplastic and
247 reconstructive elements and it is advised that both are necessary for best practice. Whilst
248 many are lecture based, there are also many excellent hands on courses, some of which
249 utilize cadavers to allow participants to try out the latest techniques.

250 **European Breast Surgery Initiative (BRESO)**

251 In recognition of the above difficulties, several European societies (ESSO, ESO, EUSOMA,
252 EUROPA DONNA, EUBREAST, the UEMS and EICBC) have come together to develop a
253 standard pan-European curriculum for both knowledge and skill requirements for a fully
254 trained breast surgeon. This initiative has been labeled the European Breast Surgery
255 Initiative, BRESO. It is hoped that in the next few years this collaboration will result in
256 widespread adoption of these standards and so improve the quality of care received by all
257 European patients with breast cancer. The group will lobby for regulatory changes to
258 improve the harmonization of training in breast surgery across Europe, increase the uptake
259 of fellowships and specialist exams and try to develop a network of European training

260 fellowships similar to those offered in the USA, UK and Australia and New Zealand. Clearly
261 these are ambitious goals but, based on the success and impact of existing models, worthy
262 of pursuing.

263 **Conclusion**

264 As can be seen from the above, training in breast surgery across Europe is highly variable
265 and generally poorly regulated with a few notable exceptions (the UK, Germany, France).

266 This raises concern about the experience and expertise of surgeons delivering breast care
267 and the impact this may have on patient experience and oncological outcomes. Regulation
268 across Europe is challenging as the EU does not have a legislative role in controlling or
269 harmonizing training other than at the level of the undergraduate degree and at the level of
270 completion of training in general surgery or gynaecology. At these two points training
271 should be equivalent, but the level of breast expertise expected within these much broader
272 specialties is poor and inadequate for the demands of modern breast practice. However
273 because breast surgery is not recognized as a specialty in its own right, there is no
274 mechanism for policing standards beyond this. Efforts to address this initially should focus
275 on voluntary measures to enhance training, with high quality fellowships, training courses
276 and examinations. Ultimately however regulatory change will be required either by
277 individual member states or via European directives, to recognize breast surgery as a
278 specialist discipline within Europe to mandate improvements.

279

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282

283 **Disclosure Statement**

284 The authors have no conflicts of interest to declare.

285

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288

289 **Author Contributions**

290 LW, IR and TK all contributed to the drafting and editing of the document.

291

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Figure Legends

Figure 1. Timeline for the evolution of breast cancer surgery. Reproduced with permission from Wyld et al, Nature Reviews Clinical Oncology, 2015[8].

Figure 2. Age Standardised Mortality rates per 100 000 women in Europe. (European Cancer Information System)[14].

Figure 3. (a) Length of surgical training and cancer surgery residency and (b) duration of specialist fellowships in European countries. Reproduced from Are et al, 2016, with permission[15].

Table 1. Survey of European surgeons about training and certification of breast surgery in their country. Reproduced with permission from Rubio et al, 2019[16]

Table 1. Table reviewing the provision of breast surgery delivery, training and certification across Europe.

Country	Specialties performing breast surgery	Undergraduate breast training	Post graduate breast training	Mandatory examination to obtain title of consultant breast surgeon
Spain	GS, G	No	No	No
UK	BS, GS, PS ^a	No	Yes (OPS training desirable but not mandatory)	Yes (Royal College of Surgeons exit exam)
Portugal	GS, G	No	No	No
Italy	GS, PS ^a	No	No	No
Sweden	BS, GS, PS ^a	No	Yes, UEMS exam	Yes
Netherlands	GS, PS	No	No	No
Poland	GS, SO, G, PS	No	No	No
Denmark	GS, PS	No	Yes, UEMS exam	No
Iceland	GS, PS ^a	No	No	No
France	GS, G, PS	Yes	Yes	No
Hungary	GS, G, PS ^a	No	No	No
Switzerland	GS, G, PS ^a	No	Yes	In progress
Finland	GS, G, PS	Yes	Yes (not official)	No
Germany	G	Yes	Yes	No
Turkey	GS	Yes	Yes	No

BS: (Oncoplastic) breast surgery, GS: general surgery, G: Gynaecology, PS: plastic surgery (PS^a plastic surgery just for reconstructive elements), SO: surgical oncology