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Crossing the Boundaries

Nursing, Materiality and Anaesthetic Practice in Germany and Britain, 1846-1945

Karen Nolte and Christine E. Hallett

Abstract

In Germany and Britain the administration of anaesthetics during surgery was, for a limited time, one of the operating-room nurse's tasks. Yet, there were very significant differences between the British and the German cases – particularly in relation to the timing of the creation and dissolution of the role of "nurse anaesthetist". In this paper, we argue that these differences can be interpreted from a gender-history perspective by examining both the written record and the material culture of anaesthesia in the late nineteenth and early twentieth centuries. Our analysis is grounded in some of the relevant literature surrounding the distinct trajectories of professional development in the two countries. We address the ethical issues at the heart of decision-making about whether nurses should administer anaesthesia. In doing so, we offer a particular focus on the role the objects used during anaesthesia played in supporting arguments for both the professionalisation and de-professionalisation of nurse anaesthetists. During the later twentieth century in both countries, one key competence of nursing, namely the holistic concept of monitoring the patients, was largely transferred to machines.

1 Introduction

For a limited period and in the context of the respective historical settings of Germany and Britain initiating and monitoring anaesthesia was one of the nurses' tasks. In Britain nurses administered anaesthesia for only a few years during the First World War. By contrast, in West Germany nurses with a special additional training were responsible for anaesthesia from the second half of the nineteenth century until well into the 1950s.[1] The conduct of operating-room anaesthesia is steeped in moral and ethical dilemmas. At the heart of these is the challenge of ensuring the most effective and least harmful means of anaesthetising the patient; and delegating this work to the most effective personnel to meet its challenges has been perceived as key. Anaesthetics have always been highly toxic substances; and their administration has always had to be very carefully calibrated. Employing the most appropriate personnel to handle these drugs has been a matter not only of status and professional identity, but also of ethical probity. For nurses to administer anaesthesia two dimensions of trust were crucial: firstly, the patient undergoing surgery had to trust the nurse's skills in order to consent to being put in a state of unconsciousness and lack of will, and to temporarily giving up his autonomy; secondly, the surgeon had to trust the professional expertise of the nurse who needed not only to know the technique of initiating anaesthesia perfectly but also to be

[1] In the US surgeons were initially not interested in this role, which they regarded as a lowly job. Nurses proved themselves to be fully capable of initiating and monitoring anaesthesia. In 1905, physicians founded the first expert association for anaesthesia but only in 1940 was the consultant/specialty for anaesthesia introduced. Nurses who had previously been engaged in developing the technique of inhalative anaesthesia had to accept now that they were assistants, cf. Bankert 1989. Yet, anaesthesiology did eventually emerge as an important specialism for nurses in the USA, Cf. Keeling 2007, passim.

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able to judge the condition of the patient under anaesthesia correctly in order to act quickly and calmly in a case of emergency.[2]

In Germany for approximately one hundred years – from the mid nineteenth to the mid twentieth century – the "drip nurse" was part of every image showing surgeries. The nurse who personally initiated the inhalation anaesthesia and carefully monitored the condition of the patient under anaesthesia is a ubiquitous figure at the head of the operating table on these contemporary photographs. Nonetheless, today she has disappeared from collective memory.[3] In Britain, even fewer such fleeting images are left – and all relate to wartime practice. Nurse-anaesthetists were introduced into British (and British Dominion) military hospitals only briefly from 1917 to 1918.[4] After the First World War, these practitioners were obliged to return to their former roles as 'theatre sisters' or 'scrub nurses', only to emerge again – briefly and on an ad hoc (unofficial) basis – during the Second World War. This paper will examine the implications of the role of 'nurse-anaesthetist' in Germany and Britain from 1846 to 1954. In doing so, it will focus on the materiality of anaesthetic practice, considering the ways in which nurses adapted their peculiar 'nursing' skills, professional training and moral frameworks to the administration of hazardous medication and the use of equipment such as masks, drip bottles and complex apparatus. One of our foci is on the objects of anaesthesia and their role in arguments for or against nurse anaesthetists. What influence did the design and the handling of objects have on the perception of anaesthesia as a part of nurse competence in contrast to a doctor's responsibility?

Drawing on the concept of a "material turn" in history[5] the paper analyses on the one hand the link of nursing objects to practice and on the other hand their meaning in discussions relating to the tasks and competencies of nurses. The meaning of this issue has hardly been addressed in history of nursing because actual nursing practice has not been at the centre of historical research.[6] Isabel Atzl has systematically analysed the stock of nursing objects in museums and other collections in the German-speaking area, thus bringing objects and material culture into the discipline of History of Nursing.[7] Very little similar work has been done in the UK, although collaborations between university academics and museum curators are beginning to emerge.

This article focuses on several questions relating to the role of the nurse-anaesthetist in Germany and Britain: Why were nurses permitted to perform anaesthesia in Germany from the mid nineteenth century onwards? Why was nurse-led anaesthesia introduced in the UK only during the wartime emergency of the First World War? And why was this expansion of the nurse's role reversed again after the war? Which developments in mid-twentieth-century

[2] On the ethics of trust in relation to the autonomy cf. Wiesemann 2016.
[3] One year after introducing the specialisation of Consultant in Anaesthesia in West Germany, a text book on anaesthesia was published but the introduction with an overview of the history of anaesthesia did not mention nurse anaesthetists at all. Cf. Kilian, 1954.
[4] Hallett, 2014, p. 246.
[5] Programmatically on objects in history cf. Daston 2004; Ludwig 2015.
[6] Atzl 2017 (forthcoming).
[7] Cf. also Atzl 2011.

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West Germany led to the changes from "old-fashioned" nurse anaesthesia to anaesthesia that could only be performed by physicians? What are the possible reasons for the wide variations in practice between the two countries?

2 Germany: The long era of nurse anaesthesia

A German textbook for nurses from the late 19th century emphasised how "responsible" the work of "chloroforming" was and stated furthermore that it could only be learned through "lots of practice under the supervision of a doctor."[8] This brief statement offers three insights: (1) during this time nurses performed anaesthesia with chloroform; (2) they received training in this activity, and (3) a physician was to supervise; that is, the initiation of anaesthesia was understood as providing the doctor assistance with his activities. The last insight here suggests how ambiguous the role of nurse anaesthetist was and helps us begin to uncover the gender specific conception of her work, her status during surgical procedures, and the link to objects involved in this work.

Initially the descriptions of the tasks of an anaesthesia nurse in textbooks for nurses between 1900-1954 show the large responsibility with which a nurse anaesthetist was entrusted during surgery. She constantly had to monitor the breathing and vital signs of the patient while also controlling the blink reflex through regular touches of the eye lid. This served to decide when the chloroform mask had to be taken away and when it had to be attached again. The nurse anaesthetist was the person who announced when resuscitation like artificial respiration had to be started. In the Surgical Health Care Manual for Nurses and Theatre Nurses[9] from 1922[10], the important position of the nurse anaesthetist in the theatre is emphasised in several instances. First, however, it was clarified that this nursing task required a high level of responsibility and served to support the doctor: "For all assisting nurses the rule applies that they only perform tasks that they were asked to perform. […] The surgeon who must be the master in the operating room gives her a specific task."[11] One nurse was charged with performing the anaesthesia, a second nurse had to hold the patient's head and a third had to be ready to get or pass on objects which the disinfected nurses at the operating table were not allowed to touch. Only the context provided in the subsequent description reveals that the decision as to which nurse was to perform the anaesthesia was not made spontaneously as this activity required special skills and experience. Of course, the nurse passing on the instruments also needed a qualification that exceeded the general training in nursing. Linguistically the nurse anaesthetist is described as seemingly on a par with the surgeon performing the operation as it is emphasised that the "nurse performing anaesthesia" did not have to pay attention to anything but the anaesthesia. She had to ensure that it was quiet in the operating theatre so that she and the surgeon could focus during their work. Also:

[8] Rupprecht 1898, p. 252.
[9] Lehrbuch der Chirurgischen Krankenpflege für Pflegerinnen und Operationsschwestern.
[10] Janssen 1922.
[11] Janssen 1922, p. 157. Cf. also Heller 1948.

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"Nobody shall talk to her [...]" and "a person who talks to her nonetheless cannot expect to receive an answer."[12] Because:

During the anaesthesia that is now following and which, in most cases, progresses evenly, the nurse anaesthetist must pay closest attention to a variety of things. If something is not right she has to speak in a clear voice to the surgeon and report this immediately, and he will base his next actions on this report.[13]

In the textbooks on nursing, the nurses' task to strictly monitor the patient is particularly emphasised. Thus, the central idea of nursing is defined as observing the patient, which formed the key of the nursing training not only at the time but has continued to be central to this day.[14]

The following section considers the "implicit knowledge" of the central object of nurse anaesthesia: the chloroform dropper bottle.

The chloroform dropper bottle that can be seen in the medical historical collections in Würzburg has a drip faucet that looks like a teapot. The bottle is round and bulbous and reminds us of a perfume bottle (bottles with Cologne looked similar at this time, and indeed Cologne itself was also used during anaesthesia). The aesthetics of the dropper bottle recalls a household object and implicitly points to a female user.

Fig. 1: Chloroform bottle 1850, Medical historical collections of Würzburg, Photography: Karen Nolte

[12] Janssen 1922, p. 182.
[13] Janssen 1922, p. 182.
[14] Cf. here especially Salzwedel 1909, pp. 115-152. Other text books on nursing that are listed in the references equally provide many pages on the instructions on the professional observation of patients. We thank Isabel Atzl for her suggestion to investigate the relationship between observing patients and anaesthesia as part of nursing more closely.

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In the text books on nursing there are detailed descriptions of how a nurse anaesthetist had to manage the chloroform cap and dropper bottle at the initiation and intensification of inhalation anaesthesia: At the beginning the methyl trichloride had to be combined with Eau de Cologne to give the narcotic a pleasant smell which ensured the patient's compliance. To avoid the feeling of choking, the chloroform mask had to be moved slowly towards the face and then carefully placed over mouth and nose. The text book continues that it was popular to let the patient count, but the continuous counting contained the risk that the patient did not breathe deeply enough. The nurse anaesthetist dripped the methyl trichloride continuously on the mask until the so called "excitation stage" had been overcome and the patient could be put into narcotic sleep – usually this was supposed to happen after approximately 1000 drops.[15]

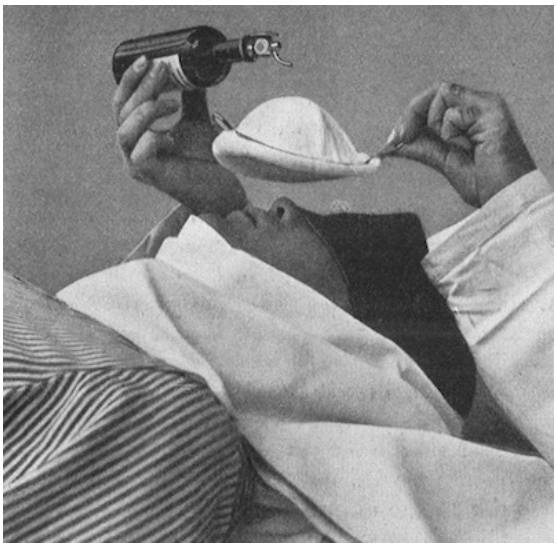

Fig. 2: Fischer/Gross/Venzmer 1940, p. 287: Dropper bottle and Schimmelbusch mask

The textbook for nurses contained further images of additional instruments with an explanation on their usage: a mouth-gag by Heister, a mouth mirror to examine the mouth for foreign objects or food leftovers, tongs to pull out the tongue - in case it blocked the respiratory tract – and a sick bowl.[16]

2.1 "Femininity" and the administration of anaesthesia

At the end of the 1940s an additional qualification of the nurse anaesthetist is emphasised that refers rather to her female "characteristics" rather than focussing on her ability to follow instructions and on her practical experience. The idea was to create a practitioner who could handle the technology in a professional manner while caring for the patient with the

[15] Rupprecht 1898, pp. 251-254; Rupprecht 1902, pp. 257-261; Janssen 1922, pp. 173-178; Lindemann 1928, pp. 158-160; Fischer/Groß/Krick/Bauer 1949, pp. 438-440.
[16] Rupprecht 1898, p. 253; Rupprecht 1902, p. 259; Janssen 1922, p. 178; Lindemann 1928, p. 162.

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gentleness wanted and skill needed. The significance of emotional qualities in dealing with technology, i.e., especially the technical tools, as well as the patients was also emphasised for nurses performing X-rays, as Monika Dommann has shown in her study on the history of X-rays.[17] In 1940 for instance the "Manual and Textbook of Nursing" by Fischer, Groß and Vezmer had the following to say on the tasks of a nurse anaesthetist:

> Putting a patient under anaesthesia, which requires a lot of practice, experience, concentration, calmness, cold-bloodedness at a moment of danger, and comprehensive knowledge, is an art, albeit one that can be learned. In other words, just as it is with the doctors, the personality that also characterises a good nurse in general, is the crucial element because success does not only depend on technical ability but also on psychological factors, such as a relationship of mutual trust between the nurse and the patient, who, with the beginning of the anaesthesia, entrusted his life for better or worse to the nurse. The nurse must always be aware of that![18]

The personal gift of a nurse chosen to be a nurse anaesthetist consisted in creating "the spiritual contact" to the male or female patient and provide "the patient with a feeling of security and comfort". After she had created this atmosphere of peace and confidence in the operating theatre she was supposed to fully concentrate on the anaesthesia:

> She only pays attention to the course of the anaesthesia, to reflexes, breathing, circulation, and after these observations she must set up the amount of the narcotic which must be administered. Upon request of the surgeon she must be able to immediately count the pulse, and share her observation of its nature, the look of the patient, his or her breathing etc.[19]

While nurses had been confident, since the introduction of the inhalation anaesthesia, to work with breathing masks, chloroform or ether, the 1950s saw the introduction of tracheal intubation anaesthesia. This new technique and the management of a complex anaesthesia machine would now require that the male physician anaesthetist would perform the anaesthesia – or so the opponents of the so called "nurse anaesthesia" claimed.

2.2 The chloroform bottle and chloroform mask as material traces of a forgotten history

Today chloroform masks and chloroform bottles are perceived as objects of medical intervention and have therefore survived only in some medical historical collections. These artefacts share the history of their tradition with many other items of nursing.[20] The "implicit

[17] Dommann 2003, pp. 139-192.
[18] Fischer et al. 1940, p. 280.
[19] Fischer et al. 1949, p. 356.
[20] On the term nursing care objects cf. Atzl 2017.

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knowledge"[21] of these objects is no longer visible and must be reconstructed in conjunction with the history of anaesthesia and its agents. The forgetting of nurse anaesthetists is closely linked to the portrayal of the history of anaesthesia, which has usually been written by doctors and in particular anaesthetists. If nurse anaesthetists are mentioned at all in historical overviews, they are merely representatives of the "old-fashioned" method of anaesthesia through "breathing-in" which could, fortunately, be overcome through the establishment of the specialist for anaesthesia and the mechanisation of anaesthesia in 1953.[22] In the meantime, of course the patients and surgeons in West Germany had confidence in the skills of the nurse anaesthetists, which was seemingly closely related to their ability to manipulate the objects used for anaesthesia.

3 Britain: the adaptable wartime nurse-anaesthetist

3.1 "Unlimited scope for resourcefulness"

In Britain anaesthesia had been regarded as a purely medical practice until well into the twentieth century.[23] The authors of influential nursing textbooks had emphasised how important it was for the professional nurse to understand the boundaries of her practice, and to avoid crossing those boundaries into the medical domain. Isla Stewart, Matron of St Bartholomew's Hospital in London argued, in 1899, that the good nurse was one who recognised her limitations and was "averse to taking unnecessary responsibility on herself".[24] She made it clear that "unnecessary responsibility" constituted anything that would normally be part of medical practice.

Historians of nursing have attempted to understand the nature of the profession's boundaries, and the way in which these emerged during the nineteenth century. Historian, Brian Abel-Smith's interest in nursing appears to have stemmed from his work on the history of British hospitals in the nineteenth and early twentieth centuries.[25] Abel-Smith argued that, in Britain, the more prestigious, voluntary hospitals, within which the earliest nurse training schools were founded, were driven both by medical technical advance, and by a need to demonstrate their worth to their wealthy subscribers. By the late nineteenth century they were taking fewer long-term chronic cases (who were more likely to be admitted to poor law

[21] Reckwitz 2003, p. 291.

[22] Cf. Weißauer 2003, pp. 74-76. Nurse anaesthesia is completely omitted in the Festschrift of the Heidelberg Anaesthesiology, cf. Meister 2007. The website states: "Anaesthetising using old-fashioned methods and subordinate nursing staff was still practised up until the post-war period all over Germany. Only when it was recognised that in the Anglo-American countries huge progress was made during surgical procedures through the specialisation of anaesthesia, German surgeons began to rethink the issue and slowly accepted that specialists in anaesthesia with thorough training were inevitable." cf. https://www.klinikum.uni-heidelberg.de/Historie.135360.0.html, 5/7/2017.

[23] On the history of anaesthesia as a medical practice, see: Snow 2008, passim.

[24] Stewart 1899, p.15. See also Luckes 1914, p. 10.

[25] Abel-Smith 1964, passim. See also Rivett, 1986, passim.

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hospitals or nursed at home) and a greater number of acute and surgical cases, whose stay in hospital would be short-lived and would, potentially, result in a demonstrable cure. These developments increased pressure on medical men – especially surgeons – and led to the emergence of specialist surgical nurses. It did not, however, give rise in Britain, as it had in Germany, to the inception of the role 'nurse-anaesthetist'. This appears to have been due to a greater vigilance over their boundaries among British medical-men, who were unwilling to relinquish roles appearing to require both technical skill and scientific knowledge.

Women's historian, Sue Hawkins has argued that gender alone cannot explain such assiduous protection of professional boundaries. Nor can it enable us to understand the tensions that began to emerge between female nurses and male doctors in the late nineteenth century. Any historical analysis must consider the role of social class alongside that of gender. The assertive efforts of reforming "lady nurses" to carve out their own sphere of practice and develop their own moral code, appear to have aroused the anxieties of medical men. Hawkins suggests that the intensity of these anxieties was largely due to the fact that the 'new nurses' were of "at least equal status in society to their male colleagues".[26] Very few historians of gender have paid attention to the emergence of the nursing profession in the late nineteenth century, though several notable works by women's historians have explored the notion of separate male and female "social spheres" in nineteenth-century Britain, a notion that helps explain the rise of the nursing profession.[27] Social historian, Eva Gamarnikow has argued that nurses deliberately used their status as experts in the domestic sphere to forward their claims to an exclusively female profession,[28] while nurse historian, Anne Marie Rafferty has observed that male doctors permitted nurses to expand their sphere of practice because they required competent assistants and believed that they could easily exert control over what, at first, appeared to be a docile social group.[29] In relation to nursing, Hawkins has observed that nurses succeeded in negotiating a space within the male-dominated Victorian hospital by creating a "discrete feminine enclave at the heart of the male bastion". She adds, however, that "socially elite women were challenging accepted social roles for women in Victorian society in a variety of settings, and lady nurses were bringing such challenges directly into the hospitals, which were bastions of male authority".[30] Such observations can offer insights into the ways in which nurses' pursuit of a "professionalising" project might have evoked anxiety in medical men, driving them to establish hard boundaries around technical and scientific domains of practice such as anaesthesia. The willingness of senior nurses to observe these boundaries illustrates the extent to which they recognised the value of arguing for a "separate

[26] Hawkins 2017, pp. 41-64; quotation on p. 42. Hawkins presents the example of Zepharina Veitch, a reforming matron at St Georges Hospital. See: Hawkins, 2010, passim.
[27] Vicinus 1985, passim; Vickery 1998, 294-322. On the role of gender in creating tension and conflict between nineteenth-century British nurses and doctors, see: Moore 1988, passim; Young 2008, 18-41; Tesseyman 2014, passim.
[28] Gamarnikow 1991, pp. 110-129.
[29] Rafferty 1996, passim.
[30] Hawkins 2017, p. 47.

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sphere" for nurses within the hospital – a sphere that encompassed the domestic, practical and emotional elements of care.

When the First World War began in August 1914, professional nurses volunteered in their thousands for "war-service" in military hospitals – only to find themselves turned away by the military medical services, or refused "release" by their civilian hospitals. For many, their response was to enrol in volunteer hospitals many of which were financed and directed by wealthy patriots with no existing experience of hospital work. In these hospitals trained staff were scarce and the crossing of professional boundaries was frequent. The strictures of matrons such as Stewart not to cross the boundaries between nursing and medical practice appear to have held no sway in this new and challenging environment, in which professional boundaries seemed to have been becoming much less distinct. The lack of medical officers (M.O.s) meant that nurses began to perform procedures that would, previously, have been seen as unsuitable to their role and training. Among these was anaesthesia.

Fully-trained professional nurse, Violetta Thurstan, was funded by her employer the National Union of Trained Nurses to take a group of professionals to Belgium in September 1914. Thurstan was later to write that those early months of the war had provided unprecedented opportunities for professional nurses not only to demonstrate that women could perform valuable work during wartime, but also (and more importantly) to advance and expand their practice.[31] Later in the war – in 1917 – Thurstan consolidated her ideas into her influential A Text Book of War Nursing, in which she wrote:

> In many ways nursing was more interesting in the early days of the war, when everything had to be improvised or adapted, than later on when the excitement and the first rush were over, organisation brought to an undreamt-of pitch of perfection, and all necessaries amply and even lavishly supplied. In those first months the individual had unlimited scope for resourcefulness and quickness of perception, and who shall say how many lives and limbs were saved by the nurses' ready inventiveness and clever fingers?[32]

As Thurstan's word imply, the "inventiveness" of the early months of the war were soon replaced by a more controlled process by which medical men – from the commanding officers of casualty clearing stations to the most senior of consulting surgeons – began to recognise that the best solution to the problems posed by an acute shortage of M.O.s was to enable nurses to cross their previously rigidly-enforced boundaries into the fiercely-guarded medical domain of anaesthesia. By 1917, Thurstan was observing that nurses may "often have to give an anaesthetic themselves in an emergency where there is no anaesthetist available".[33] As will be discussed later in this paper, however, this boundary-crossing behaviour by nurses was complicated (and, in many ways, compromised) by the development of innovative – and far more complex – anaesthetic equipment from 1916 onwards.

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[31] Thurstan 1915, passim.
[32] Thurstan 1917, p. 11.
[33] Thurstan 1917, p. 142.

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In the Spring of 1917 British journal, The Nursing Times, published a series of articles by A. De Prenderville, an anaesthetist at Charing Cross Hospital. There is no reference to the fact that, in some war-hospitals, nurses were administering anaesthetics. Instead, the series pays close attention to the many ways in which the nurse can support a patient prior to anaesthesia and assist a surgeon or anaesthetist during the operation. In his first article, dated 28 April, De Prenderville recognises the particular skill of the nurse in soothing and reassuring patients about to undergo anaesthesia:

> Here there is a real chance for the nurse. She comes into close contact with the patient for some days before the operation and can naturally and easily comfort and reassure her charge, pointing out the need of taking healthy and optimistic views, banishing doubts and fears, and generally inspiring confidence and courage.[34]

In a later paper, De Prenderville recognises that the total nursing care given to a patient can dramatically improve his chances of surviving anaesthesia and surgery. "It is just because [nurses] are so exact", he comments, "that such good results are seen in our hospitals". "Patients", he adds, "must be subjected to a minute overhaul", with nurses ensuring that nutrition is good, teeth and mouth are clean and bowels are empty prior to surgery.[35] The Remainder of De Prenderville's series of articles offers nurses detailed information on the drugs and equipment used in anaesthesia, including information on how to diagnose and treat side-effects.[36] It does not, however, advocate the direct administration of anaesthesia by a nurse, leaving the reader uncertain about whether the editor of The Nursing Times is in favour of nurse-anaesthetists or not.

3.2 "On active service"

By November 1917 the Director Generals of the Army Medical Services, Sir Alfred Keogh and Sir Arthur Sloggett, were recognising that so many nurses were being asked to "step up" and give anaesthetics in the operating room that the practice needed to be regulated: nurses must receive a recognised anaesthetics training. This move was supported by Ethel Hope Becher, the Matron-in-Chief of the Queen Alexandra's Imperial Military Nursing Service, and by her deputy on the Western Front, Maud McCarthy.[37] On 14 January 1918 a seven-month training was introduced. British and Dominion (Australian, New Zealand, Canadian and South African) nurses were carefully selected to become so-called "lady anaesthetists". The training was "hands-on" with the nurses spending time in a base hospital operating theatre, working closely

[34] De Prenderville 1917, p. 508.
[35] De Prenderville, 1917, p. 534.
[36] De Prenderville, 1917, pp. 566-569; pp. 592-359; p. 620; pp. 650-651; pp. 681-682; pp. 711-712; pp. 740-743; pp. 767-768; p. 794.
[37] Hallett 2009, p. 99; Hallett, 2014, p. 246.

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with experienced surgeons, followed by transfer to a casualty clearing station close to the front lines, where the work was more intense.[38]

Sixty-three nurses successfully completed the training.[39] Most went on to practice as nurse-anaesthetists until well beyond the Armistice of 1918. But the efforts of one group were stymied by unwelcome medical intervention: Australian nurse-anaesthetists were never permitted to practice. Soon after they had completed their training, Sir Neville Howse, Assistant Medical Director of the Australian military medical service decided that nurses should not perform the work of anaesthetists, and they were never able to use their newly-acquired skills.[40] This professional 'gate-keeping' by a medical director perhaps illustrates the anxieties that could be evoked in the minds of medical men when nurses moved their practice across professional boundaries. Even though nurses had already proved themselves capable of administering anaesthetics when asked to do so in emergency situations by their surgical colleagues, some senior medical men still appear to have placed professional territoriality before clinical pragmatism – or it may be that they were concerned about the lack of anatomical and physiological knowledge, even amongst highly-trained professional nurses.

The experience of the Australian nurses contrasts markedly with that of US nurse-anaesthetists, who travelled to the Western Front, as part of several "base hospital" units in 1917. Many of these were already highly experienced in the administration of anaesthetics, and their expertise never appears to have been questioned.[41] Not all British nurses shared the conviction of their US counterparts that the practice of the anaesthetists lay, rightly, in the domain of the professional nurse. Some appear to have shared the scepticism of many medical officers. One anonymous letter to the British Journal of Nursing illustrates the discomfort that could be experienced by nurses who found themselves, effectively, having to "give up" nursing, in order to become anaesthetists. This particular correspondent had clearly anticipated that as a "nurse anaesthetist" she would be a nurse first and an anaesthetist only second. Her dismay on discovering that the opposite was to be the case is palpable:

> In a weak moment when the lists of Candidates for Training in the Giving of Anaesthetics came out, I put my name down never dreaming what it entailed. We were all dismayed on arriving here, when we were told that if considered suitable at the end of two months' training we should then be sent up to C.C. Stations for one month and then be branded as anaesthetists, and not be allowed to do any more nursing! We have, therefore, decided to go through the training, and when we return to nursing we shall have the experience to help in case of emergency.[42]

[38] Rawstron 2005, passim.
[39] McCarthy 1918, pp. 7-8.
[40] Bassett 1992, pp. 61-62; Harris, 2003, pp. 138-143; Harris, 2011, p. 199.
[41] Telford 2007, pp. 134-135. On the role of the American nurse-anaesthetist, see also: Keeling 2007, passim. On US Army Nurse Corps anaesthetists during the First World War, see: Sarnecky, 1999, pp. 128-130.
[42] Anonymous 1918, p. 92.

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Clearly, this nurse, and it is implied, her colleagues – had a very clear sense of where the boundaries of their practice lay. Although they were willing to step across those boundaries "in case of emergency", they anticipated that such "infringements" would be temporary.

Nurse-author, Violetta Thurstan, was direct in her instruction to nurse-anaesthetists. In her A Text Book of War Nursing, she makes it clear that the administration of anaesthetics required a range of nursing skills, from manual dexterity in administering the drug; through an ability to monitor and closely observe a patient's condition; to emotional intelligence and skill in supporting and soothing an agitated patient. The following account of the process of administering chloroform – from Thurstan's influential text - highlights these skills and abilities:

> The patient is generally told to count in the first stage of an anaesthetic, this ensures his opening his mouth well to inhale it. After a few minutes, the second stage begins, the patient begins to get confused, stops counting for a minute, the muscles begin to contract, and he begins to get excited and to struggle. He may also at this stage turn a bad colour and breathe badly, this may be from attempts to vomit. On active service it is not always possible to carry out the ideal rule of giving an anaesthetic on an empty stomach, and a patient who has recently had a meal is likely to vomit. When this occurs, the head should be turned on one side, the tongue pulled forward with the tongue forceps, and the anaesthetic is pushed. In the next stage the muscles are relaxed, the breathing becomes easy and rhythmic and the patient is quite unconscious. The operation is begun after the deep unconsciousness has been tested by touching the patient's eyeball with the tip of the finger, if he does not flinch, he is well "under" the anaesthetic. The sister must watch carefully (1) the respiration, (2) the pulse, (3) the state of the pupil of the eye.[43]

As Thurstan's text indicates, the Allied nurses of the First World War were, by 1918, becoming comfortable with the administration of anaesthetics – bringing this practice, it could be argued, to the level of an art-form, in which knowledge of the nature and actions of ether, chloroform and other potent chemicals, was combined with a dexterity in their administration and an understanding of how to ameliorate the physical and emotional distress they evoked in the patient. And yet, anaesthetic practice was removed from British nurses after the war. It, in fact, emerged as a medical specialty in 1918.[44] The innovations of the years 1917-18 along with recognition of the expanding knowledge-base of anaesthesiology induced the medical profession to give its practitioners much greater recognition as experts. Nevertheless, it is telling that the administration of anaesthetics by trained nurses re-emerged (although only in a purely ad hoc fashion) during the Second World War, when nurses, again, began to fill the gaps created by a shortage of medical practitioners.[45]

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[43] Thurstan 1917, p. 143.

[44] Smith 2015, p. 7.

[45] An article, published in the British Medical Journal in September 1940, recommended the training and employment of 'nurse anaesthetists' in civilian hospitals: Parsons 1940, p. 429. The proposal was, however,

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3.3 Objects of anaesthesia on the Western Front: Allied nursing practice from 1914 to 1918

At the outbreak of the First World War, anaesthesia was not a specialist service. Techniques had changed very little since the 1870s but were always performed by a doctor. Ether and chloroform were delivered via a face mask (usually the Schimmelbusch mask). There were very few alternatives, although more complex processes adopting Clover's Ether Inhaler' and 'Junker's Chloroform Apparatus' were sometimes used. The use of masks and dropper bottles by nurses was prevalent in Britain and Dominion military hospitals – just as it had been in German hospitals since the mid nineteenth century. Extant dropper bottles, held at the Manchester Museum of Medicine and Health, UK, illustrate the apparently implicitly feminine qualities of the dropper bottles, which are reminiscent of teapots, evoking the culture of the drawing-room rather than that of the operating theatre.

Fig. 3: Chloroform dropper bottles of the type used in British military hospitals during the First World War (By permission: The University of Manchester Museum of Medicine & Health)

The side effects of chloroform and ether included myocardial depression and prolonged vomiting; hence it became clear that its administration was, potentially, a very dangerous process for patients who were being brought from the battlefields suffering from hypothermia and acute wound-shock.[46] Anaesthetic practice in the USA was more advanced, and was already, in some instances, being performed by specialist nurses. Oxygen and nitrous oxide was frequently used – delivered through the newly-invented Gwathmey apparatus.

Among Allied medical services, for the first three years of the so-called "Great War", anaesthesia was mostly administered by the "open drop" method. As we have seen, during the high-pressure, so-called "rushes" of casualties that followed large assaults on the front

vigorously opposed by other correspondents to the journal. See: Barford, 1940, p. 474; Stanley-Sykes, 1941, p. 339. We are indebted to Jane Brooks, who brought these source materials in the British Medical Journal to our attention. Brooks' book, Negotiating Nursing, will be published by Manchester University Press in 2018.

[46] Smith 2015, p. 6.

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lines, ether or chloroform could be administered by personnel other than doctors.47 In volunteer-hospitals run under the auspices of the Red Cross or Order of St John of Jerusalem it was sometimes handled by priests, or volunteer-nurses with very little training, under the supervision of the surgeon who attempted to monitor the condition of the patient and support the amateur-anaesthetist, whilst at the same time performing the surgery. Where trained nurses were available, they were the surgeons' preferred anaesthetists. Apart from their manual dexterity, they were seen – like the German nurse anaesthetists in the previous examples - to have the emotional skills needed to soothe patients, thus reducing the agitation in a patient during the process of anaesthetisation and ameliorate the risks of facial injury.

In her A Text Book of War Nursing, Violetta Thurstan devoted the last paragraph of her chapter on anaesthesia to a detailed explanation of the preparations for anaesthetic-administration, illustrating that, however much her role had shifted away from that of "doctor's assistant" to that of "anaesthetist", the nurse-anaesthetist was still responsible for the mundane task of preparing the materials to be used. Taking preparation for chloroform anaesthesia as her example, Thurstan advised that the nurse must first create a sterile field and then lay out the equipment:

> The usual chloroform mask has a wire frame, but a small towel folded in the shape of a cone does equally well; measure glass; one or two bottles of chloroform; a bottle of ether; stethoscope and towel. (If the patient does not take chloroform well the anaesthetist may change to ether in the middle of the operation.) A few swabs for wiping out the mouth, and swab forceps; Vaseline to smear the face; tongue forceps; gag; a hypodermic injection of caffeine, strychnine, camphor or whatever stimulant the doctor prefers; pituitary extract; oxygen receiver and towel in case of vomiting; warm blanket to cover the patient after the operation.[48]

Fig. 4: A Schimmelbusch Mask, of the type in use in British military hospitals during the First World War (by permission: The University of Manchester Museum of Medicine & Health)

[47] Hallett, 2014, p. 246.
[48] Thurstan 1917, pp. 145-146.

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Intriguing here is the juxtaposition of drugs and pragmatic functional equipment designed to anaesthetise and revive the patient and ensure his safety, alongside more obviously care-related objects such as a towel and a warm blanket. Thurstan makes it clear that the nurse's vital role is still a caring one. She also emphasises the fact that the physician is still at the centre of proceedings in the operating theatre. He is still the senior and responsible clinician; the reference, for example, to ensuring the availability of "whatever stimulant the doctor prefers" is telling. The nurse may be administering the anaesthetic – but she is certainly not prescribing any of the drugs in the room. She is, nevertheless, responsible for ensuring the success and safety of the procedure, and the care and comfort of the patient. Her work is multi-faceted, requiring both operational precision, practical skill and emotional intelligence. Among her particular domains of practice are the ensuring of comfort and a sense of security in the patient.

In her vivid account of work at Mobile Surgical No. 1, a French field hospital in Flanders, author Ellen La Motte described how, during an operative procedure using a spinal anaesthetic, nurses, along with a priest-orderly soothed and reassured a patient:

> A nurse held the sheet on one side of the table, and a priest-orderly held it at the other… and the Directrice and another nurse, answering the string of vapid remarks and trying to soothe him… the man babbled of his home, and of his wife. He said he wanted to see her again, very much… So, the man rambled on, gasping, and they replied to him in a soothing manner, and told him that there was a chance that he might see her again.[49]

But Mary Borden – the Directrice mentioned in the above excerpt – was sceptical about nurses' involvement in technology. In her war-memoir, The Forbidden Zone, she included, the compelling short-story, 'Paraphernalia', which questions the nurses' use of technological equipment:

> Here are cotton things and rubber things and steel things and things made of glass, all manner of things. What have so many things to do with the final adventure of this spirit? Here are blankets and pillows and tin boxes and needles and bottles and pots and basins and long rubber tubes and many little white squares of gauze. Here are bottles of all sizes filled with coloured liquids and basins of curious shapes and round shining boxes and square boxes marked with blue labels, and here you are busy among your things. Yes, I know you understand all these things… You have crowded the room with all manner of things. Why do you crowd all these things up to the edge of the great emptiness?[50]

In this excerpt, Borden implicitly argues that the "things" of nursing – the equipment and apparatus – are not simply useless: they are actually obstructive to the real challenges of nursing a dying patient. Borden's arguments carry some weight in a case such as this, where there is clearly no hope for the patient's survival. Yet, her account also carries a larger message

[49] La Motte, 1916, pp. 161-162.
[50] Borden 1929, pp. 123-125.

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– highlighting the proliferation of technologies during the early twentieth century – and the escalation of that process during the First World War. As the war progressed, nurses found themselves in charge of some highly sophisticated pieces of machinery. Yet articles in the nursing journals of the time indicate that attention to such apparatus was combined with a continuing focus on the holistic care of the patient. An article written by an anaesthetist (a medical doctor) and published in the Nursing Times for 5 May 1917 emphasises the nurse's role in preparing the patient for surgery. The need to pay special attention to the bowels, the teeth and mouth and to "nutriment before operation" is emphasised.[51]

In 1916, the so-called 'Shipway's apparatus' had been introduced. It could deliver both chloroform and ether at different points during the surgical operation and had several benefits. The incidence of bronchitis was much lower in patients anaesthetised using Shipway's than in those anaesthetised by the open drop method. The technique used warm vapour and the anaesthetic was delivered, along with oxygen, through a mask as a steady flow. Because anaesthesia was induced using chloroform and then maintained by ether, the procedure induced less mucous production (a distinct problem with ether); hence, both prolonged vomiting and chest complications were less likely. In one military hospital, surgeon, Geoffrey Marshall, found that the incidence of bronchitis in a sample of patients with abdominal wounds was 54% when the open drop method was used – and 14.7% with the use of warm ether vapour.[52] In an article published in the British Medical Journal on 2 June 1917, Surgeon-General, Sir Anthony Bowlby, along with co-author, Colonel Cuthbert Wallace, emphasised the value of the Shipway's apparatus.[53] Its use transformed anaesthetic practice. The careful, slow process of dripping anaesthetic onto a mask – a process requiring individual judgement and manual dexterity – was replaced by the mechanised delivery of chemicals through a complex device.

[51] De Prenderville 1917, p. 534.
[52] Marshall 1917, passim. See also: Smith 2015, p. 6. On the surgical treatment of war wounds, see also Harrison, 2010, passim.
[53] Bowlby and Wallace 1917, pp. 705-721.

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Fig. 5: Sir Francis Shipway (1875-1968) invented an apparatus that could deliver warm ether and/or chloroform vapours through in intra-tracheal tube. The apparatus consisted of two bottles of anaesthetic (one containing ether, the other chloroform) and a vacuum bottle that was used as a 'warming flask'. This photograph shows an example of the type of apparatus used in British military hospitals during the First World War (by permission: The University of Manchester Museum of Medicine & Health)

The 'Shipway's apparatus was introduced just before the decision was taken to train nurses in anaesthetic practice, and, although there are no records to indicate which procedures were included in the training programme, it is highly likely that nurses were taught to apply both techniques. Hence, the practice of the nurse-anaesthetist was changing, even as her work was gaining recognition and becoming regularised. From the ad hoc application of an artistic – almost intuitive – process (the open drop method) to the need to maintain the functioning of a complex machine (the Shipway's), the attention of the anaesthetist was subtly shifting – her focus being drawn away from the patient's face towards the apparatus that was keeping him anaesthetised.

This was, perhaps, typical of so-called "advances" in nursing practice throughout the twentieth century, in which, as nurse-historian Margerete Sandelowski observes, there was perceived to be a growing danger that the nurse would lose her traditional focus and would spend more time nursing the machine than caring for the patient himself.[54] These fears, as Sandelowski herself observes, were largely unfounded. The highly focussed, careful, and, at times highly intuitive experiential knowledge that enabled the nurse to monitor the unconscious patient's condition, along with her physical and emotional abilities in enabling his subsequent recovery from the anaesthetics' more toxic effects continued to be a part of the repertoire of skills she deployed. In a catalogue produced by the medical equipment suppliers, Mayer and Phelps in

[54] Sandelowski 2000, passim; Barnard/Sandelowski 2001, pp. 367-375.

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1931 – thirteen years after the removal of British and dominion nurses from anaesthetic practice – the authors refer to the operation of the hand-bellows on the Shipway's apparatus:

> The hand-bellows is of such a size that it fills the hand comfortably, and continuous pumping is not wearisome. By squeezing it regularly with inspiration the anaesthetist soon acquires the habit of delivering a practically uniform dosage. He has two means of altering the strength of the vapour: one by regulation of the tap, the other by varying the vigour of the squeezing.[55]

It is difficult to avoid the gendered tone of this excerpt. The instrument suppliers clearly anticipate that the apparatus will be used by a male practitioner. The distinction between the "vigour of squeezing" when using the Shipway's and the delicacy of the administration of chloroform drop-by-drop via a dropper bottle can be interpreted as marking a shift away from the implicitly feminine practice of administering anaesthetics via a dropper to the implicitly masculine use of the Shipway's and other complex devices.

Nurses did continue to administer anaesthetics in military hospitals until the end of the war, incorporating further innovations into their repertoire. The introduction of the so-called "Boyle's apparatus" from 1916 onwards began to overcome the problems association with administering chloroform and ether to patients with wound-shock. The apparatus was modelled on the American "Gwathmey's apparatus" and could deliver oxygen and nitrous oxide (and, when required, ether) via an endotracheal tube. This had an even more intricate mechanism – designed to carefully calibrate the doses of the chemical elements delivered. Its complexity (along with the increasing use of donated blood to treat shock) was one of the arguments used for the development of anaesthesia as a purely medical specialism in 1918.[56]

Fig. 6: Photograph: A nurse using the Boyle's apparatus in a British army operating theatre at Wimereux, near Boulogne towards the end of the First World War: Wellcome Library L0008872

[55] Mayer and Phelps 1931, p. 504.
[56] Smith 2015, pp. 6-7.

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4 Objects of Physician Anaesthesia

One of the main justifications for the development of anaesthesia as a specialist medical practice in Britain in 1918 was the increasing complexity of the apparatus used. A detailed knowledge of human physiology, along with an understanding of the actions of various chemicals on the human body was said to be fundamental to such practice. Alongside these arguments was an implicit assumption that the handling of machines was a masculine activity – just as the soothing of patients was a feminine one. Similar arguments (influenced by similar prejudices) can be found in West Germany in the mid twentieth century.[57] The Principal of the Association of German Nurses[58], Ruth Elster, pointed out in 1958 in the Doctors' Announcements[59] that "anaesthesia that requires operating machines" would not fall into the tasks of a nurse.[60] She thus defined the border between "nurse anaesthesia" and the physicians' anaesthesia through the object that had to be used to initiate the anaesthesia. While anaesthesia with the objects "chloroform cap" or ether mask respectively, dropper bottle, mouth mirror, tongs to pull out the tongue, and a sick bowl were acceptable for the work of a nurse, because they suggested a simple procedure. Operating a machine fell outside the scope of their area of expertise. Furthermore, intubation required an invasive procedure that the doctors wanted to keep to themselves. Yet, Dr. Fischer from Kiel suggested in 1960 in the journal "Der Chirurg" (The Surgeon) that the doctor could perform the intubation, but the nurse could still operate the anaesthesia machine and monitor the anaesthesia. He emphasised: "The way things are at the moment we will not get by without nurses as anaesthesia assistants."[61]

Again, the work of the nurse anaesthetist is characterised as an assistant job so that the line between the areas of expertise of a nurse and doctor respectively, did not get blurred. Fischer pointed out that there was a special training for nurse anaesthetists in Sweden and the USA and suggested the introduction of similar additional training of nurses in West Germany.[62] The technical procedure of initiating anaesthesia moved to the centre of attention. Not even the nurses themselves address the actual expertise of the person performing the anaesthesia, namely keeping the patient under close observation through professional monitoring of the vital signs and his general condition.

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[57] In the preface of the fourth edition of his "Kleines Narkosebuch" ("Little Book of Anaesthesia") from 1950, the surgeon and senior consultant in Saarbrücken still emphasised that the "duties and responsibilities of the doctors assistants – male and female nurses – [included] to perform anaesthesia of all types, Hesse 1950, p. III.

[58] Arbeitsgemeinschaft Deutscher Schwesternverbände und der Deutschen Schwesternschaft e.V. 1958.

[59] Ärztliche Mitteilungen, today Deutsches Ärzteblatt.

[60] Elster 1958, p. 1213.

[61] Fischer 1960, p. 201.

[62] Fischer 1959.

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The dramatic shortage of nurses since the middle of the 1950s due to a lack of recruitment finally played into the hands of the anaesthetists in their efforts for professionalisation.[63] Furthermore, the professional organisation of nurses, the Agnes-Karll-Verband, rejected the idea of those proponents among doctors that anaesthesia should remain a responsibility of nurse anaesthetists, pointing to the lack of nurses. In addition, the German Hospital Federation[64] ascribed the legal responsibility of performing anaesthesia exclusively to the assistants (meaning nurses) whom the doctor had authorised. This guideline could have caused nurses who were willing to perform anaesthesia into big trouble, as nurses pointed out in 1959 in the German Journal for Nurses.[65]

At this point, the nurses' task in the operating theatre was restricted to assisting and preparing the anaesthesia. In a text book on nursing from 1957 the transition of anaesthesia as an area of nursing expertise to an area of physicians' competence becomes very clear. The task of the nurse anaesthetist was now limited to the area of psychological and physical preparation of the patient and assistance during anaesthesia. The gender specific connotation of the work of the male anaesthetist was expressly emphasised. Initiating anaesthesia required technical expertise as did the handling of the technical equipment to monitor vital signs of the anaesthetised patient. [66]

5 Closing remarks

The emergence and disappearance of the nurse anaesthetist in Germany and Britain during the nineteenth and twentieth centuries appears to have been linked to the adoption of new and increasingly complex technologies. With the introduction of inhalation anaesthesia nurses in Germany became experts in this field and enjoyed the trust of patients and surgeons for approximately one hundred years. Yet, in spite of (or perhaps because of) their higher social status, and their greater claims to professional independence, nurses in Britain, and in the self-governing Dominions of the former British Empire, were slow to cross the boundary to the adoption of anaesthetic practice. They only, eventually, made this move during a wartime emergency which occasioned an acute shortage of medical personnel. This paper has argued that, perhaps, because of the more entrenched boundaries between the male medical profession and the female nursing profession in Britain and its Dominions, nurses in these countries were not enabled to take on the role of anaesthetists until 1917. And their transition across the boundary from nurse to anaesthetic practitioner was short-lived, because, even as they were adopting the role of "lady anaesthetist", the invention of new technology – in the form of the "Boyle's Apparatus", a type of endotracheal anaesthesia – was creating a situation in which medical anaesthetists would be able to argue, at the end of the war (just one year later, in 1918) that only a trained doctor was competent to administer anaesthesia.

[63] On the scarcity of nurses at that time in West Germany, cf. Kreutzer 2005, pp. 164-274.
[64] Deutsche Krankenhausgesellschaft nicht im Verzeichnis
[65] Deutsche Schwesternzeitung 12/1959, p. 407.
[66] Fischer-Groß 1957, pp. 426-433. Cf. also Arbeitsgemeinschaft Deutscher Schwesterverbände 1958, pp. 458-479.

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On the face of it, there were two reasons for the "demotion" of nurse anaesthetists: firstly, the wartime emergency – and its attendant shortage of surgeons – was over; and, secondly, equipment such as the "Boyle's" was seen in terms of gender and profession as a purely medical area of competence. Yet, the situation was more complex than this. The role of the nurse- anaesthetist in wartime surgical practice was fleeting and transitory because both technological advance and medical prejudice were overtaking the burgeoning skill of the nurse. There is evidence that the new endotracheal technology appears to have been mastered by the nurse-anaesthetists (as indicated in Figure 5 in this paper). Yet, their medical colleagues still insisted on their removal from the role of anaesthetist after the war.

Hence, in Britain the emergence of new endotracheal technologies and their associated objects towards the end of the First World War served as an argument to return operating theatre nurses to the position of doctors' assistants, working alongside surgeons and newly-recognised specialist anaesthetists. Anaesthesiology was an area in which technological advance was particularly rapid during the early twentieth century. The delivery of warm ether or chloroform vapour through a "Shipway's" apparatus from 1916 in military hospitals, and the use of the "Boyle machine" to deliver nitrous oxide and oxygen from 1917 enabled the delivery of anaesthetics into patients' bodies more effectively and with fewer side effects than the earlier open-drop methods. These innovations did not happen in isolation. They were heavily influenced by the arrival of US base hospital units on the Western Front; in the second decade of the twentieth century, US anaesthesia had already been using more advanced techniques than those current in European hospitals. Hence, in Britain (and the British self-governing Dominions) the nurse-anaesthetist was a fleeting figure who made a brief entrance into the military operating theatre, only to disappear again when peace was restored. But, during that brief period, her engagement with the apparatus – the "paraphernalia" - of anaesthesiology required a rapid process of learning and adaptation.

In West Germany, the practice of anaesthesia only began to change significantly in the middle of the 1950s, with the introduction of endotracheal or intubation anaesthesia. The introduction of the new technologies appears to have triggered the handover of anaesthesia from the nurse to the doctor. The delivery of anaesthetics became a 'medical task'. The arguments for the change of responsibility focussed heavily on the material objects that were used to initiate and monitor anaesthesia. While handling the objects during inhalation anaesthesia was perceived as a simple technique that could be performed by women, the new demands of endotracheal anaesthesia gave rise to an argument, not only among (male) doctors but also within the organisation of nurses, that the skill to operate technically complex apparatuses could only be expected from a man.

The actual expertise that carers brought to the job as a nurse anaesthetist, namely the systematic observation of the patient, was addressed neither by the doctors nor by the nurses who participated in this debate. Indeed, with the increasing mechanisation of anaesthesia, machines took on part of the monitoring of patients' vital signs. The close observation of skin colour, breathing, and quality and quantity of the pulse was previously the responsibility of experienced nurses who initiated action at the moment when the anaesthetised patient's condition became critical.

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'Trust' is an ethical issue. When surgeons gave their consent for nurses to perform anaesthesia – whether in the Germany of the nineteenth century or the Allied military hospitals of 1917 – it was because they believed that female nurses were not only competent to administer the drugs and monitor the patient's condition but also that those nurses were peculiarly skilled in inspiring confidence. But the introduction of any new technology also raises new ethical issues. By 1918 in Britain and 1953 in West Germany, surgeons were arguing that nurses were not competent to handle technology such as endotracheal intubation – and could not, therefore be anaesthetists. Nurses, it was argued, were poorly equipped to handle complex machinery; so anaesthesiology was removed from their domain of practice. The interaction of care and technology[67] thus had first a "professionalising" and then, arguably, a "de-professionalising" effect on nurses.

With the replacement of the inhalation anaesthesia by endotracheal approaches, the initiation of anaesthesia was removed from the skill set of female nurses. The key competence of observing the patients was, subsequently, also transferred to technical apparatuses. Something that both the medical practitioners and the nurses' organisations of the time, perhaps, failed to fully recognise was the nurse's continuing ability to employ careful and systematic observation. Corporeality – the colour and temperature of the skin; the quality and rate of the respirations and pulse; the level of calm or agitation – was not measured by machines – nor could a machine soothe a distressed patient.

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[67] On the relationship of care practices and technology cf. also Mol/Moser/Pols 2010, pp. 7-26.

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