

Cruel Apprenticeship

National Imaginaries in China's Operating Rooms

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Abstract

Doctors learn to be doctors through clinical or therapeutic apprenticeships. By following, observing, and being mentored by more experienced physicians, trainees at various stages acquire embodied knowledge, affects, and ethics via both taught and hidden curricula. Previous research has demonstrated how biomedical training reproduces the social authority of scientific knowledge. This research article examines how for Chinese surgeons, apprenticeship not only immerses individuals within the scientific logics and hierarchical norms of biomedicine, but also embeds trainees within scientific imaginaries on a national scale. Drawing on ethnographic fieldwork in a Chinese academic hospital and a surrounding network of community hospitals, I examine how apprenticeship for Chinese surgical trainees extends beyond medical school and residency programmes, both in terms of temporality and geography. I examine how 'technonational' narratives, which permeate medical practice in China, impact the affects and ethics embodied by Chinese surgical trainees, and argue that changes in training expectations and the scope of training generates entanglements, dreams, and attachments which are cruel in their optimism. Thus, the therapeutic apprenticeship of Chinese surgical training reveals a 'cruel apprenticeship', a framing which encourages further exploration of the political and ethical stakes which permeate medical training and practice.

Keywords

Embodiment, Affect, Apprenticeship, China, Surgery.

Introduction

‘Good doctors are made, not born’ (Prentice 2013, 8).

‘What does it mean to be a doctor? You can do a surgery well: your technique is very good. Does that make you a good doctor? If you think what you’re doing for the patient is good and you end up killing the patient, you are just falsely standing under the halo and protection of the title of being a doctor.

After you treated the patient, what happened to him? What was the result of your intervention? Do you know? If you don’t know, how do you know whether you were a good doctor? This is what China lacks.’

(Lecture to visiting professors by a senior attending surgeon, June 2019).

How and when are doctors made? What are the boundaries of the apprenticeship through which doctors are made? What aspects of societal contexts have an impact on this apprenticeship? The training of physicians encompasses both formal training (coursework, examinations, and experiential learning), as well as informal training, often termed the ‘hidden curriculum’ (Hafferty and Castellani 2009), through which a doctor’s habitus and socialised subjectivity are formed to align with a professional collective (Sinclair 1997). This research article explores surgical training in China and analyses how structures and values that lie outside immediate medical or therapeutic spaces influence clinical training and apprenticeship in affectual ways. China’s medical system has undergone significant reform over the past decades and current medical training in China demonstrates the complex impact of historical narratives, political imaginaries, and social pressures on the apprenticeship experiences of individual medical trainees. Thus, an examination of China’s medical system, and specifically the experience of its surgical trainees, provides the opportunity to understand affectual tensions, which arise through therapeutic apprenticeships, and encourages a rethinking of the optimism generally associated with apprenticeship experiences.

Surgical training is embodied: through following a formal and informal curriculum, surgical trainees acquire not just technical abilities to perform operations, but ways of seeing, judging, or being—in other words: affects, judgments, and ethics. The acquisition of a surgical habitus occurs through forms of apprenticeship which are oriented towards therapeutic or professional ends. Years of apprenticeship prepare surgeons (technically, emotionally, and ethically) to practice surgery, yet what apprenticeship entails varies in different contexts, due to differences in epistemologies, societal trust, or availability of resources and clinical options.

Wendland, in her ethnography of medical training in Malawi, explores the ‘*extra-institutional factors that ... shape professional identity: regional history and culture, access to capital and resources – the wider matters and cultural contexts of medical training*’ (2010, 21). Like Wendland, I explore how extra-institutional factors shape surgical training: how practices of training and professionalisation are transformed and translated as global assemblages with fluctuating and inter-related technologies, politics, and ethics (Ong and Collier 2004).

What then are the extra-institutional factors that shape surgical training? I propose that surgical training extends beyond the operating room or the cadaver lab to encompass the larger milieu of medical care and beyond. Surgery is coupled with dominant power structures and the social authority of science and technology (Bourdieu 1975; 1991). As science, technology, and social norms and authorities shift in different contextual settings, so are biomedicine and biomedical training destabilised, adjusted, and transformed. By attending to the therapeutic apprenticeship of surgical training, I aim to understand how biomedical training not only reproduces historical structures and narratives but makes possible new forms of scientific and sociotechnical imaginaries and subsequent affective experiences. This article begins by discussing the role of surgery within China’s current narratives of *fixing* [revival], provides a brief overview of medical education in contemporary China, and ultimately puts forward the argument that the structure of China’s medical training combined with national narratives enforced by state-mandated reforms produce a ‘cruel apprenticeship’ for the country’s surgical trainees.

Surgery in China as sociotechnical imaginary

Biomedical sciences and technologies have been seen as instruments in China’s transformation from a vulnerable, bullied, and low-resourced nation into an aspirational, wealthy, and modern global power (Schneider 2003; Elman 2006). Science and technology have been fundamental to narratives of modern governance in China: in 1911, ‘Mr Science’ and ‘Mr Democracy’ were the metaphorical figureheads of the May Fourth movement. This movement put forward these critiques as theories explaining the perceived scientific and political backwardness of the country, which had led to China’s poverty and to its political and military defeats. In the post-Mao regimes, science and technology were touted as one of the Four Modernisations and the subsequent rise of science and technology and their role in society and governance led to what some have called China’s ‘virtual technocracy’ (Cheng and White 1991; Li 2001; Greenhalgh 2010; Baum 2019; Lee 2002).

With China’s economic reform, the rise of the middle class, and the proliferation of market-based fee-for-service healthcare models, growth in the biotechnology and

biomedical sectors has soared, and strengthening biomedical sciences has become a central aspect of national political strategy. The Chinese Communist Party's most recent Five Year Plan, for instance, includes goals for dominating the international scientific community, as measured by publication productivity, patents, grant funding, and governmental investment.¹ Dreams of national 'revival' [*fixing*] are animated by the promise that science will deliver China to the top: President Xi Jinping has emphasised the role of science and technology as the foundation on which China relies for power, and on which ordinary people rely for a better life.

This research article does not present a history of surgical practice in modern China; rather, it recognises the importance of a complex historical backdrop in understanding how surgical practice now emerges as a representation of modernity, amidst the broader growth of scientific and biomedical disciplines and industries. Beginning in the late 1990s and into the early 2000s, the ability for rural patients to access life-saving surgeries or for surgeons at top academic hospitals to perform complex surgeries were commended as demonstrations of the development and advancement of Chinese society, since surgical practice requires hospitals to have up-to-date facilities, imaging modalities, and anaesthesiologists and nursing staff. Concretely, the emergency trauma medical response to the Wenchuan earthquake of 2008 was seen as evidence of the strength of China's infrastructure, technology, and clinical practice. The growth of surgical practice has also stimulated the success of Chinese surgical instrument companies who challenge foreign competitors.

To understand the development of biomedical training in China and the moral valences attached to the authority of science and technology, I draw on the work of Jasanoff and Kim (2015) and their discussion of sociotechnical imaginaries. These they define as 'collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology' (Ibid., 4). These imaginaries chart the collective aspirations of societies, the narratives of entire political communities, connecting individuals who may never meet, but who are 'tied together through shared practices of narrating, collecting, and forgetting' (Ibid., 23).

In China, this collective imagination takes the form of 'technonationalism', a phrase used to describe the links between technological capacity and a nation's security, economic prosperity, and social stability (Reich 1987). As Song (2017) describes, state efforts to promote the modernising promises of science and technology as means of raising China's standing globally led to pressures on individual

1 See: http://www.xinhuanet.com/politics/2021lh/2021-03/05/c_1127172897.htm.

physicians and scientists to make scientific breakthroughs which could bring glory to their nation. The stresses that trickle down from this are emphasised by Mason (2016), in her ethnography of China's CDC in the post-SARS era.² She notes that anxiety to grow national research capacity transformed China's public health departments, redirecting their focus towards a global audience, with emphasis on professionalisation, biomedicalisation, and technological implementation.

While the promise of science and technology paints an optimistic picture, reality may not meet such expectations. In the introduction to *Can Science and Technology Save China?* (Greenhalgh and Zhang 2020), Greenhalgh questions whether the Chinese dreams of science and technology as modernising and rejuvenating a nation have manifested as 'fears, nightmares, and struggles to achieve the promised good life' (Greenhalgh 2020, 7). This bleak perspective provides an example of what Berlant (2011) terms 'cruel optimism' in that 'the promised hope serves to stifle dissent, discourage change, and render aspirations unattainable' (Greenhalgh and Zhang 2020, 5) such that 'utopian dreams were followed by dystopian realities' (Ibid., 18).

In this article, I ask how embodied practices (such as therapeutic apprenticeship) are embedded within and imbued with national narratives. To do so, I examine how surgical training in China is structurally expansive and unbounded—and how the unbounded nature of this apprenticeship allows for the hidden curriculum to include more expansive ideals of technonationalism. These ideals shift the individual and dyadic-focused clinical training experience to one of national and collective imaginaries. I propose that the ideal of a 'good doctor', towards which medical trainees strive, produces a 'cruel optimism' (Berlant 2011), wherein national fantasy is unattainable, and the desire to reach that ideal becomes an obstacle to individuals' flourishing.

This article draws on sixteen months of participant observation on a general surgery ward in a high-ranking academic tertiary hospital in China ('Hospital A³') and on ten months of participant observation, in addition to my own training as an American medical student, at a tertiary academic hospital in California. My training and background as an American medical student framed my experiences at Hospital A and provided me with necessary access to surgical departments. At the time of my fieldwork, I had completed my rotations in surgery and, with letters of recommendation which indicated competence in the operating room, I was welcomed onto surgical teams at Hospital A. There I attended morning reports, rounded on patients, scrubbed into operations, and joined trainees for research

2 The Severe Acute Respiratory Syndrome (SARS) epidemic outbreak took place in 2002–2004. The coronavirus causing SARS was first identified in the region of Guangdong in China.

3 As there are few highly ranked hospitals in China, to preserve the anonymity of the institution and the individuals with whom I worked I have not disclosed its regional location, and have edited details so as to disguise my field site.

meetings and overnight calls. I had no patient responsibilities but worked with and spoke to trainees at different levels of their training and from different institutions.

Hospital A was founded in the late 1800s by missionaries from the United States, Canada, and the United Kingdom. In the century since its founding, it had grown to become one of the largest hospitals in China; it consistently ranks as one of the top hospitals in the country and is known for its focus on medical research. Due to its renown, admission to the medical college is highly competitive and trainees from around the country apply to train there. Hospital A is particularly renowned for several surgical specialties, and its operating rooms therefore train many of the region's surgeons, anaesthesiologists, and nursing staff. Thus, short-term and long-term visitors in the operating room are common, and my presence—as one among several visitors—was rarely commented upon.

In the last decade, with its new waves of medical reform, academic hospitals including Hospital A have been encouraged by state mandates to form 'medical alliances' with lower-tiered community hospitals. These formal alliances aim to increase collaboration between research hospitals and community hospitals, encouraging patient flow to appropriate specialists and allowing knowledge and resources to 'trickle-down' to lower-resource or more rural settings. Professors from Hospital A are hired by alliance hospitals in roles which include medical director, chief executive officer (CEO), or chief financial officer (CFO) of the entire hospital, or as chairs or vice-chairs of departments, taking on titles like 'Vice-Chair of Research and Scholarship' or 'Vice-Chair of Clinical Education'. Although my research started at Hospital A, I followed trainees and professors to affiliate and non-affiliate hospitals throughout neighbouring provinces and observed the formations of and challenges behind these hospital alliances.

While the focus of this article is on ethnographic research conducted at Hospital A, this article draws where relevant on my experience as a trainee and observer of the American medical system. Direct quotations are drawn from interviews with trainees and surgeons at various hospitals. All names and identifying details have been changed to protect the privacy of individuals.

Surgical training in China's hospitals

The medical education system in China has undergone significant changes, largely driven by political forces and shifts in state priorities, since the introduction of biomedicine⁴ in the late 1800s by missionaries. Since the reorganisation of medical

4 Although in China, 'Western medicine' (*xiyi*) denotes its opposition to Chinese medicine (*zhong yi*), in this article I refer to 'biomedicine' rather than to 'Western medicine', as so-called 'Western' medicine is no longer confined to or predominantly from the 'West'. Further, 'biomedicine' captures this medical system's alignment with and reliance on biological models of scientific rationality and understandings of disease and the body.

education after the founding of the People's Republic of China (PRC) in 1949, the number of medical education institutions grew from 22 to 118 by 1986 (Deng 1990) and to 159 by 2008 (Xu et al. 2010).

| | Undergraduate medical education | | Postgraduate education | | |
|----------------------|---|--|------------------------|--|--|
| China | Bachelors programme (5y) | | | Standardised residency training (SRT) (3–5y) | Standardised sub-specialty training (?y) |
| | | | Masters (3y) | SRT (4y) | |
| | | | Masters (3y) | Doctorate (3y) | |
| | Bachelors + Masters combined programme (7y) | | | Doctorate (3y) | |
| | Bachelors + Masters + Doctorate combined programme (8y) | | | | |
| United States | Bachelors (4y) | Medical Doctor (MD) programme (4y) | Residency (3–7y) | | Fellowship (1–3y) |
| | | Doctor of Osteopathic medicine (DO) programme (4y) | | | |
| | | MD/PhD programme (8y) | | | |

Figure 1. Stages of medical education in China and the United States. Figure created by the author.

Medical education in China is complicated, with numerous pathways towards being a medical doctor (see Figure 1). Options are to pursue either a five-year bachelors programme in medicine, followed by a masters or doctoral degree programme, which shortens the residency requirement; a seven-year combined bachelors and masters programme for students who score highest on annual college entrance exams; or a dedicated eight-year combined bachelors, masters, and doctoral programme, offered by a few select medical colleges only (Wu et al. 2014). While in the United States one can pursue a Medical Doctor (MD), Doctor of Osteopathic medicine (DO), or MD/PhD programme after completing a bachelor's degree and prior to undergoing residency, whatever degree programme is selected, every doctor must go through a standardised residency training, which is managed and overseen by the Accreditation Council for Graduate Medical Education (ACGME).

Medical training pathways are comparatively less standardised in China than in the US (Zhu, Li, and Chen 2016). Figure 1 does not fully capture the additional complexity of China's medical education system. Nearly half of China's current

physicians hold a qualification lower than a bachelor's degree, having earned their medical diplomas from vocational (*zhuan ke*) or secondary vocational schools (*zhong zhuan*) (idem.). Since masters or doctoral degrees can be research-focused, and thus obtained without undergoing clinical training, residency training aims to ensure that clinical training is more standardised for China's doctors, regardless of the route they have taken to obtain their medical diploma (Lu and Fan 2008).

China's complex medical education system is a product of many reforms and attempts to standardise training, and medical training continues to be the subject of reform. After having been piloted in Shanghai for three years (Zheng et al. 2020; He et al. 2020), in 2013 the Ministry of Health (MOH) launched a nationwide medical education reform, nicknamed the '5+3' programme: five years of undergraduate medical study, plus three years of standardised residency training (SRT). SRT contends with many challenges, including inadequate supervision, highly variable teaching, and persistent inequality in training quality between high-resource and low-resource regions (Lio et al. 2016). Given that regional differences in quality of training and number of trained professionals have been shown to lead to health outcome disparities (Anand et al. 2008), the ongoing challenge to standardise medical education in China continues to be a national priority.

One attempt to rectify these inequalities is the requirement for community physicians (those not at academic training hospitals) to complete visiting fellowship (*jinxiu*) of between six and twelve months at a higher-tiered hospital before being promoted to junior-level or senior-level attending surgeons. Attending surgeons (or 'attendings' are physicians who have completed formal training, supervise fellows and trainees, and are responsible for the care of patients. Little research has been conducted on the history of these programmes, the standardisation of requirements, or their efficacy in increasing intra-institutional knowledge transfer. Visiting fellows comprise a significant proportion of trainees who trade 'labor for training' (Prentice 2013, 3) at academic hospitals, and their presence at Hospital A (and Hospital A's presence at alliance hospitals) is one such representation of the attempt to ensure that community hospitals stay abreast of changes in clinical management or cutting-edge research.

These complex training pathways and medical alliances reveal different training priorities in China's medical education system: to train standardised, competent physicians and to produce academic researchers; tensions which will be further explored later in this article. Thus, while China's complex medical education system appears to progress by as depicted in Figure 1, the absence of standardisation or oversight of training means that in practice, surgical training extends beyond the delimited stages of training. In the following section, I examine

how the experiences of apprenticeship in surgical education extend beyond both stages of training and accredited training sites. Here, I propose that the unbounded nature of surgical education keep trainees at an impasse, leading to forms of apprenticeship which are affectively cruel.

Unbounded apprenticeship

The therapeutic apprenticeship of surgical training is longitudinally expansive, beginning earlier and lasting longer than what has been traditionally described in North American contexts or in formal records of China's medical education system such as those in the literature previously cited. It is also spatially more expansive, extending beyond structured spaces of learning (the operating room, the surgical ward) and beyond specific designated institutions of training.

Surgical training can be amorphous: regardless of one's official stage of training, a trainee's surgical training begins whenever they step into an operating room. Whether in my home institution in California or at Hospital A, if I could show that I knew how to scrub and gown, I was allowed to stand at the operating table and learn. If I could demonstrate that I could stay out of the way of the primary surgeons, I might be given the opportunity to tie a knot; if I could tie a knot, I would be given instruments to close a small laparoscopic port site, and so on.

At Hospital A, I watched other trainees go through the same tests: some trainees balked when asked if they knew how to tie knots; some tied sloppily and were told to practice more; some tied adequately and were given tips to improve. Each of the trainees was on a different path—some were undergraduate medical students, some masters students, some attending surgeons from other hospitals visiting as part of the *jinxiu* programme. One senior attending told me that he often did not know who was in his operating room or what training each individual had. Even if he knew the level a trainee was at, he continued, he could not assume their skills, whether in relation to being able to suture well or to be entrusted with additional tasks.

From my observations, having a medical degree seemed to signify a wide range of abilities. Just because someone made it into the operating room did not indicate their level of skill, and the attending surgeons treated each trainee with caution. As most surgeons at Hospital A have spent a year or more on research fellowships in the United States, Japan, Korea, or various Western European countries, they often drew comparisons between China's training and other medical systems. Many surgeons commented on the absence of a professional body equivalent to the United States' ACGME in providing more standardisation across surgical training programmes. This absence of standardisation led to mistrust of trainees and the constant need to test their abilities. One attending explicitly compared the

residency training of America and China, telling me: ‘In America, I know you need to complete a certain number of appendectomies, colectomies, hernia repairs, etc. in order to graduate from a surgical residency programme. Here, you graduate when your time is up, no matter what you have seen or done.’

In China, surgical training is not complete until one is a senior attending surgeon. Junior attending surgeons at Hospital A start with minimal technical responsibility and are slowly trained under the watch of a senior attending, who holds the medical and legal responsibility for the entire operative group. Unlike in American surgical training, where obtaining an MD degree indicates that one has full responsibility and is primary surgeon on operations, operative independence in China is not granted when one graduates from medical school or residency. One junior attending surgeon explained: ‘At the end of your training, then you can start to do *some* of the surgery on your own—if you can do one step safely, supervised, then you can try unsupervised; if you can do that, then you can do the next step. Little by little.’ The structures (or absence of structures) result in a perpetual state of training. Some trainees saw the benefit of this system, noting that it allowed many more years to observe, appreciate, and experience the nuances of surgery from experienced older surgeons. Another junior attending noted: ‘I notice many things now that I could not have appreciated as a resident; it took me trying to do the same dissection many times before I recognised what [the senior attending] does differently and so well.’

What each trainee learned from an experience depended on where they were in their trajectory and what that trajectory was. The responsibilities associated with and opportunities for apprenticeship varied considerably among trainees at different ages and different stages, and were sometimes mediated by personal relationships more so than by institutional structures and norms (Hsu 1999). This was especially true of visiting fellows, whose experiences, training, and the goals they had for their fellowship varied. Some visiting fellows merely observed, rarely scrubbing in; others were trusted to start surgeries without the attending surgeon. When I commented to one visiting fellow that the attending surgeon seemed to trust him a lot, allowing him to operate unsupervised, he told me:

Dr Ye has given me a lot of opportunity. He knows I want to learn from him and that I have a lot of experience in the community. We go way back—we actually met playing cards, and when I had to do my fellowship, I contacted Dr Ye to see if I could come here. I’m leaving soon, but we will stay in touch: I’ve already brought Dr Ye to my hospital to do consult surgeries, so I know I will see him often after I finish.

His apprenticeship began outside the operating room (playing cards) and extends beyond Hospital A (to his original hospital, and possibly to other locations as well).

While his apprenticeship relationship with Dr Ye may not be typical, I found it representative in its unboundedness. While apprenticeship relationships may begin at the central nexus of an academic teaching hospital, they extend far beyond these boundaries, both in terms of temporality and geography.

These structural factors which lead to the unboundedness of surgical training change the way therapeutic apprenticeship is experienced. In the following sections, I explore how the structural unboundedness—and thus perpetual state of surgical training—lends itself to affectual experiences of precarity and unrelenting evaluation wherein ‘graduation’ may not be possible but remains always the tantalising goal.

Apprenticeship amidst sociotechnical imaginaries

While surgical apprenticeship is, on paper, confined to certain stages and sites of training, the therapeutic apprenticeship of Chinese surgical training is not always bounded by time or institution. In this section, I propose that the apprenticeship and medical embodiment of surgical training in China also expands beyond the skills and affects generally described in previous ethnographies of surgical training (Bosk 2003; Katz 1998; Prentice 2013, 2007; Collins 1994; Hafferty 1988). These ethnographies describe surgical training as a process of professionalisation, where students are transformed from outsiders to insiders. Like many educational practices, surgical training is a form of social and cultural reproduction (Bourdieu 1977). Reproduction happens as surgical trainees come to take on the surgical habitus of their profession, acquired through ‘repeated practice until that practice leaves a permanent mark on the character of the person’ (Mahmood 2005, 136). Prentice describes surgical training as a combination of ‘disciplined drilling’ of techniques and of ‘situated practice’ through which trainees absorb the ‘hidden curriculum’ of training (2013, 266).

While these aspects of the hidden curriculum were certainly at play in the surgical training at Hospital A, I argue that apprenticeship for Chinese surgical trainees extends beyond the ‘hidden curriculum’ of learning the local moral worlds of medical practice and situates surgical training within larger national imaginaries. In China, surgical apprenticeship is porous, and trainees take on not only the morals and affects of the surgical profession but also those of international scientific communities and technonational aspirations.

In this section, I discuss how in the operating room, trainees learn not just the techniques of how to operate, but what it means to utilise or capitalise on their ability to produce something beyond the relief of a patient’s suffering. Surgical trainees in China strive to be a ‘good doctor’ not just for their own professional success or personal goals, but to perform and sustain a national narrative of

excellence via medicine and scientific practice. Specifically, this entails defining the ideal of the ‘good doctor’ as a doctor who conducts research which may prove China’s distinction among the global scientific community.

The question ‘What does it mean to be a good doctor?’ was one that Dr He, a well-respected researcher and surgeon and one of the senior attendings, often asked rhetorically of trainees. Dr He built one of the early databases of surgical patients, keeping records on each surgery and following up with patients to determine complication rates. Dr He stated emphatically, at every conference or meeting, that the *only* way to know whether your treatment was effective was to follow up with *all* patients and to analyse that data collectively and over time. Thus, to be a ‘good doctor’ trainees had to learn to direct their clinical work using this longitudinal and population-based view. Dr He’s preoccupation with this argument appealed to the individual physician’s ethical responsibility, but also to an overarching nationalism. Dr He felt that it was not only important for individuals to strive to be good, but it was also embarrassing on an institutional and national level when physicians did not seem to care whether or not they were good. Dr He called this perceived lack of care ‘irresponsible’ and saw it as manifested in the absence of patient follow-up or data collection.

Dr He’s emphasis on data collection as fundamental to ‘being a good doctor’ represents how national narratives embed within the local moral world of surgeons at Hospital A. For some like Dr He, being a good physician is about collecting data and producing research; for other senior physicians, being a good physician is about carrying out the most surgeries, as fast as possible, to treat the greatest number of patients. Regardless of one’s perspective on these two definitions, being a good physician in China is often a numbers game which seeks to ultimately prove that China is best. Trainees balance pressures to learn clinical skills and to produce research: a stress that is not unique to China. As an American trainee, I also feel pressure to simultaneously perform clinically and produce research; for myself and for my colleagues, however, doing so is merely an individual mandate rather than a national one. At most, I carry the shame of my immediate faculty mentors—not the shame or pride of an entire nation’s hopes and imaginaries.

In contrast, in China, these pressures have become part of medical reform and national dialogues about strength and resurrection, and slogans reflecting these narratives are ubiquitous on large banners hung above staff elevators, placed in department meeting rooms, and repeated as chants at departmental meetings. On posters in the hallways or in congratulatory social media posts, every new article is lauded as a ‘high-impact *international* article’ (my emphasis), and chairs often praise strong researchers for ‘bringing honour to China’ with their international research collaborations.

The presence of political narrative is not subtle within clinical departments. Every Thursday, at morning report, the *danwei* (unit or department) party representative shows a prepared slideshow with the party teachings for the week; the punchy slogans are read and repeated, and the representative ties the month's key theme—for example, 'striving and regeneration through individual effort' (*zili gengsheng*)—to the work of each individual doctor. The representative declares: 'every day in our clinic or in our operating room, we have to embody *zili gengsheng*: it is our individual work together that will bring the resurrection of China!' Everyone claps appreciatively, and he clicks through the PowerPoint quickly to cover more points. In other months, slogans have focused on the 'China spirit' (*zhongguo jingshen*) of reform and innovation, or on not forgetting the original purpose of the revolution and holding fast to one's calling (*buwang chuxin, laoji shiming*). In these weekly sessions, each slogan is tied to medicine and the work of doctors, and the party representative makes clear calls for the research, data collection, and attendance at international conferences to reflect these national slogans. If each person participates in this striving, the collective nation will experience its much-awaited rejuvenation. The flipside of the message would seem to imply that an individual's failure to strive defers a collective dream.

While much ethnography on the apprenticeship of surgical training focuses on developing clinical skill and judgment, at Hospital A apprenticeship includes coming to embody a research ethos as well: attending to patients as numbers and as parts of a database. Even if trainees are not explicitly being encouraged to do research, they practice and take on the habitus of generating data from each patient. Although previously, patient histories were written in a few sentences in the patient chart, senior professors developed and implemented automated forms with drop-down menus for trainees to fill out for each patient, cataloguing the presence or absence of each symptom, values of specific laboratory and diagnostic tests, forcing trainees to see each patient as a line of data in an Excel spreadsheet and allowing for future easy analysis of patient data. Trainees tagged tissues such that each lymph node or surgical specimen could be tied to a patient's outcomes and learned to analyse databases of tissues samples, diagnostic imaging, and patient charts.

Ultimately, the push to create data from surgical operations is part of a larger pressure to participate in evidence-based medicine (Wang 2010), which despite its intents and its hegemony in dictating what 'counts', takes different forms and is adapted to different settings (Lambert 2006; Adams 2016; Brives, Le Marcis, and Sanabria 2016; Fan and Uretsky 2017). At Hospital A, which is known for its high case volume and the complexity of cases, senior attendings often told junior attendings and graduate students not to 'waste' cases and case volume. It was not enough to save a patient's life (or at least to attempt to do so); what really mattered

was that that patient's surgery (and a trainee's experience doing it) was made into *something*—that the operation was transformed into a research figure, a trial, a publication, and eventually an improvement in the ranking of the hospital and in China's stature from the global standpoint. While taking out a patient's cancer might improve the patient's life, being a 'good' doctor was about proving China's rising biomedical standing by means of evidence-based medicine.

This push towards evidence-based medicine and the incentive to publish is not limited to academic tertiary hospitals. At community hospitals, which are increasingly part of medical alliances, consultants like those from Hospital A are hired to encourage both an improvement of clinical outcomes and an increase in research productivity. Their role is often vague and unstructured: some attend weekly rounds to discuss challenging cases while others organise journal clubs or multi-disciplinary tumour boards and trainings. While research has long been a requirement for advancement at academic hospitals, it is now the case for community hospitals as well, and physicians are financially incentivised to publish with cash awards which are proportional to the impact factor of the publication journal (Quan, Chen, and Shu 2017; Yimin 2001).

These pressures are felt especially by trainees, who expressed feeling buffeted along by external forces. The national tensions of a healthcare system that is striving both to produce competent physicians for a large population and innovative physician-scientists who produce groundbreaking research become embodied by medical training and the trainees who manifest that tension. With limited time and limited resources, do surgical trainees spend time following up on past surgical patients to collect a 'complete' dataset, read up on recent evidence for new surgical techniques, or see an additional five patients? Does a trainee choose to focus on mastering technical skills or on producing a research manuscript?

Many trainees felt they had no agency in their training: many I spoke to did not choose their medical specialty based on interest, but rather based on availability of places and on which professors were willing to take a trainee at the time. Over lunch in the canteen, one masters student told me that he had always wanted to fly airplanes and went to a military school to learn to do so. After a few years, his parents said that he should switch to pursue medicine, so he applied to change courses. He told me he was lucky to have the opportunity to study his masters degree at Hospital A, but that he was worried he did not have enough research background or experience to 'make it'. He was training to be a vascular surgeon because that was the department which had accepted him. He followed the path available to him, both in terms of his career trajectory and in the day-to-day: whether he was in the operating room or doing research just depended on what was available to him. He added: 'I am lucky, but I have to keep working hard

otherwise I will not be so lucky at the next junction, and I know I need to find a way to publish to make it. But it is all luck, who you work with, whether your project is successful.'

He expressed incredulity that I was expected to come up with my own PhD project, as he said most trainees took on their mentors' projects. When I asked another PhD student how research questions were determined, he told me: 'if you are lucky, you get assigned a project that is publishable'. His comments reflect Bourdieu's commentary on scientific authority as reproduction, wherein work is defined as important when it yields symbolic profit: 'researchers [tend] to concentrate on those problems regarded as the most important ones ... [defined because] contribution or discovery relating to those questions will tend to yield greater symbolic profit' (Bourdieu 1975, 22).

For these trainees, symbolic profit is defined by publications, which represent subjective, external, and often international review. Both in the U.S. and in China, this seems to hold true: individuals, departments, and hospitals push for publications in order to maintain their status or rankings, and productivity is measured largely by publications. The shift for community hospitals to develop an academic focus originates from state policy goals for hospital reform (People's Republic of China State Council General Office 2015). The motivation for county hospitals to develop research productivity arises from the reliance on rankings to draw patients to hospitals, and the effect of publications and academic productivity on a hospital's position in those rankings.

The importance of evidence-based medicine and this focus on publications indicates the presence of a larger narrative. While in American media, the narrative of China's biomedical growth over the last decades is often one of imitation and catching up, the narrative within China is the claiming of China's (rightful) place at the top. The growth in China's research productivity is therefore seen as part of a narrative of *fixing*: trainees are not taught to do research because research is 'good' in the abstract. Research, evidence-based medicine, and publications are inherently comparative; publications are therefore a way to prove the success and superiority of Chinese biomedicine and technology.

One surgeon, who although still relatively junior was a prolific surgeon and researcher, told me:

If you do a million surgeries, there's no point. You have to be able to say, I've done one million cases and I've published them in [a high-impact journal]. I've done this data collection, this comparison. And now I am showing you that I have done things that can change clinical practice.

Though the ‘I’ he indicates is hypothetical, ego is certainly at the centre of his statements. An individual does the cases, an individual publishes the research, an individual does the data collection, and an individual is creating change. Though ‘a million surgeries’ is surely an exaggeration, the point is that this case volume only matters if compared with *other* cases and published in a high-impact journal where that comparison can be seen, and where its visibility can lead to change in practice.

However, while publishing is important for the individual, the act sits within a larger framework of pride. Publishing in high impact factor journals is proof that China can compete on the international stage. In 2018, China overtook the United States in total scientific publications (Tollefson 2018), is second to the United States in spending on research and development, and continues to increase its investment annually. While my American colleagues strive for publication in high impact factor journals, they seem to do so for individual professional growth. My colleagues in China, on the other hand, express both the individual professional pressure and the desire to contribute to an international scientific community—variously, to ‘have a seat at the table’, to ‘be taken seriously by others’ (both Chinese and ‘Western’) and to ‘show them what we are capable of’.

Through state documents and speeches from party leadership, the strength of China’s biomedical achievements is tied to the security and strength of the nation. Premier Li Keqiang stated in an executive meeting that meeting the ‘great demands in healthcare’ was necessary to ‘drive the country’s economic and social development’ (Yue 2017). Not only is the strength of the population crucial for economic development, failures in the medical system can lead to catastrophic consequences, on economic and geopolitical grounds.

The 2002–2003 SARS outbreak served as a reminder that healthy societies were crucial for social and economic development (Meng et al. 2019), and epidemics could contribute to a slowdown in growth or modernisation, as well as international rebuke and national shame. In contrast, medical triumphs bring honour to the country. This technonationalism imbues the aspirations of researchers, who often extrapolate from weakness or aptitude in their own individual research by saying ‘this is China’s weakness [or strength]’. Their promise is China’s promise, and their failures are China’s failures. The achievements of China’s growth in scientific publications point to a collective sociotechnical imaginary within which individual trainees’ dreams and aspirations can ‘take hold and acquire collective force [when making] their visions durable’ (Jasanoff and Kim 2015, 25).

Most recently, this has been highlighted by the COVID-19 pandemic, which spotlighted China’s rapid sequencing of the viral genome, development of testing kits, construction of tertiary hospitals, and deployment of medical professionals

from other provinces to Wuhan. ‘The eyes of the world are on China, and we show them that our healthcare system is strong’, stated one Wuhan government official during a press conference, just days after city-wide lockdowns began in 2020.⁵ The official went on to assert that the modernity and strength of China was reflected in the modernity and strength of its healthcare system. Even in a pandemic, it was not enough to save patients: it was necessary to prove it on a national and international scale, through research, publications, and international collaborations (Xiang et al. 2020; Fry et al. 2020).

Surgical trainees whose apprenticeship extends from medical school through junior attending status are immersed in these narratives, their experiences of training shaped by the opportunities determined by national priorities. While state policies may seem abstract and removed from the interpersonal apprenticeship of surgical training, they become embodied in ways of seeing patients and understanding of what it means to be a ‘good doctor’.

Cruel apprenticeship

Through therapeutic apprenticeship, surgical trainees come to take on the dreams of a nation. However, these dreams, entanglements, and attachments may not lead to flourishing. Berlant’s ‘cruel optimism’ describes the situation when that which one desires becomes an ‘obstacle to [one’s] flourishing’ (2011, 1). It describes the affective draw towards a possibility which leaves one at an impasse, which is precarious and cruel. In this section, I show how the Chinese technonational narrative imbues surgical training, such that trainees experience these tensions and narratives as an impasse, a space of unbounded uncertainty, while still working towards possibility and optimism.

In the therapeutic apprenticeship of surgical training in China, trainees take on national narratives: historic shame of technological backwardness, and hope that science and medicine will deliver modernity and rejuvenation. Trainees inherit and embody their mentors’ ethics of what it takes to be a ‘good doctor’, which is entangled within these narratives. Already kept structurally at an impasse in an unbounded and continuous apprenticeship, the ideals of a ‘good doctor’ towards which trainees strive serve to compound that impasse, leaving apprentices uncertain in their path forward and unable to attain that towards which they strive.

Sometimes the ties between surgical prowess and national pride are palpable in seemingly throwaway comments made in research meetings or operating rooms: ‘look at us in China, we’re doing it all!’ one trainee comments proudly, as he overhears device representatives noting the comparative benefits of the China-

5 The video has since been taken down—an outcome not uncommon with Chinese media.

made laparoscopic camera and the same device made by an American company. Other times, the tie between surgery and nationhood came through Kaplan-Meier curves which compared patient populations with the same disease surviving for longer after surgeries done in China or Korea as opposed to in America or Europe. These graphs were often accompanied by statements which combined interpretation of data with national pride: 'Look at the gap between these curves; look at China!' Each clinical trial represents not just the institutions where the clinical trial data were collected, but China itself, in comparison with other nations.

However, for those in training, embodying or representing this pride seemed to present challenges, and trainees expressed feelings of striving towards a seemingly unattainable goal. One trainee told me they were all trying their best (*jinli erwei*) to strive or fight for opportunity (*zhengqu*) but said this with a look of disappointment on his face. As I sat with one trainee, looking over a draft of a manuscript to be submitted to an American medical journal, he lamented that he struggled to determine which statistical methods to use. He felt he was supposed to figure it out on his own, and that he was not provided with any support, yet still expected to produce something great. All of his previous articles had been rejected without review. He and other trainees told me they felt that with a Chinese name and a Chinese institutional affiliation, his articles were automatically rejected by American editors.

Some attributed this to blanket unfairness; others noted that it was because historically some Chinese scholars may have doctored data and now 'we are all painted with the same brush'. A trainee who was training to be a transplant surgeon noted specifically that: 'it is impossible to publish in transplant surgery because international journals accused China of harvesting organs from prisoners and even though we have stopped that practice they still think we are all the same. I have not been able to publish because of this and I feel doomed to failure!' Whether or not this reason explains his article rejections, he and many trainees felt the rejection of their articles not just as personal defeats but as institutional failures and national slights. Though they dream of China's assuredness and independence, individuals experience this dream as existing within an impasse of precarity, impossibility, and frustration.

Trainees also lamented that the absence of systematic training left them dependent on their mentors: whether or not they learned how to do research depended on whether or not their mentors knew how to do research. A good mentor would guide them on how to work with data, with whom to collaborate, how to apply for Institutional Review Board approval, how to write an article. But no one felt they had a 'good mentor'—an imagined possibility which seemed just as elusive as being a 'good doctor' or writing a 'good paper'. Trainees told me that

they felt 'stuck' and often wondered whether they should give up, but also felt like they had no other option than to continue trying.

Even junior attendings joked that they had spent their lives striving to reach their current status only to find that 'the good life' still not attainable. One told me: 'I find myself happier if I just do not play these games, but even when I try not to play, I have to play'. When I asked him what he meant by games, he gestured to his desk, which had stacks of unfinished manuscripts and research grants. The academic pressures are not unique to the Chinese context, but the pressures of national narratives, promise of a better future for the nation and individual, and precarity of training (which trainees attributed to the absence of standardisation and lack of resources), intensified a sense of impasse.

The unboundedness of training means that this experience does not stop with the completion of residency. Even senior faculty and chairs of departments told me that they felt trapped, without the freedom to research what they were genuinely interested in, feeling they instead needed to chase that which yielded the most symbolic profit. A chair of a surgical department told me: 'it does not stop; even at my stage we have to network on a national and international level because the grants go to those who have international connections'. Seeking patronage within a cultural and political hierarchy, therefore, does not end with residency training. The pressure to receive grants is not a financial pressure but a political one: in order to maintain good standing, one has to bring glory and honour to the country via prestigious grants and collaborations.

Can China be accepted amidst the 'international' community of scientists (i.e., the European and American scientists who lead high impact factor journals)? The Asia editor of one of these journals told me that China is at a turning point, and she sees herself as a nanny, wanting the best for her 'children' (Chinese researchers) and nagging them to take the necessary steps to be seen as global scientific citizens and have their work accepted by such prestigious journals. 'Have controls!' she urged her authors. 'Register your trials!' Children are young, apprentices, in training, not yet reaching their full potential. The editor captured their optimism, but not the pain of constant failure, reminder of past humiliations, and continued dependence on the appraisal of others. The trainees feel the unbounded impasse of adolescence and experience the suffering of yearning for an unattainable imaginary 'adulthood'.

Though trainees are taught to value research and to strive towards publication, most trainees are unable to manifest this dream. The Hospital A physicians who are hired as consultants at alliance hospitals lament that surgeons at these hospitals do not conduct clinical research. While one surgeon encouraged the staff

surgeons and provided them with research ideas, in his two years of experience there, they still had not shown signs of developing research projects. He told me:

They feel like doing this sort of research is too time-consuming and too much work and they don't have time because they don't have their own research students and to do so on their own is too big a challenge. They're not really used to the idea of working overtime [like at Hospital A] where it is completely normal to work insane hours—they can't keep up or tolerate that workload.

This Hospital A physician attributes community surgeons' inability to conduct research as an unwillingness to work overtime, an inability to tolerate a heavier workload. The moral judgment is not purposeful, but there is a clear sense that *inability* is judged also an *unwillingness* to exhaust one's body.

However, staff physicians at alliance hospitals often told me that the consulting physicians who came from Hospital A did not understand their lives. A frustrated staff physician told me:

They don't understand us; our lives are very different. We don't have [residents] who are writing our patient notes and communicating with patients and their families to get them to sign consent papers. They don't have to see patients in the emergency department. They only need to operate and go to clinic, and all of the paperwork is done for them.

County hospitals have no additional labour; staff physicians must do time-consuming paperwork, such as writing medical notes or signing documents, until they are promoted to senior attendings. These physicians express exasperation that their workloads are not adjusted and that additional expectations are even added to them: the same surgeon said he felt he was dropped into a rat-race without consent or help. Though they want to be 'good doctors', the ideal of 'good doctor' is incompatible with their practice, yet they are asked to strive towards it—and are required to do so by promotion policies—in the knowledge that it is not attainable. Thus, though striving to be a 'good doctor' originates from national and institutional optimism, it also produces feelings of frustration, incompetence, and guilt at not performing to arbitrary and constantly shifting standards.

Even those who make time to conduct research or are able to produce research feel the conflicting cruelty of this optimism. The department chair at a newly-affiliated hospital expressed pride in what his department has accomplished as researchers and evidence-based clinicians: 'The [Hospital A] doctors think they are making such a difference, but we have been doing this for years. Every week I have journal club and I have my surgeons read a new article. In English! Even we do this in [this smaller town]; what can China not do?' Again, the success of his

department is given as an example of the success (or potential) of an entire nation. His statement is both a comparison with a larger academic hospital and proof of the nation's success. He shows me their access to UpToDate (an online database of up-to-date evidence-based management recommendations for physicians), and has me meet with the department's physicians, who ask me questions (many of which I cannot answer) about how specific gastrointestinal cancers are managed, what chemotherapy regimens are used, or which lymphadenectomies are standard in the U.S., where I am receiving my training.

One of the surgeons sheepishly asks if I have any suggestions for how to improve his English or to get papers accepted: 'We are trying to do similar research, but our work is never taken seriously. It's not that we don't want to meet the benchmarks set [by policy] but we feel like we are striving constantly with little result.' According to these doctors, the same research done at his community institution is not to be taken as seriously – by being at a community hospital, it is assumed that he is not as capable of producing strong research, thus trapping him and preventing him from ever getting the research publications needed to leave the community hospital: 'judgment on a student's or a researcher's scientific capacities are *always contaminated* at all stages of academic life, by knowledge of the position he occupies in the instituted hierarchies' (Bourdieu 1975, 20). One surgeon uses the example of traffic deadlock: 'we are all trying to get to the same place, and we keep hearing how great that place is, so more cars get on the road, and the more cars there are, no one moves. We are all stuck here.' They are stuck at an impasse, a cruel phase of apprenticeship, ever learning and striving, and never able to reach being the 'good doctor' they are taught to yearn to become for the sake of their nation.

Conclusion

Surgical trainees, through therapeutic apprenticeship, learn to perform surgery and to be—or to strive to be—good doctors. This article explores surgical training in China to understand how the unboundedness of medical training makes porous the perimeters of apprenticeship. Apprenticeship is a process of becoming that extends beyond the transfer of concrete knowledge and includes the acquisition of ethics, affects, morals, and ways of being of certain professional worlds. In this article, I show how the open-endedness of the surgical training process places trainees in a boundless impasse and that through surgical apprenticeship, they take on not only the norms of a profession, but the sociotechnical imaginaries of a nation. Surgical trainees in China strive not only for their own pride, but to contribute to the distinction of their nation.

Few have considered or described the effects of extra-institutional, historical, or societal factors on surgical or medical training. Huang (2005) considers China's cultural context and historical trends on surgical knowledge sharing, his research focuses on aspects of Chinese culture like saving face, indirect communication, deference to hierarchy, and so on, which he traces to Confucianism or other historical trends. In contrast, this article attends to larger national narratives, attempting to understand how technonationalistic ambitions shape the embodied apprenticeship of surgical training. Huang (2005) does address how health reforms and the promotion of surgeons based on degree attained rather than clinical experience affects knowledge sharing; however, I propose that these reforms are part of larger national narratives and priorities which permeate surgical apprenticeship in shaping what trainees strive towards.

Drawing on Berlant's (2011) concept of cruel optimism, I show how the ideal of the 'good doctor' towards which trainees endeavour produces a cruel apprenticeship and that China provides a specific example of how uncertainties within training structures, in addition to ideological optimism, can lead to experiences of impasse. Trainees are taught to value research and to strive towards publication for their own success and for the development of the nation, but are unable, for various reasons, to manifest these dreams. The cruelty of this state of being is not merely in its impossibility: the cruelty is in the continued *embodiment* of this desire towards an imaginary ideal. To be a perpetual trainee is to be perpetually in a state of striving.

This article explores the porousness and unboundedness of medical training by examining how surgical apprenticeship takes on nationalistic and sociotechnical imaginaries in China. Rather than considering only the professional norms which are transferred via the hidden curriculum, these questions prompt us to consider what extra-institutional factors shape those norms and the embodied knowledges taken on through therapeutic apprenticeship. More broadly, this opens up questions of how forms of surgical practice, medical training, and therapeutic apprenticeship are challenged, destabilised, transformed, and translated across situated settings.

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