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The pen is mightier than the sword. Reinstating patient care as the object of prescribing education

Gillespie, H., McCrystal, E., Reid, H. J., Conn, R., Kennedy, N., & Dornan, T. (2020). The pen is mightier than the sword. Reinstating patient care as the object of prescribing education. *Medical teacher*, 1-8.
<https://doi.org/10.1080/0142159X.2020.1795103>, <https://doi.org/10.1080/0142159X.2020.1795103>

Published in:
Medical teacher

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

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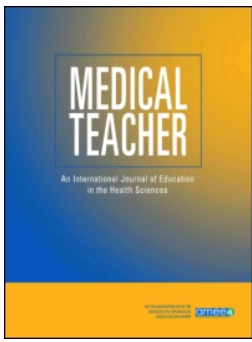
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To cite this article: Hannah Gillespie , Eleanor McCrystal , Helen Reid , Richard Conn , Neil Kennedy & Tim Dornan (2020): The pen is mightier than the sword. Reinstating patient care as the object of prescribing education, Medical Teacher, DOI: [10.1080/0142159X.2020.1795103](https://doi.org/10.1080/0142159X.2020.1795103)

To link to this article: <https://doi.org/10.1080/0142159X.2020.1795103>



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Published online: 28 Jul 2020.



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The pen is mightier than the sword. Reinstating patient care as the object of prescribing education

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ABSTRACT

Prescribing (writing medication orders) is one of residents' commonest tasks. Superficially, all they have to do is complete a form. Below this apparent simplicity, though, lies the complex task of framing patients' needs and navigating relationships with them and other clinicians. Mistakes, which compromise patient safety, commonly result. There is no evidence that competence-based education is preventing harm. We found a profound contradiction between medical students becoming competent, as defined by passing competence assessments, and becoming capable of safely caring for patients. We reinstated patients as the object of learning by allowing students to 'pre-prescribe' (complete, but not authorise prescriptions). This turned a disabling tension into a driver of curriculum improvement. Students 'knotworked' within interprofessional teams to the benefit of patients as well as themselves. Refocusing undergraduate medical education on patient care showed promise as a way of improving patient safety.

KEYWORDS

Activity theory; prescribing education; preparation for practice; workplace learning

Introduction

Qualifying as a doctor and becoming a resident (UK terminology: Foundation Y1 Doctor) gives students the right to treat patients. It gives them, also, the responsibility to do so safely and effectively. Residents practise with arms-length supervision, which means recognising which tasks are within their capabilities and asking supervisors to help with tasks that are not. Prescribing (writing medication orders) for patients in hospital exemplifies this type of supervised practice. It is, on the one hand, so frequently performed that it tends to be delegated to the most junior residents (Dornan et al. 2009). It is, on the other hand, the tip of a safety-critical iceberg. Since every prescription is part of a patient's whole process of care, safe prescribing is predicated on accurately assessing patients' complex needs, comorbidities, and responses to earlier treatments. Any prescription has potential to cause harm as well as good, which places prescribing decisions on a knife edge. Surveys consistently show that medical students becoming residents feel less well prepared to prescribe than to perform almost any other task (Illing et al. 2013; Monrouxe et al. 2017). Residents are right that they are unready to prescribe because up to 10% of their prescriptions are technically flawed, inappropriate to patients' needs, or frankly unsafe (Dornan et al. 2009).



The threat to prescribing safety posed by residents can be easily explained. You can really only learn to prescribe by prescribing. It would be possible to improve safety by giving residents less responsibility or supervising them more closely but hospital prescribing tends to rely too heavily on residents for

Practice points

- Be attentive to how politically driven educational changes create counterproductive tensions that affect the object of medical education.
- Involving students in real prescribing mediates their involvement in practice and helps them transition into a doctor's identity.
- A carefully conceptualised but simple and cheap intervention can cause major, potentially beneficial change in a complex social system.
- AT can help analyse complex problems and implement simple and effective solutions.

this to be imaginable. Society has become intolerant of unsafe practice, such as errors resulting from residents ascending their learning curves, so educators have intensified off-the-job teaching and training hoping that this can supplant practice-based learning. Evidence of the efficacy of this is, however, lacking. Experience suggests that both are needed.

This article is in two parts, linked by Activity Theory. The first critically reviews the history of the present, identifying tensions between off-the-job training and practice-based education. The second describes how a low-cost on-the-job formative intervention ('purple pen') reinstated patient care as the object of prescribing education and 'tipped' the system towards better learning. This made productive use of tensions and contradictions to cause expansive learning and involved students in the knotworking of authentic practice

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(Meijer et al. 2020; Engeström and Pyörälä 2020; Varpio and Teunissen 2020 in this Issue for other worked examples of these). Our central arguments are that: (1) education and clinical service delivery can be synergistic outcomes of an activity system whose object is caring for patients; and (2) an over-emphasis on off-the-job training and summative assessment is disruptive because it causes a fundamental contradiction in the object of prescribing education.

Apprenticeship education

Dating back to medieval craft guilds, apprenticeship describes on-the-job education, where a learner does real work in a one-to-one supervisory relationship with a master of a craft. Traditionally, medical students learned that way, (Dornan 2005) becoming progressively more independent (Kennedy et al. 2005) until they were ready to be independent practitioners. In AT language, caring for patients was the common 'object' (motivation) of clinical apprentices' practice and education. They were doctors-in-waiting, whose actions directly impacted patients' health. Clinical apprentices used the same tools as their supervisors. They obeyed the same official rules of practice apart from one additional one: to ask for help when tasks were too difficult. Apprentices also obeyed unofficial rules: not to disturb supervisors' sleep unnecessarily and not to betray weakness by calling for help prematurely. They were members of communities of practice, where the division of labour gave them easier tasks at first and harder tasks as they became more capable.

Education and patient care having a common object ensured that students gained the identity of doctors, became experienced, and learned to recognise when problems were beyond their capabilities. They worked productively, either by completing simple tasks unaided or helping trained doctors tackle complex tasks. Students worked under supervision until they were ready to work independently. They lightened supervisors' clinical loads and relieved them of menial work. Apprenticeship education treated error and harm as unavoidable, if regrettable, consequences of practice.

Limitations of apprenticeship

Lave and Wenger explained that apprenticeship has changed in all walks of life because the complexity of practice has changed one-to-one master-apprenticeship relationships into many-to-many relationships in communities of practice (Lave and Wenger 1991). Clinical education has fragmented into a plethora of activities as a result of the proliferation of technical tools, specialties, roles, and outcome expectations. This increases the potential for tensions and contradictions between interacting systems. More influential still has been the advent of the patient safety movement. Sparked by growing awareness and intolerance of medical harm, this movement viewed medical students as too potentially unsafe to be subjects in the activity of clinical care. The response was to develop an activity system, whose object was not caring for patients but demonstrating competence as a prerequisite for providing care. This changed the motivating force of education from patients to regulators and training bodies and it shifted the point when medical students were first fully confronted by

real clinical practice to the time when they assumed responsibility for patient care. The next section explains how this created a contradiction in the previously shared object of safe practice.

Preparedness for practice: A beguiling alternative

Politicians actively promoted the patient safety movement. In the UK, this strengthened the role of the General Medical Council (GMC), which regulates the education of medical students. It became fashionable to assume that standardising the teaching, training, and testing of clinical skills and theoretical knowledge would ensure students were prepared to practise safely. Standardisation tended to shift education from 'messy' workplaces to 'tidy' simulation suites, seminar rooms, and computer laboratories. Students now had to pass off-the-job situation awareness, knowledge, and skills tests. In the case of prescribing education, passing an off-the-job, standardised test of knowledge and part-task skills – the Prescribing Safety Assessment (PSA) – certifies students as prepared to prescribe for real.

The determinacy of preparedness versus the indeterminacy of practice

The high stakes assessments that assure preparedness have to be reliable enough to withstand legal challenge because judging students to be incompetent deprives them of a livelihood. Every student must, therefore, respond to standardised stimuli under standardised conditions. Assessments are on computers or in simulation centres because situations arising in workplaces are too indeterminate to support reliable testing. Decontextualising assessment, though, threatens its validity because much more harm results from the influence of clinical contexts on residents than on residents' competence per se. What is presented as a standardised task in competence tests can be a very different task in different patients with different comorbidities, at weekends rather than on weekdays, during nights rather than days, or on a medical rather than a surgical ward. Variation in the approachability and workload of fellow professionals also contributes to error. This is ironic: the indeterminacy of the practice settings that generate errors is such a threat to the reliability of assessments that these have moved to settings that increase the determinacy of test situations, which threatens the validity of tests. And it is validity that influences what is indisputably important – the safety of practice.

Putting it differently, tests measure competence, but safe practice requires 'an all-round human quality; an integration of knowledge, skills, personal qualities and understanding used appropriately and effectively' (Neve and Hanks 2016) which is termed capability. We observed that at least some students had become so accustomed to 'learning to the test' that successfully demonstrating competence in the PSA removed their motivation to become capable. The complexity of workplaces bewildered them. When they could have been familiarising themselves with the job of a doctor, they did little more than get a form signed to confirm they had attended. The quest for safe prescribing had become self-defeating: 'uroboric', like a snake eating its own tail.

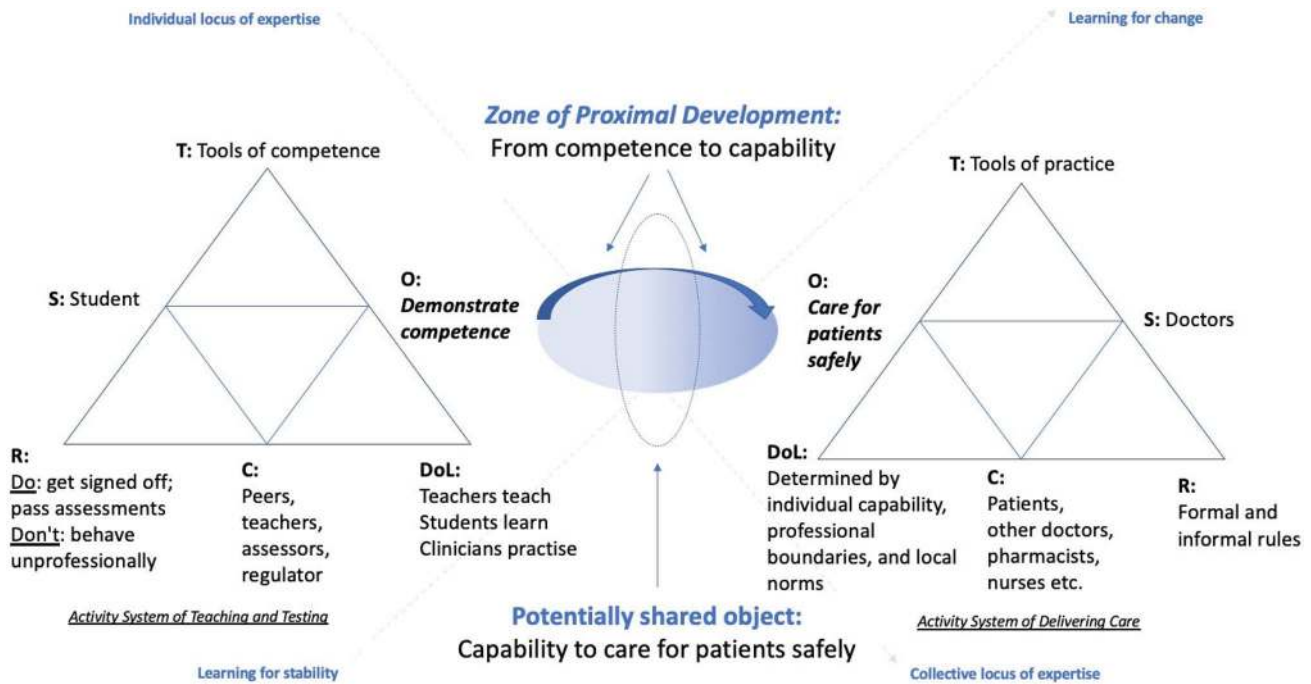


Figure 1. Two contrasting activity systems (see Table 1 for explanation).

Analysis, informed by AT

Figure 1 and Table 1 use AT to represent a contradiction between competence and capability, which creates a Zone of Proximal Development within which prescribing education could expand.

The activity of training and testing

The quest to improve patient safety has built an activity system of training and testing. The subjects of the system are students, who are potential threats to patient safety. The tools, rules, community, and division of labour of this system are divorced from practice, driven by the object of satisfying regulators that students have demonstrated competence in reliable assessments.

The activity of delivering patient care

After qualification, though, students assume the subject position of doctors in the activity system of clinical practice, whose object is to deliver safe patient care. The curriculum that ensured they were competent will not necessarily have familiarised them with the rules and tools of practice. They have to transition abruptly from observer to participant. The division of labour is suddenly different because they have to take responsibility for prescribing on behalf of nurses and pharmacists, most of whom are not legally allowed to prescribe.

Education for stability or change

Figure 2, after Engeström (2018) depicts a tension between education for stability and education for communality, flexibility, and change. Apprenticeship education (shown in the bottom left of the figure) is the archetype of individualistic education for stability. At the other extreme, experiential clinical education is dynamically co-produced by professionals, patients, and students in complex social milieus (shown in the

top right of the figure). Risk is ever-present and harm results from the indeterminacy of practice, which calls for flexibility and ability to change. (1) Political pressure to eliminate errors, however, fuelled a competency approach, whose locus of expertise is the (in)competence of individual practitioners, and the outcome of which is being able to respond successfully to standardised test items, located at the top left of Figure 2. Competency-based education is as likely to compromise as assure patient safety because of two contradictions: regulators hold individuals accountable for the safety of activities that are conducted by communities of practice, rather than individuals; and educators test a stable construct – competence – to be sure individuals can engage in a practice that is characterised by flexibility and change. We now describe a formative intervention, which addressed these contradictions.

The formative intervention

The setting and existing clinical education practice

With ethics approval, we conducted the research in Queen’s University Belfast (QUB), Northern Ireland (NI), which has a 5-year predominantly undergraduate entry programme, split between preclinical and clinical phases. Figure 1 shows the activity system of teaching and testing.

Health and social care to NI’s population of two million people is delivered by five Health and Social Care Trusts, which are individually responsible for risk management. Their senior physicians, residents, nurses, pharmacists, and clerical and technical staff teach students. Anxiety about comprising patient safety has limited students’ participation in patient care, even during 9-week hospital ‘assistantships’ when students ‘shadow’ their predecessors immediately before starting residency.

Hospital prescribers in NI use pen and ink to write the name, dose, frequency, route of administration of a drug and then sign the prescription. This authorises a pharmacist to dispense the drug and a nurse to administer it. Residents’ role is to transcribe patients’ prior medications onto hospital charts on admission (revising as necessary),

Table 1. An explanation of two contrasting activity systems, shown in Figure 1.

	Activity system of teaching and testing	Activity system of delivering patient care
Subject (S)	Students, who are assumed to be unsafe to participate in practice because their competence has yet to be proven	Doctors, who may only just have graduated but are expected to practise semi-independently, under sometimes very limited supervision, are assumed to be safe, and held accountable for it
Object (O)	Demonstrate competence, the outcome of which is to pass the Prescribing Safety Assessment and OSCEs, both of which take place off-the-job	Care for patients safely. In the context of prescribing, this means prescribing the correct dose, route of administration, frequency and duration of a clinically appropriate medication
Tools (T)	Tools of acquiring and demonstrating competence Books; lecture notes and slides; elearning; virtual patients; questions asked in previous tests; mannikins and other simulators	Tools of practice Stethoscope; pen; (electronic) clinical record and prescription chart; results of clinical examination, imaging, and laboratory tests; pager
Rules (R)	Be trained <ul style="list-style-type: none"> Attend training sessions in clinical skills (simulation) centres Pass assessments <ul style="list-style-type: none"> Skills tests: perform skills, as trained Written tests: commit information to memory; anticipate questions; learn answers Workplace-based assessments: be able to perform as expected under observation Be present in workplaces <ul style="list-style-type: none"> Attend and observe, as instructed; ensure you are signed off as having attended Do not participate in practice until you have passed competence tests Do not demonstrate lack of professionalism Behave as expected by the regulator at all times 	Overriding rule <ul style="list-style-type: none"> Work, as required by supervisors and managers Formal rules <ul style="list-style-type: none"> Adhere to local policies and clinical guidelines. Ask for help when uncertain Report adverse events Informal rules <ul style="list-style-type: none"> Above all, 'get by'; learn for improvement if time and case-load permit, and your seniors are supportive Do not ask for help with 'easy' tasks like prescribing unless you absolutely have to; remember others are very busy too Do not allow reporting adverse events to incriminate yourself or others
Community (C)	Community of teaching and assessing <ul style="list-style-type: none"> Healthcare professionals: members of the community when actively teaching, but membership of the community of clinical practice takes precedence Regulator: lays down a framework for educational content and processes Curriculum leaders: implement training and assessment 	Community of clinical practice, comprising Patients <ul style="list-style-type: none"> Including their friends and relatives Health workforce <ul style="list-style-type: none"> Clinicians: peers, more senior or junior residents, senior doctors, nurses, pharmacists, other allied professionals Managers
Division of Labour (DoL)	Formal education Teachers teach and train subject matter Learners learn, apply, and reproduce subject matter in assessments	Clinical roles: <ul style="list-style-type: none"> Determined partly by professional boundaries, and partly by individual capability and local norms. These are fluid, changing as learners accrue experience, and as practices develop Informal education <ul style="list-style-type: none"> Strongly influenced by the culture of individual clinical teams, most learning takes place in the circumstances of practice; it is often implicit but may be made explicit in teaching rounds, postgraduate clinical meetings, and other educational activities related to work

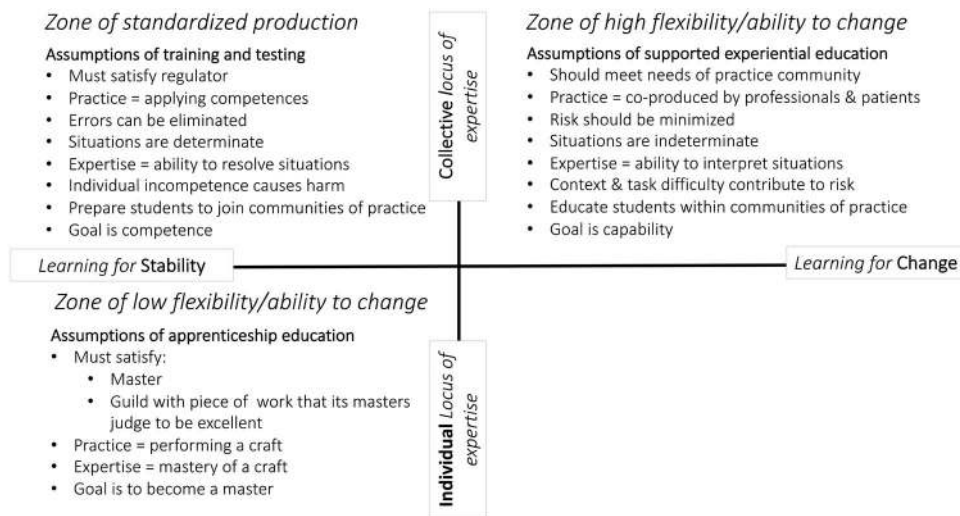


Figure 2. Three approaches to education for practice.

prescribe drugs at nurses' or senior doctors' requests, or directly initiate treatments. Pharmacists, nurses, and other doctors may suggest changes, but it remains the prescribing resident's responsibility to assess patients' often complex, interacting, and fast-changing illnesses before writing the prescription. Prescribing, which is one of residents' main tasks, is error-prone and stress-inducing.

Rationale

We reasoned that involving students directly in real prescribing rather than writing mock prescriptions or observing others prescribing would mediate students' involvement in practice and help them transition into a doctor's identity. We surmised that making patient care a shared object of education and practice would create a Zone of Proximal Development for expansive learning.

Research team

HG, a junior resident, led the project; EMcC, a medical student, conducted telephone interviews; HR and RC, clinical lecturers, helped analyse data; NK, paediatrician and Head of the Undergraduate Medical Programme, championed the intervention; TD, physician and education researcher, supervised HG and EMcC.

The intervention

To prepare students for real prescribing, researchers in Edinburgh and Keele Universities, UK, authorised students to write 'pre-prescriptions' on behalf of residents, using coloured ink or a label to show nurses that the prescription should not be administered until checked and signed by a qualified prescriber (Smith et al. 2013; Kinston et al. 2019). This was found to be so safe and effective that it became a routine component of clerkship education.

Implementation

Engaging the regional network of healthcare Trusts.

From an activity theory perspective, each Trust is an activity system. We were in a position to form a coalition of these activity systems, united by the pursuit of a common object, because the Head of the Undergraduate Programme (NK) was a member of our Team. We advocated for the intervention, explained its rationale and proposed procedures, gained support of regional healthcare leaders, and purposively selected four pilot sites whose leaders showed active interest.

Activity and object

We invited students to use pre-prescribing as a gateway to caring for real patients and neither made it mandatory nor assessed students' performance to avoid introducing new tensions.

Rules and tools

We drafted a Standard Operating Procedure (SOP) and discussed this with key stakeholders, refining its

applicability to local contexts and adapting it to the formats of different prescribing charts. Trust committees responsible for governance accepted a final version of it. We gave students pens with purple ink and made it their responsibility to discuss each pre-prescription with a qualified prescriber, who amended it if necessary, gave feedback, and countersigned it so the drug could be dispensed and administered.

Subject and division of labour

To help students use the rules and tools to care for patients safely, two junior residents developed a series of training scenarios that simulated routine prescribing tasks. They trained participants to pre-prescribe medications using purple pens, search local guidelines for prescribing advice, and cancel medication orders that a licensed prescriber had not countersigned.

Evaluation and data analysis

HG kept a log of the project and an audit trail of correspondence, meeting notes, and other information sources. We evaluated uptake of the intervention and used the regional incident reporting system to monitor harm. Six months later, EMcC carried out eight telephone interviews with junior residents who had participated in the experiment as students, administrators, lecturers, nurses, and doctors. She used open prompts to help participants describe their experiences. HG entered informative parts of her audit trail, comments from the telephone interviews, and personal reflections, whose length ranged from two to over 100 words, into a spreadsheet, which the team coded, collectively using AT as an interpretive framework.

Outcomes

Overview

Eighty students placed in medical and surgical wards in four hospitals participated. They wrote from a few prescriptions to hundreds of them. Most participating wards had pharmacists, who supported pre-prescribing and gave students feedback as they would to junior residents. A pharmacist audited 60 pre-prescriptions in one implementation site. Fifty-seven conformed to guidelines, one omitted the route of administration, and two omitted start dates. Not all students adhered to all procedural steps, such as writing their own names on the pre-prescriptions.

The project was successful in that: it allowed some students to become experienced prescribers before qualification; the SOP was found acceptable by different professional groups in different hospitals; no patient harm was reported. Not all students invited to pre-prescribe did so because, for example, wards did not accommodate it, students did not think it was worthwhile, or supervisors did not support it. Pre-prescribing opportunities were of variable quality because some junior residents to whom students were attached rarely made prescribing decisions, which left students little to do more than transcribe previously written prescriptions onto new charts. Clinicians and

Table 2. How pre-prescribing expanded the object of learning to care safely for patients.

Knotworking	<p>Pre-prescribing altered the rules of students' participation in practice. Giving them a role in the same activity system as practitioners involved them in dynamic care processes in busy workplaces, allowed them to learn authentic clinical work, and made them feel included.</p> <p>Pre-prescribing involved students in knotworking between doctors and members of other professions within practice. Working interprofessionally allowed them to learn from pharmacists and nurses as well as doctors.</p> <p>Changing the rules of students' participation in practice brought curriculum administrators into direct communication with some clinicians for the first time, particularly nurses. An interprofessional workforce having to develop new ways of working together formed new knots within individual Trusts.</p>	<p>"Whenever you ... have a chance to ... write this for them and all they have to do is sign this and check it for me, it made you feel actually part of the team" (Final Year Medical Student)</p> <p>"Pharmacists ... were very good to us and it was great to have their input and support as well" (Final Year Medical Student)</p> <p>"We had to find a way to communicate with nurses on wards and pharmacists ... it was very multi-disciplinary" (Medical Education Administrator)</p>
Expansive learning	<p>Pre-prescribing gave residents experience of supervising students and helped whole teams learn to practise more safely because looking closely at pre-prescriptions encouraged residents and other clinicians to verbalise their knowledge and uncertainties before countersigning students' pre-prescriptions.</p> <p>The need to help students participate in the activity of clinical care in order to learn altered the division of labour and promoted a culture of mutual support and team-based working and learning.</p>	<p>"It needs good supervision for the individual (student) ... so it was very positive thing for junior medical staff (residents)" (Consultant Physician)</p> <p>"A lot of people seemed to just know all of a sudden, that PP was a thing now ... and some of the nursing sisters were able to come to us ... saying would you mind writing this up for the F1 and ... at no point did I ever feel like I don't know what I'm meant to be doing here or put out" (Final Year Medical Student)</p>
Embracing tensions	<p>Before the intervention, it was tacitly accepted in some Trusts that students could help busy clinicians by writing real prescriptions, despite rules forbidding this. Pre-prescribing unearthed this unsafe culture of 'black pen prescribing' and used the tension between work and learning to promote safer practice.</p> <p>Pre-prescribing encouraged students and educators to reflect critically on prescribing education. This increased the value of 'classroom learning' by complementing it with authentic experience, whose need had been recognised but which had created contradictions in the previous activity system.</p> <p>Pre-prescribing highlighted the contradiction that 'unsafe students' became 'safe junior residents' at the moment of qualification. Providing the traditional stage of 'safe pre-prescriber' expanded the system of clinical education and helped students be safer junior residents.</p>	<p>"I think the risk of doing what we've been doing over the years ... is ... unsupervised, black pen prescribing, which has gone on for decades ... there are bigger risks there, and there are bigger risks for someone if you haven't practised at all" (Clinical Lecturer)</p> <p>"I think we still have to provide basic knowledge in a classroom format.. but I think there's a middle point that we haven't had until PP and I think it's that bit that we should be doing." (Clinical Lecturer)</p> <p>"It is that bridge between doing the PSA and all of a sudden you can prescribe anything ... (Now we are) ... so familiar with it that once you come to your first day of (residency) and someone says here prescribe this, you're like oh, no bother" (Final Year Medical Student)</p>

educators have become increasingly supportive of the intervention, which has continued to grow in scale and is anticipated to be implemented at scale in 2021.

We now present evidence that the intervention expanded the object of undergraduate medical education.

Expansion of the object

The text that follows gives a precis of findings, evidence for which is given in Table 2. The object of prescribing education – capability to care for patients safely – evolved by means of knotworking, expansive learning, and lessening of tensions.

Knotworking

By altering the rules to allow participation in practice, pre-prescribing drew students into the knotworking of clinical teams, educated them in authentic (as opposed to simulated) interprofessional working, and strengthened their

professional identities. Pre-prescribing formed new knots in the Activity Systems of medical education in individual Trusts, which brought the educational contributions of curriculum administrators and clinicians into closer alignment.

Expansive learning

Pre-prescribing expanded learning in Trusts by giving residents responsibility for supervising students' work, encouraging dialogue and thinking out loud, and giving students a clearly defined role, supporting the work of nurses as well as residents. It made an important contribution to safe practice by showing that students had often prescribed unofficially (using black ink) in the past; pre-prescribing with purple ink gave students a clear role with a clearly defined safety boundary.

Reducing tensions

Before we introduced pre-prescribing, students had mainly classroom teaching, limited experience, and no

responsibility. When they qualified, they experienced an abrupt transition to having full responsibility and little learning support. Pre-prescribing embraced this transition as an opportunity for expansive learning and made it less abrupt by providing a period of practice-based learning, with limited responsibility coupled with support.

Discussion

By applying AT to prescribing education, this article has shown how politically-driven educational changes created counterproductive tensions that affected the object of medical education. Introducing an activity system of training and testing standardised competences in standardised contexts contradicted the object of caring for patients safely in the indeterminate circumstances of practice. The simple and cheap intervention of giving students pens with purple ink and bringing practitioners together to agree operating policies that re-established patient care as the object of clinical education relieved tensions and expanded this object to offer new educational possibilities.

Transcribing brought senior medical students' learning closer to patients and prototyped a viable alternative to traditional apprenticeship education which is made necessary by today's multi-professional, highly technical, and fast-changing type of clinical care. The application of AT allowed us to identify limitations in linear, theory-before-practice curriculum designs which the patient safety movement, paradoxically, reinforced.

Participants prescribed, traditionally, with pen and ink, rather than electronic prescribing, which is likely to be ubiquitous in future. In doing so, however, it provided a pedagogic template for electronic prescribing, which will provide future opportunities to expand the object of clinical education by incorporating this and other related interventions into electronic clinical care systems. The intervention was not, of course, uniformly successful. Not all practitioners accepted it and not all practice environments were suitable. Some of the work that students did was unrewarding. And the possibility remains that this new tool will encourage students to go beyond what they are officially allowed to do by prescribing rather than pre-prescribing. Evidence suggests, though, that purple pen pre-prescribing brought illicit 'black pen prescribing' to light, which made the system as a whole safer.

Perhaps the most important implication of this research is that a carefully conceptualised but simple and cheap intervention can cause major, potentially beneficial change in a complex social system. It shows that relying solely on a complicated, costly, decontextualised training and testing regimen is a simplistic way of improving prescribing safety. We offer this experience to encourage others to use AT to analyse complex problems and implement simple and effective solutions rather than adopt politically driven, superficially attractive, but potentially counterproductive alternatives.

Acknowledgements

We thank Drs Samantha Smith and Effie Dearden, and Professor Helen Cameron of the University of Edinburgh for introducing us to

pre-prescribing and Dr Ruth Kinston and Professor Andy Hassell for inspiring us to adopt it and supporting our implementation of it. This work would not have been possible without the active support of clinical academic leaders, who are too numerous to name individually, but gave unstinting support to the process of change.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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