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Medical Education and Curriculum Reform: Putting Reform Proposals in Context

Rick Iedema, PhD*, Pieter Degeling, PhD†, Jeffrey Braithwaite, PhD‡, Daniel Kam Yin Chan, MD, MB.BS, MHA**

*Centre for Clinical Governance Research in Health
School of Public Health and Community Medicine
University of New South Wales
Sydney, NSW, 2052, Australia

†Centre for Clinical Management Improvement,
Wolfson Research Institute
University of Durham Stockton Campus
University Boulevard, Thornaby
Stockton on Tees TS17 6BH, U.K.

‡Centre for Clinical Governance Research in Health
School of Public Health and Community Medicine
Faculty of Medicine
University of New South Wales
Sydney, NSW, 2052, Australia

**Bankstown-Lidcombe Hospital
School of Public Health and Community Medicine
Faculty of Medicine
University of New South Wales
Sydney, NSW, 2052, Australia

Abstract: The purpose of this paper is to elaborate criteria by which the principles of curriculum reform can be judged. To this end, the paper presents an overview of standard critiques of medical education and examines the ways medical curriculum reforms have responded to these critiques. The paper then sets out our assessment of these curriculum reforms along three parameters: pedagogy, educational context, and knowledge status. Following on from this evaluation of recent curriculum reforms, the paper puts forward four criteria with which to gauge the adequacy medical curriculum reform. These criteria enable us to question the extent to which new curricula incorporate methods and approaches for ensuring that its substance: overcomes the traditional opposition between clinical and resource dimensions of care; emphasizes that the clinical work needs to be systematized in so far as that it feasible; promotes multi-disciplinary team work, and balances clinical autonomy with accountability to non-clinical stakeholders.

Keywords: Curriculum reform, evaluation criteria, systematization, multi-disciplinary teamwork, responsible autonomy

Recent debates in the popular media and academic literature over the role of medicine in society are indicative of the complexities and counter-veiling pressures that currently confront doctors. A example where a medical decisions has led to public controversy, is the decision by United Kingdom (UK) doctors to use IVF to impregnate the mother of a child with the purpose of using the umbilical blood of the new-born baby to save the older child.[1] Another globally debated case concerns the recommendation by UK doctors – contradicting the wishes of the parents - to surgically separate their twins so as to save one baby at the expense of the less independent other.[2] In Australia there has been controversy about doctors recommending a 'do not resuscitate' or DNR order for a heroin addict who, against the odds, managed to achieve a measure of recovery which was widely reported in the local papers.[3]

Then there are events which have put the spotlight on the medical profession in ways which have been even more far-reaching. One such recent event is the Bristol case [4, 5], where it was revealed that doctors operating on babies achieved outcomes which were much worse than the national average, and, equally problematic, that peer review processes were not effective in putting a stop to these unsafe practices. A recent report from the U.S. has thrown up related issues focusing attention on error rates and mishaps.[6] At a more mundane level but also causing friction, there is the gap between the fee charged by the doctor and the government-sanctioned fee which leads to a shortfall that has to be met by the patient, [7:64] as well as the continued privatization of services in many countries [8-10] with variable outcomes for patients and carriers. Finally, debates over the status of nurse practitioners in rural and regional care centers and of midwives in maternity care are also evidencing an increasingly critical stance towards medicine.[11, 12]

As documented by a range of social researchers, these controversies have to some extent called into question the public's conventionally forgiving attitudes towards and faith in doctors and their medical care .[13-15] The pressures which doctors face as a result of these controversies and views are only likely to increase, not least thanks to growing public and government attention to issues of safety and quality in health care,[16-18] and the increasing prominence accorded to the new ethos of public accountability. This accountability is in part achieved through recently instituted modes of organizational and managerial surveillance and control, as embodied in health care complaints units, new management information systems, and increasingly vocal patient interest groups, community organizations and specialized media campaigns. These new modes of surveillance and control are sending clear signals to the medical profession that its traditional forms of quality control, such as peer review, scrutiny or accreditation by medical and surgical colleges and the like, are no longer seen as sufficiently robust in safeguarding society. The recent events just listed seem to suggest that mechanisms for achieving public accountability are on the rise, and it is not clear where the intensification of this drive for accountability will end.

The critiques of medical practice that came in the wake of these events have not been ignored by doctors, nor by those who teach student doctors and design medical curricula. The ways in which these critiques have been taken up or responded to, however, have varied. For most, what Kamien et al have called medical schools' "fourth obligation" [19:9] encompasses the strategy taken to address the changing position of medicine in 21st century society. This "fourth obligation", in addition to medical teaching, research and service, consists of responsiveness and accountability to society at large: a 'social responsiveness'.[19] With this notion, Kamien et al argue for greater attention to medical students' awareness of social inequity, ethics, resources and funding on the part of curriculum designers. While Kamien et al's emphasis on social responsiveness is important, there is little in their work that promotes a critical concern with medical work itself.

Our view is that the resulting intensification of the accountability measures affecting the practice of medicine cannot be dismissed as being no more than inappropriate power exercised by bureaucrats and managers;[20] as being part and parcel of the legal onslaught on medicine,[21] or as consumerism turning medical care into a tradable commodity.[22] On the contrary, we are of the view that these new accountability demands are both inevitable and necessary, not least because they have the potential of achieving an acceptance within medicine of a stakeholder approach to defining what is adequate change.[23] Allowing such a stakeholder approach to inform curriculum change may contribute to enhancing trust relations by potentially balancing medical prerogatives with accountability to different stakeholders. Clearly, such an approach has consequences for how and what doctors communicate about, how they relate to each other and to other clinicians, how they organize and communicate their services across professional and organizational boundaries, and, last but not least, how they structure their medical educational programs.

Accordingly, the resources and competences needed by doctors to achieve these new kinds of inter-professional and organizational communication are rising in importance, for medical work generally and for medical teaching in particular. In addition to being about generic cross-cultural competences, these communications comprise very specifically targeted discourses. We argue that medical curricula need to pay significant attention to those communicational and organizational aspects of medical work whose scope includes but also exceeds that of the doctor-patient dyad,[24] and that facilitate addressing and managing clinical care as pre-planned and coherent sets of services, provided by multi-disciplinary clinical teams, for populations of patients. Without extending medical discourse along these lines, we remain tied to a conceptualization of medical work and medical competencies that is particularized and individualized, or one that is too generic to be of immediate and practical application. We will keep on train-

ing our student doctors for a world they are not able to effectively reflect on, act on, and intervene in, because they lack the discourses, resources and competencies required for negotiating cross-service, cross-professional and cross-organizational relationships.

The paper's argument is that medical curricula and medical education, in so far these are described in the literature,[25-33] typically take limited note of the need to provide educational space for, produce syllabus content around, and devise practices that seek to realize students' engagement with the complexities of organizational and communicational dimensions of care.[34] Moreover, the modes of evaluation that have been proposed to gauge the success of curriculum reform initiatives, while strong on measuring changes in knowledge and skills [35] and eliciting feedback from students going through the new programs,[36] have not always put assessment of the logic of curriculum change itself center-stage. Thus, proposals to include course elements such as 'hospital management' [37] may be important and innovative, but unless we are clear about the *criteria* that motivate their inclusion, we are likely to fall victim to what Bloom has called "the paradox of reform without change." [38]

The main aim of this paper is to propose criteria by which the principles of curriculum reform can be judged. Before doing so, the paper presents an overview of standard critiques of medical education and examines the main responses in current medical curriculum reform (Section 2). Section 3 sets out our assessment of these curriculum reform responses, and distils recent developments down to three issues: pedagogy, educational context, and knowledge status. Section 4 takes note of the changing position of medicine in society, and the need for a stakeholder approach to devising curriculum change. The section then relates this to clinical work and medical curriculum development, and finishes with a proposal for four criteria with which to gauge medical curriculum reform. Section 5 suggests some practical ways forward and offers some concluding statements.

Critiques of Traditional Modes of Medical Training

Critiques of medical education have highlighted misalignments between broader social expectations on the one hand, and the practices of medicine and the stances taken by doctors on the other.[30-33,39,40] Four main kinds of misalignment are evident here. The first among these is the overly scientific orientation of medical curricula. It has become quite clear that the emphasis placed in medical education on 'hard science' - "the traditional bias toward biomedical science that so dominates the medical educational scene …" [41: 55] produces some undesirable outcomes. Student doctors have traditionally been trained to see themselves as primarily medical scientists, and this has been found to be to the detriment of doctors' social and organizational functions: "medical schools may prepare physicians well for their narrow, biomedical responsibilities but inadequately for their expanded roles." [34:49] The specialized focus of medical training has thus led doctors to conceptualize their responsibilities and tasks predominantly in scientific-technical terms, and this has detracted from how they enact their moral accountabilities, their organizational duties, as well as their social responsibilities.[42, 43] In response to this, curriculum writers have sought to achieve an improved integration between the basic and applied sciences (cf [26]).

A second problem centers on how the attention paid in medicine to acute and chronic disease, with limited focus on the socio-cultural and behavioral determinants of disease, tends to maintain a system which revolves around the treatment of the results of accidents, physical deterioration and unhealthy living, but which affords only restricted means for attending to the causes of morbidity and mortality. This led to the acknowledgement that "students require an understanding of the social nature of disease processes, and a growing recognition that graduates need to have skills in the area of disease prevention and health promotion." [44:231] As in medical circles the relevance of the 'population perspective' (cf [25:5]) is now seen to be an important part of clinical decision making,[45, 46] curricula increasingly offer course options centering around epidemiology and public health. [47]

Thirdly, critics have commented that the practical, actual outcomes of medical training often contradict the 'sacred' mission of medicine. A host of studies show how medical students, rather than espousing the altruistic and service-oriented precepts contained in the medical oath, tend to become increasingly individualistic and even cynical in the course of their education,[48-51] among many others. Aside from this loss in humanism, evidence has also suggested that students grow increasingly 'conservative' (i.e. protective of profession-centered interests and priorities) as they progress through their courses.[52-54] These issues are addressed as courses are introduced which seek to create an awareness on the part of the students of alternative value frameworks. Some such courses (as envisaged in Irvine [55]) incorporate components on medical ethics and health rights, which, while not always focusing on the tragic choices, wicked problems and mundane compromises of everyday clinical

practice,[56] offer up for philosophical consideration 'commonplace ethical dilemmas'.[57:287] Other initiatives have been the re-structuring of the student selection process, with the aim of attracting students with a greater range of practical experience and social awareness. [44]

Finally, and as research going back as far as the 1950's and 1960's already suggested, the lack of attention to communicative and interactive skills on the part of trainee doctors was linked to low levels of communicative success of clinical interactions and consultations.[58: 73ff, 59, 60] Initially the communication problem was evident only in doctors' interactions with patients,[60, 61] and it was this problem which the integration into medical programs of communication and interview skills components sought to address. The assumptions and prerogatives of medical communication have been found also to affect how doctors interact with fellow clinicians and representatives of hospitals' management,[62-64] but only in a limited way are curriculum writers becoming conscious of the need to integrate cross-disciplinary communication components into their courses.[65]

Speaking very generally, medical educators have sought to address these critiques by reforming curricula on three broad fronts: at the level of pedagogy, educational context, and content. Changes in pedagogy have aimed to infuse medical education with new modes of teaching that are more socially-aware, more practice-oriented, more engaging and more acknowledging of students' diverse interests and concerns. Changes in educational context have aimed to enrich clinical training by including community health care centers, rural and regional medical centers, but also other kinds of care facilities as teaching sites, extending the clinical experience from acute to other settings. Changes in content have aimed to revisit the issue of what is deemed to be 'basic knowledge' (e.g. anatomy, physiology). Here, attempts are made to re-address the relationship between traditional medical knowledge and other forms of knowledge, including epidemiology, ethics, communication, and so on. The next section addresses these three domains in more detail.

Pedagogy, Educational Context, and Status of Formal Knowledge

On examination of the courses on offer, it appears that a disjunction arises between the intentions of educators on the one hand, and the substance of reform initiatives on the other hand. Here, we will explore these disjunctions with reference to each of the three domains just mentioned in turn.

Changes in Pedagogy- Repositioning teacher and student - *How* medicine is taught is at the forefront of curriculum reform, and is centrally concerned with issues of *pedagogy*. Our choice of *pedagogy* has consequences for the way we structure the curriculum, its contents, and its mode of delivery.[66] This is because pedagogy affects not merely what students take away, but also what teachers do; that is, how teachers project both themselves and their knowledge to students. Most importantly for the concerns of curriculum writers, the choice of pedagogy constrains how teachers and students are positioned in relation to one another, and how expectations translate into a structured syllabus; that is, the study materials. The lecture, for example, positions participants in the learning process very differently compared to clinical training, or self-directed learning.

If the curriculum does not transparently confront the fact and the implications of these changing positioning, its educational intent is unlikely to be realized in the syllabus and the teaching and learning. Without explicit reasoning about why these innovations are introduced, our pedagogic rules and expectations will remain 'invisible' to both teacher and learner.[67, 68] Under these circumstances, the 'invisible pedagogy' is most likely to naturalize and privilege conventional and dominant roles and relationships, as well as marginalizing the intended change and innovation. A visible pedagogy, by contrast, sets out in explicit terms the targets, objectives, limits and interpersonal implications of curriculum resources and strategies. If pedagogy and educational strategies are promoted without such transparent and comprehensive definition, teachers' decisions and learners' understandings in response to the new curriculum are going to remain arbitrary and unconnected.

One way of assessing medical curriculum reform, then, is to consider in the light of the above considerations statements made by medical educators about pedagogy, such as "Developing the ability to learn by inquiry (often referred to as 'learning-to-learn') should be an explicit part of a medical curriculum. Learners must also develop an ability to think about their own learning." [28:29] Strategies like 'learning-to-learn', 'inquisitive learning', and the like are a central part of modern curricula. In our view, however, these notions need to be carefully defined and specified, and explicitly related to what they mean for day-to-day teaching for them to become educationally valid and useful. Our pedagogic philosophy, in other words, must have tangible consequences for the way we design and execute the curriculum, its contents and its delivery.

As said, pedagogy positions students, teachers and knowledge in relation to each other.[69] Most importantly for the concerns of curriculum writers, our choice of pedagogy will have consequences for those relationships, and this, in turn, has (or must have) tangible implications for course materials. Equally, in a 'visible pedagogy', the targets, objectives and limits of its pedagogic strategies, as well as the kinds of contents which are judged to realize the desired outcomes, are set out in explicit terms, promoting the objectives of student inquiry and reflection from the level of indeterminate ideal to clearly defined, recognizable and assessable student practice.

Significantly, too, terms such as 'inquisitive learning', 'reflection' and 'self-directed learning' originate from pedagogic theories which aimed to challenge traditional conceptions of learning centered around the memorization of 'hard' facts. Seeking to overcome this traditional emphasis on the centrality of knowledge, 'learner-centered' pedagogies put the needs, concerns and interests of the learner, rather than those of the system or the teacher, center-stage.[70-72] In a similar vein, 'self-directed learning' harbors the ideal that students should ultimately be able to discover as well as generate knowledge relevant to their needs without overt and explicit guidance and direction from teachers. But this discourse of 'learner-centeredness' says more than merely highlighting and creating room for individual students' different backgrounds, variable knowledge, needs, motivations and interests. This discourse embodies a *critical* edge that educators themselves need to confront and accommodate. Because the pedagogic orientation at issue here does not seek to erase but foreground such differences, students can now assess knowledge based on its usefulness for and applicability to their own interests and orientations. This means that students no longer need to take information as naturally, self-evidently and unquestionably useful and true. Instead, the usefulness - and to some extent even the truth - of such information becomes a function of its relevance to students' and practitioners' situated needs, concerns and interests.

It is in that sense that learner-centered pedagogy is a 'critical pedagogy': it enables and encourages students not only to access different and sometimes even contradictory kinds of knowledge, but also to assess these kinds of knowledge with regard to the experiential contexts within which they live and seek to deploy those kinds of knowledge. In a 'critical pedagogy', students are not receptacles of coherent collections of independent facts and pre-structured knowledge to be deployed in situ, but capable apprentices who are being socialized into a set of discourses and practices, with adequate means for reflecting on those discourses and practices, as well as on their own process of educational socialization. Hence, a 'critical pedagogy' produces the possibility that students socialize into different and sometimes incompatible discourse practices, producing potentially incommensurable kinds of learning.

With respect to the curriculum, the uncertainties, the misunderstandings, and the political sensitivities that surround specific areas of medical practice (think of prostate cancer treatment, 'DNR orders', organ donation and transplantation, genetics, etc.), could be used to address medicine's silences, complexities and contradictions, and highlight the need for situated and contextualized modes of diagnosis and decision making. A 'critical pedagogy' will not gloss over such uncertainties and sensitivities, and neither will it dissimulate their problematic, tragic and perhaps even 'wicked' nature .[73] In a 'critical pedagogy', students are not only confronted with what medicine knows and does, but also with the limits of what it knows and does - limits where others with different skills and ways of knowing step in to complement medical practice.

What needs to be specified is not only *that* students will achieve self-directed learning and reflection, but also *how*; that is, what will they reflect on or enquire into. In our view, the private, philosophical and non-specific intent of these terms is ill-suited to the more overt and direct engagement required in modern doctoring with the range of discourses and practices which now criss-cross medicine. Rather, curriculum statements need to make explicit how these learning strategies translate into classroom action - that is, 'reflection' and 'inquisitive learning' are to be formulated in terms of clearly delineated discourses, learning exercises and study foci. Without these, teachers as well as learners will remain unclear about what these terms mean, as well as about their relevance to syllabus design, performance and assessment. The reflexive consideration of medical discourses and practices by students cannot take place in a vacuum and requires explicit framing, guidance and encouragement. When we formulate our criteria below we will have opportunity to return to this point.

Medical teaching in context(s) - The *contexts* which are to be given prominence in our medical training should include the 'geographical locales' of the hospital ward as well as that of the urban, rural, and regional medical center. While traditionally medical training has been welded to the hospital, the

broadening of medical training to include alternative clinical settings arises from an acknowledgement that not all doctors will end up working in acute centers, but may find employment in other kinds of organizations. It further acknowledges that clinical work will vary from specialized and highly technological practices enacted in teaching hospitals, to more broadly defined clinical roles enacted in less well equipped regional, rural and community settings. This expansion of the range of contexts in medical training will generate a fuller picture of what it is that current and future modes of clinical work entail.

This advantage notwithstanding, there is little evidence that future modes of medical education will incorporate space for explicit consideration of and reflexivity about its various clinical practice settings (but see [74]), the ways in which these settings interact with one another, or the ways in which these entities and relationships are changing. Lacking the resources to address these issues, programs will continue to project to students a largely 'take-it-for-granted' view of the intra-organizational, inter-organizational, and inter-disciplinary dimensions of the medical work. By not providing students with the resources for conceptualizing and considering the systems dimensions of the various medical settings in explicit terms, and from alternative perspectives, medical schools are failing in two regards. First, they are not appropriately training future doctors for the social and organizational intricacies and complexities that are constitutive of organized doctoring. Second, they fail to furnish students with the means to enhance their participation in and contribution to these work settings, and thereby fail to foster their proclivity towards 'lifelong learning' other in a narrowly defined medical-scientific sense,[75] or in an arbitrary, literary sense.[76]

Due to changes in work places in general,[77, 78] and the (re)configuration of provider organizations,[79, 80] the problems which are inherent in the ways in which doctors (are taught to) work and communicate, and the ways in which they work and communicate with other doctors as well as with other professionals in formal health care settings are increasingly attracting attention and criticism[15,63,81,82] In the face of this, there is evidence which shows that the positions which doctors' take on issues such as clinical practice variation, the relation between the clinical and resource dimensions of care, evidence-based medicine and the standardization of clinical work, suggest medical clinicians are unlikely to favor transparent discussion of such and other problem issues among themselves, let alone across professional boundaries .[83] Lack of critical attention paid to the organizational dimension of doctoring in fact means that student doctors' identification with the positions taken by the medical fraternity into which they are 'vocationally' inducted is likely to continue to override interest in contributing to the clinical work on a transparent, accountable, team-oriented, service-centered and resource-conscious basis.

By and large, there is continued black-boxing of the hospital's 'negotiated practical order' [84] and sequestering of medical education in the clinic away from contexts conducive to critical reflection. This black-boxing and sequestering have enabled both the profession and medical education programs not only to persistently affirm 'a medical model', but also to continue to render its limits invisible by wrapping these in private and guilty knowledges to be guarded by the initiated. It is in that sense too that clinicians as well as clinician teachers are able to exploit the room for maneuver afforded them by their taken-for-granted and essentially unqualified rapport with the hospital context and the continuum of care. While admittedly the full-time status of some staff specialists, registrars and medical academics tends to strengthen their sense of connection with their teaching hospital, with the services it provides, and with the continuity of those services, others, such as visiting private specialist practitioners, are independent contractors. The latter's resulting intermittent relationship with their hospital tends for many to remain restricted to matters that touch on their immediate interests only, and that leaves little room for attention to issues that pertain to the logics of care; let alone to issues to do with innovation in their teaching to suit new 'philosophies', 'ideologies', or 'pedagogies'.

These factors in part explain the rather indifferent performance of both universities and medical colleges in establishing *explicit* practice standards for their specialty fields, and provide students with resources and methods (guidelines, protocols, and the like) to guide them in their medical apprenticeships. It seems logical to suggest that this absence of explicit practice pathways, that is, an explicit discourse about what medical work is, will ultimately be to the detriment of medicine as a whole, in so far as it rules out of court three crucial possibilities:

1. That medicine be self-reflexive about and critical towards its own practices for the sake of both student training and improvement of quality and outcomes;

2. That medicine negotiate the details of medical practice across not only different specialties and but also other disciplines, and
3. That medicine render its self-descriptions increasingly sophisticated, and in turn enabling its practices to move to higher levels of complexity. [85, 86]

In the main, provision of space, or a context, where generalizations can be considered, reflections pursued and critiques formulated about medical practice remains chancy and localized, both in clinical practice [87] and in medical education.[56] The tendency to privilege the situated or experiential dimension of clinical work tends to be justified by saying that student doctors need to familiarize themselves with the uncertainties and ambiguities of clinical practice. These uncertainties and ambiguities, it is claimed, render the amalgam of clinical and social skills and activities unteachable in settings outside the clinic, because what produces 'good clinical outcomes' is not routine, and therefore non-standardizable, and non-communicable: "cases [that] are unique, … every patient represents his own unique set of problems that cannot be resolved by rigid application of some legalistically formulated rule." [88:44-45; see foot note 1]

The effect of this, however, is to render the outcomes produced by those skills and activities unavailable for external assessment, scrutiny and comparison. More academically questionable still, this means that representations in the medical program of that clinical work are likely to continue to be cast in the form of a list of individual 'cases' relevant to a given specialty. This is the basis of what, in the vocational context, produces the invisible pedagogy of 'encyclopedia' teaching: "for physicians, armed with a detailed knowledge of particular cases and constantly on hand, an insistence on case-by-case decision making is a means of maximizing their own discretion".[90:11] In short, without a 'neutral' context where the practice of medicine can be approached reflexively and inquisitively, the stated objectives of curricular reform will have been circumvented, and the traditional status quo preserved. This point too will be picked up again in our criteria below.

Knowledge, medical decision-making and the medical curriculum - These first two points relate to a third and somewhat more abstract issue. The level of explicitness that we are able and willing to invest in our pedagogy and curriculum not only reflects our preferred mode of knowing, but also our preferred *mode of relating*. Are we able to make explicit, and create a space for reflection on, not only the formal but also the more difficult, tragic and compromising dimensions of what we know and do? The aim here is not of course to produce an exhaustive record of great confessional depth and procedural detail, not least because doing so is both undesirable and impossible.[91] Rather, the question here is how productive a pedagogic situation is when scientific and authoritative knowledge is allowed to impose a 'learned' distance, in contrast to one in which openness and trust make possible discussions about the intractable complexities of medical practice and decision-making?

Thus, we should ask, is our mode of knowing and teaching one which bears no contradiction, difference or uncertainty? Or is it a mode that is capable of contextualizing itself intellectually, socially, culturally, politically, organizationally and interactively? The former mode of course is one which is concerned to affirm its premises by reference to 'unshakable' proof, statistical evidence and absolute truth; it dismisses alternatives as inappropriate challenges, and denies that any knoweldge arises out of a confluence of very specific social, cultural, technical, and organizational factors. The latter mode, by contrast, is able to regard itself as a product of not only scientific, but also socio-historical, political and interactive events. Knowing, in this latter view, is intimately tied to the contexts which make it possible, which nurture its relevance, where it has meaning, and where it serves specific interests. Such knowing is not some independent construct of information ('learned in one place and applied in another'), but a set of sayings and doings shared by specific communities and their practices, and situated in the midst of a host of competing social, cultural and political discourses offering alternative views and definitions.

Clearly, for a lot of doctors, medical knowledge is scientifically derived, and applied with a discretion that at times touches on artistry. [62, 92, 93] In their view of the world, knowing and its contents are natural and necessary, as they are scientifically motivated by what is 'real'. There are clear problems with this

[1] Feinstein notes that "a clinician performs an experiment every time he treats a patient. The experiment has purposes different from those of the laboratory work, but the sequence, and intellectual construction are the same: a plan, an execution, and an appraisal. [Yet in doctors' judgment] our experiments in treatment were acceptable by the standards of the community, but were not reproducible by the standards of science. Clinical judgment was our method for designing and evaluating those experiments, but the method was unreproducible because we had been taught to call it an 'art' …." [89:14].

view, however. First, science does not have a monopoly over 'the real'. Thomas Kuhn's "The Structure of Scientific Revolutions" [94] has taught us that science is not a rational and progressive accumulation of facts and information that contribute to building our knowledge about 'the real'. Kuhn showed that scientific knowledge most often contradicts past knowledge, and that new knowledge is contingent upon entirely new and incommensurate paradigms of knowing. Thus, scientific knowledge is not a body of truths, but a set of specialized ways of talking and doing that have a degree of efficacy. In addition, a lot of these specialized ways of talking and doing keep on existing (witness the contestations about the impact of sanitation and hygiene in the 19th century, or the more recent struggles around vaccination). Knowledge and science do not grow in a linear fashion, and considerable proportions of them remain mutually exclusive and contradictory.

An important outcome of this realization is that the status of terms like 'fact', 'certainty' and 'proof' has changed. As Prigogine notes,

> "Classical science emphasized order and stability; now, in contrast, we see fluctuations, instability, multiple choices, and limited predictability at all levels of observation. … In the classical view – and here we include quantum mechanics and relativity – laws of nature express certitudes. When appropriate initial conditions are given, we can predict with certainty the future, or 'retrodict' the past. Once instability is included, this is no longer the case, and the meaning of the laws of nature changes radically, for they now express possibilities or probabilities. Here we go against one of the basic traditions of western thought, the belief in certainty." [95:4]

If Kuhn challenged the positivist view of scientific knowledge, Prigogine explodes the possibility of absolute ('positive') proof and certainty. Following these arguments, claims about knowledge that is basic to medicine, in contrast to other kinds of knowledge that are merely peripheral or even inimical, are not 'realist' claims. We must now accept that knowledge is constructed and maintained to serve specific needs and interests; it is not only *surrounded* by contesting discourses, but in fact itself most likely shot through with probabilistic and sometimes even contradictory meanings. Any claim as to the universality of a knowledge is ultimately a *political* claim - as is, of course, the very claim that we make here.

While it might seem that the emphasis on paradigms and probabilities ties scientific knowledge and its modes of knowing into self-referential and relativizing knots, such an objection in fact feeds off the expectation of an all-or-nothing, absolute answer to the problem that we now face.[96] Relevant here is the lesson offered by the 'post-modern turn' (which swept through the sciences following - among others - Kuhn's critique [97]), which is precisely that there are multiple constructions about what life and reality have to offer, and that we are morally, politically, and practically obligated, not only to acknowledge, but also to engage with those myriad ways of knowing the world.[98]

The question which arises at this point is, to what extent are such post-modern insights compatible with the tenet of medical curriculum reform? From our analysis, it appears that while some aspects of the innovations recently proposed tackle the contextualization of medicine, others remain ambiguous. In our view, acceptable innovations in learning and knowing will only become possible when different constructions of and knowledge and discourse about medical practice and disease are integrated into the medical curriculum. Only by acknowledging difference and allowing and encouraging critical reflexivity will medical knowing evolve, and will our medical curriculum be able to make space for the contextualized, ethical and practical ways of knowing and doing that are increasingly being demanded from clinicians.

Consequences of social changes and of health reform: four assessment criteria - But what should this new plurality consist of, and how can it be realized in the medical curriculum? In view of the pressures bearing on medicine commented on in the opening of our paper, such a plurality of stakeholder inputs should encompass not only those discourses and practices *traditionally* associated with medical work, but also those required for dealing with the changes in the social and organizational world around doctors: changes in health care policy, new 'streamed' and standardized ways of organizing clinical work, practice and quality improvement methodologies, changing medical and informational-communicational technologies, and so on. We now need to state in greater detail what this plurality of stakeholders and their discourses looks like, and formulate criteria to help us assess whether they have been envisaged in our medical educational reforms (cf [83]).

Let us briefly consider each of the new stakeholder domains more closely, to facilitate formulating our assessment criteria. The new stakeholders include, first, medicine's purchasers; that is, governments, health departments, insurers. Back in the 1970s and at a time of shrinking budgetary resources, purchasers saw that acute care was fast becoming an ever-increasing consumer of resources. Borrowing from commercial management, policy makers, health bureaucrats and health insurers began to call for improvements in effectiveness and efficiency, and make demands to match inputs to outputs.[99] Casemix funding via DRGs is one exemplar of this [100, 101]; practice improvement tools such as EQuIP being another [102]. Having phrased the new health care regulations and requirements in this language of accounting, private sector management, and the more recent quality improvement rhetoric, purchasers have in effect placed the onus on medicine to elaborate on what these new policies and discourses mean for the ways in which doctors do their work.

Second, and as a direct result of the growing intrusion of health care policy and management ideas into the medical-clinical sphere, hospital administrators and health managers increasingly conceive of their work in terms of controlling the clinical work in health care settings ('managing down') rather than in terms of pursuing funding sources to facilitate whatever went on in their health care settings ('managing up'). They are therefore trying to understand what clinicians do, with the aim to map, plan and project their organizations' budgets, activities and outputs into the future. Their concern with work process control, benchmarking, evidence, and standardization centers therefore mainly on the need to move from what used to be autonomous and conventionalized practices and historical budgeting to a situation where clinical and managerial activity devise a common discourse.

Third, and due no doubt to the rising prominence of medicine-related events announced in the mass media, the public has begun to assume a very strong political presence through complaints bodies, interest groups and organizational participation at the local community and hospital levels. In earlier times, the public have been the receivers of medical care as patients and the objects of its largely unstandardized and invisible modes of ensuring quality and outcome. By giving more attention to the tragic choices, wicked problems and mundane compromises of medical care, the public, the patient and the people that care for them, as well as the medical community itself, are less and less inclined to allow doctors to dismiss these matters as merely the 'fuzzy' obverse of expert care. In acknowledgement of this, patient-shared decision-making is coming to the fore as a mode of practice that is reflexive and enabling for patients, but quite demanding for practitioners in terms of their communicative and empathetic abilities.[103, 104]

Fourth and last, other and alternative health providers including nursing, allied health, and the complementary healing professions, have become less and less content to take the back seat in negotiations over and decisions about work method, patients' treatment and (legal) responsibility for the quality and outcome of care. This contingent's alternative perceptions, experiences and conceptualizations of clinical care provide a critical counterpoint to the long-held assumption on the part of doctors that their medical expertise is synonymous with organizational power, privilege and prominence. The knowledge and initiatives emerging from within these professions represent important and new approaches to care, cross-professional communication and risk management.[105] Most important here are those recent developments in nursing, for example, which have led the way in devising communicative opportunity by explicitly standardizing or mapping as a 'critical pathway' a range of clinical activities.[106, 107] Nurses' achievements in this domain put into sharp relief the conviction among some doctors that explicit description of the routine dimensions of what they do is inimical to medicine's 'art of science' and reduces medical expertise to 'cookbook medicine' [108] – a stance of course which is of deleterious consequence for co-workers in nursing, allied health, health management, *and* for the public, in *their* attempt to understand, negotiate, and contribute to the substance of clinical practice. [85, 86, 109, 110]

The legitimacy of these four stakeholder groups and their claims over aspects of modern medicine is contingent upon not only acknowledgement from within medicine, but also, we suggest, upon integration of their discourse into medical education. Put differently, the expansion of the spectrum of stakeholders in health care requires not just medical practitioners but also medical educators to seek a new balance between bio-socio-psycho discourses on the one hand, and the pluralist complexity of health policy, hospital management, patient-family-the public, and other health professional discourses, on the other hand.

The criteria that follow from the above discussion and with which we would now want to assess medical curricula and curriculum reforms are as follows. To reflect the changing contexts in which

medicine operates, medical curricula (and reforms) will need to begin adopting discourses which:

1. Acknowledge the connection between clinical and resource dimensions of care. This is a discourse that engages students with health policy: it frames clinical decisions no longer in opposition to resource decisions; it places 'clinical prioritizing' within the context of 'resource rationing', and provides the informational means to pursue the relationships between practice, resources and quality of outcomes.
2. Accept that clinical work needs to be standardized in so far as that it feasible and desirable. This is a discourse that promotes the legitimacy of hospital management and clinical work process control, and sheds light on how these matters serve other clinicians, trainee clinicians, management and the public. This discourse foregrounds a systemizing and (medical-scientific) evidence-based conception of clinical practice and teaches the construction and implementation of 'multi-disciplinary clinical pathways' [111] which are explicit about the sequencing and details of patient care within and across care settings.
3. Accept that multi-disciplinary teams are central to good service provision.[112] This is a discourse that acknowledges the importance of, and promotes a 'communicative ethics' as the basis of, relationships with other health professionals.[113] This discourse inducts students into communication-centered conceptions of medical practice and organization.
4. Accepts that clinical autonomy needs to be balanced with transparent accountability. This is a discourse that creates room for the interests and concerns held by external stakeholders in general, by projecting a more transparent image of clinical practice on the one hand, and by providing mechanisms for incorporating stakeholder judgments on the other hand. Critically, it familiarizes student doctors with not only peer review, but also with outside review structures and practices.

For the future doctor to be able to successfully negotiate these discourses as well those which have traditionally defined the face of medicine, the new medical curriculum cannot afford to ignore or even merely 'tolerate' those discourses but must actively pursue their relation, application and relevance to medicine in both its bio-socio-psychological and its scientific-technological specializations. It is the incorporation of these alternative ways of speaking and knowing into the medical curriculum which will appropriately prepare doctors for the new roles and tasks they face in 21st century health care settings.

Ways Forward and Conclusion

We have argued that the curriculum reforms proposed in the literature only go some way towards integrating into medical education the range of competences and discourses required for modern clinical care. Action is therefore required on two fronts: 1) medical curricula are to be structured such that they take account of biomedical, as well as socio-cultural, organizational, communicational, and policy issues. For these issues to be adequately taught (and enacted); 2) medical practitioners need to be made aware of and inducted into practices which enable them to meet the demands of multi-disciplinary practice negotiation, clinical work process management, and health policy reform.

The thesis underlying this approach to devising the medical syllabus is that the diagnosis and treatment of disease do not take place in a clinical vacuum, and are in fact unachievable as medical-clinical tasks in such a vacuum. This means that educational tasks are likely to lack meaning if not concurrently placed within a socio-cultural-political context, an organizational context with its constraints and requirements, a multi-disciplinary view of clinical practice, and a perspective of medical identity and practice anchored in 'responsible autonomy'.

This paper has aimed to contribute to the discussion about the specific shape that reform might take by looking closely at some of the assumptions underpinning what has been put forward. Included for consideration here were the major pedagogy-oriented suggestions, the redefinition of the training context, and the proposals relating to content. The paper argued that while the objective to reconsider the teaching methodologies used and the contents and contexts accorded most prominence in the new curriculum is an important one, the proposals are likely to fall short of creating a real and critical engagement with the discourses and practices of medicine, unless curriculum reforms are gauged against the four criteria put forward in this paper.

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Correspondence

Rick IEDEMA, PhD
Centre for Clinical Governance Research in Health
Senior Lecturer
School of Public Health and Community Medicine
Faculty of Medicine
University of New South Wales
Sydney, NSW, 2052, Australia
Phone: + 61 2 9385 1474
Fax: + 61 2 9663 4926
Email: r.iedema@unsw.edu.au