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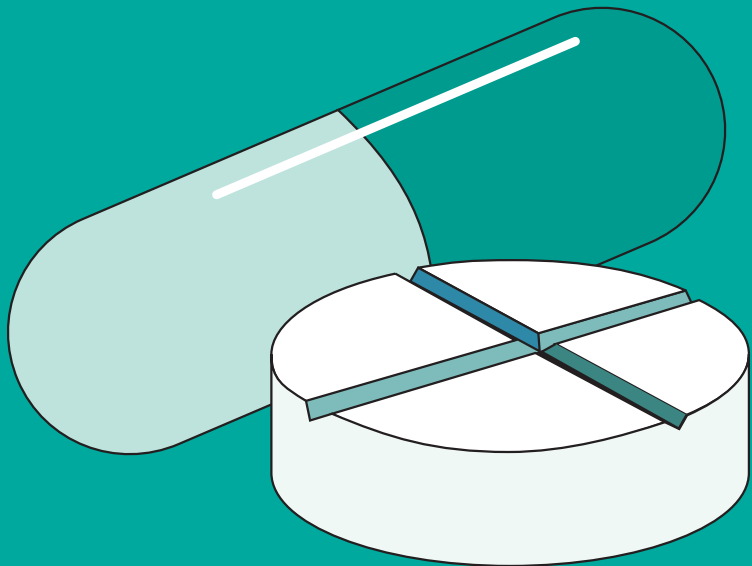
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CHAPTER 6

Improving pharmacology education throughout a medical school curriculum: change from within

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ABSTRACT

Background: Given the explosion of new medicines, our aging population and the problems experienced today with inappropriate prescribing, improving the prescribing abilities of graduating physicians should be a priority for all schools of medicine. However, implementing an educational change in a medical school curriculum is a difficult and slow process. Is it possible for faculty members to learn change management processes to bring innovations more quickly to the curriculum?

Methods: This paper reviews the shortcomings of the current medical literature regarding instituting change from a faculty member's perspective. Combining a review of the literature and our own experience, a new approach for faculty members wanting to implement their own educational innovation in the curriculum is proposed. The approach includes a set of eight steps and identifies the factors associated with a successful implementation.

Conclusions: It is our hope that more educational changes will be assessed for their value to the curriculum and drive improvements in medical education in order to meet the needs of today's society.

INTRODUCTION

In 2004 the Dutch Inspectors of Healthcare found that hundreds of people each year die by receiving inappropriate therapy, and tens of thousands more are harmed (1). This report led to great alarm in Dutch society over the quality of their healthcare system (2-4). One newspaper headline even implicated medical schools for the problem by stating that 'Physicians learn little about medications' (5). Scientific reports indicate that medication errors are not limited to the Dutch population, but are an internationally occurring phenomenon (6-8). The use of medications in the Netherlands has expanded rapidly over the past several years, and in 2006, reached a record of 5.9 prescriptions per capita per year (9). These statistics are a reflection of the fact that as our society ages, it is increasingly attempting to keep mortality at bay through the utilization of medications. In 2005 the conceptual artist Damien Hirst captured this belief in his audacious exhibition 'The New Religion', an examination of society's illusion that medicines can postpone reality. Can physicians appropriately prescribe powerful new drugs to ward off death? No, not entirely, and not forever, of course. But, by improved pharmacological education and training for physicians, they will be able to maximize the potential of these medicines to improve and extend peoples' lives.

Given the explosion of new medicines, our aging population and the problems experienced today with inappropriate prescribing, improving the education of physicians should be a priority for all schools of medicine.



However, implementing an educational change in a medical school curriculum is a difficult task. A review of any medical education journal will provide numerous examples of various new educational strategies, most remain confined within the domains of individual courses. Can change occur across the curriculum in a disciplines-oriented organizational structure? In medical education there have been a few key papers directed toward the topic of curricular change. Some are insightful 'how to...' or conversely 'how not to...' articles (10-13), others describe the environment (14-16) or leadership (17-20) necessary to evoke change, and lastly there are the articles with hyperbolic titles such as "No Fear' curricular change' (21), or 'Change, Stories of the Journey' (22). All these reports indicate that curricular change is a difficult and long process that requires careful and persistent management.

The purpose of the current paper is 1) to evaluate a few of the commonly used models for instituting change, and 2) in the context of our department's attempt to implement a new strategy for teaching pharmacology across the curriculum, describe how elements of these models either helped or failed in the development of a new model for creating change in a medical school curriculum. It is hoped that the new model facilitates more teachers to promulgate new teaching strategies into areas outside their expertise. It is foreseeable that this model would result in more innovative strategies being utilized and assessed across disciplines, and would subsequently enrich our understanding and increase the rate of advancement in the field of medical education.

REVIEWING MODELS FOR 'CHANGE'

The medical as well as non-medical literature was searched for articles providing guidance in managing change (often called 'change management' in business literature). The most basic model found was proposed by Lewin who was famous for his organizational theory which included three steps that were associated with 1) getting the organization ready to change (he termed this 'unfreezing'; 2) making the change, and 3) solidifying the change ('refreezing') (23). Most subsequent theories have used this model as a basis to either expand or refute the steps stated above. In 1979 John P. Kotter introduced the 'Eight steps to transforming your organization' (see table 1) to the business literature and it remains a commonly used model today (24). Kotter's step descriptions are more specific and describe the 'acts' that must be performed for success. A year later in 1980, Levine identified a four step process for change specific for implementing innovations in higher education, but also switched the focus from performing steps towards identifying the factors that led to failure (25). Since his seminal work, most published efforts in medical education have also focused on identifying factors associated with successful change rather than the process



necessary for a successful change. The largest amount of data comes from the 27 health education schools that reported their process of change as they attempted to meet the W. K. Kellogg Foundation's initiative to enhance training in primary care (21). This article provides many examples of the factors involved by creating change from the top (administration) and enforcing it down (toward faculty and ultimately students). But can teachers drive educational change? The recent thorough review of (curricular) change literature by Bland et al. (10) provides a set of characteristics associated with successfully managing a curricular change. Since Bland's review was written by summarizing currently available literature and from the perspective of creating change from the top down, they will be of little utility for teachers. As an example, it is recognized that change 'requires a redistribution of time and energy' and that the organization needs to provide rewards to encourage participation (10). Unfortunately, non-administrative faculty would have difficulty influencing the commonly used rewards mentioned in the article (salaries, recognitions, tenure and promotions). Which is why top administrative stakeholders—who have the resources—should be involved in change processes, as soon as possible.

Table 1 *John P. Kotter's 'Eight steps to transforming your organization' (24)*

1	Establishing a sense of urgency
2	Forming a powerful guiding coalition
3	Creating a vision
4	Communicating the vision
5	Empowering others to act on the vision
6	Planning for and creating short term wins
7	Consolidating improvements and producing still more changes
8	Institutionalizing new approaches

THE CONTEXT FOR OUR CURRICULAR CHANGE

Leiden University Medical Center had recently integrated the teaching of various disciplines across the curriculum. While basic sciences such as anatomy and physiology were integrated into the new courses, pharmacology had all but disappeared from the curriculum. In addition, due to time restraints, pharmacotherapy was to remain in the clinical portion of the curriculum. A few faculty members from the Department of Clinical Pharmacology recognized this would lead to a deficit in student knowledge and decided to put forth effort to increase both pharmacology and pharmacotherapy education in all parts of the curriculum. The Teaching Resource Centre (TRC) was created to compile and create pharmacology and pharmacotherapy learning strategies to offer course coordinators and



lecturers. But the question remained, how were these materials going to be incorporated throughout the curriculum?

Based on our review, a few key models were identified and assessed as being a useful guide for us to implement a change in the curriculum. We used Levine's process for implementing innovations in higher education which includes 1) recognizing the need for change; 2) planning; 3) implementing, and 4) institutionalizing, provided the backbone for our new model (25). John P. Kotter's 'Eight steps to transforming your organization' as described in the business literature (24) was used to establish more specific steps in the process. Finally, the factors we would need to consider in order to be successful were derived from the previously described literature review 'Curricular Change in Medical Schools: How to succeed' (10). Although these models and factors were used to guide the integration of our innovation into the curriculum, their implementation and success varied. As such, a new approach with the factors found to be important at each step was developed. This new approach is found in table 2; each step to be performed by the change agents (in this example, the TRC) is described in the body of this paper.

STEPS TO TRANSFORM THE CURRICULUM

Establishing the need for educational change

STEP 1: IDENTIFYING THE NEED FOR CHANGE. Both Levine and Kotter started their change process with this step by stating that change begins by establishing a sense of urgency. The need for the change can be established by the change agents when they examine the current environment and identify the crises or potential crises that the institution bears. In our case, we had no problem identifying a crisis with regard to pharmacology education; the lay press had done it for us. With increasing frequency, the press was publishing headlines declaring that doctors were not being trained to use medicines (5), and that their prescribing errors were increasingly hazardous to patients' health (2,3). Obviously, it was up to the medical schools to address this problem and nobody we encountered within the institution disagreed with this.

STEP 2: RECOGNIZING THE LIMITATIONS OF THE ENVIRONMENT. In the early stages of the change process the change agents need to determine if the environment will respond to a change effort. This is an institution-specific analysis of the potential barriers to implementing change. Many of the features listed by Bland et al. review (institution has a history of effective change, a loose organizational structure and a cooperative climate for collaboration) are likely to be relevant to any institution (10). But these are static features and the group or individual initiating the change only



Table 2

Steps and factors to implement change throughout a medical curriculum as adapted from Kotter (24) and Bland (10)

ESTABLISHING THE NEED FOR EDUCATIONAL CHANGE
Step 1: Identifying the need for change
- A crisis (or potential crisis) provides an opportunity to introduce the innovation
Step 2: Recognizing the limitations of the environment
- The institutional environment will accept change
- Obstacles to implementing the change are not insurmountable
PLANNING
Step 3: Creating the vision and strategies for implementing the change
- Link between vision and educational intervention is logical
- The outcomes and educational vision are short and easy-to-communicate
Step 4: Developing a supportive coalition
- Able to tap into a broad range of leadership styles
- People with considerable influence support the innovation
IMPLEMENTING
Step 5: Communicating the vision
- Opportunity for repeated, face-to-face communication
- Early-Adopters have been identified in the institution
- The innovation is able to reward those who embrace the change
- Demonstrations of the innovation and success are possible
Step 6: Working to remove the obstacles to success
- Able to adapt innovation in order to foster new collaborators
- Able to use logic to address non-existent blockades to adoption
Step 7: Demonstrating success
- Short-term results reward those that are supportive
- Successes are visible to those both inside and outside the institution
INSTITUTIONALIZING
Step 8: Solidifying the change to the point of sustainability
- Innovation is accepted by the authoritative body
- The educational change is able to resist new policies that are inconsistent
- Link between improved outcomes and innovation is apparent
- Support of resources necessary to continue work is garnered
- Plan for succession is in place



needs to consider them as far as to plan the best way to overcome them in later steps. At this step it is most important for the change agents to be certain that the goals of the change are consistent with the institution's goals.

Planning

STEP 3: CREATING THE VISION AND STRATEGIES FOR IMPLEMENTING THE CHANGE. In contrast to most change processes, the educational change agents are the innovators and have already formed the basic model for change and tested it in their own course(s). Thus, the teacher/innovator needs to solidify the vision and create the strategies for achieving the vision (Kotter's step 3) based on the evaluation process above. We thought that it would be difficult to have a solid and effective workgroup without a vision to drive the process. Thus, in our example, a vision for improving the prescribing habits of physicians through the provision of pharmacology education was created based on outcome-based educational principles. The vision centered around five learning outcomes (see table 3) that were simple enough to communicate to students, professors and practicing physicians. Interestingly, the importance of this step appears lost in Bland's features listed for curricular change (the closest feature is to ensure that the scope and complexity of the innovation is consistent with the curriculum). Perhaps this is because when academic leaders are instituting change, they are often not truly innovating, but implementing an innovation that has been invented elsewhere. In situations where the academic leader was instigating the innovation, the vision was clearly voiced and repeatedly expressed (26).

Table 3 *Five easily communicated outcomes*

At the end of the curriculum the student can:	
1	Explain pharmacological mechanisms of action;
2	Explain physiological/pathophysiological mechanisms of disease;
3	Critically analyze indications for drugs by comparing pharmacological and pathophysiological mechanisms;
4	Select drug therapy based on pharmacotherapeutic principles, and
5	Monitor drug therapy based on pharmacotherapeutic principles.

STEP 4: DEVELOPING A SUPPORTIVE COALITION. In the first step of the implementation process, those initiating the change should start to identify people who will help to promote the program. Bland et al. made it clear in their report 'Curricular Change: How to succeed...', that leadership is the most cited reason for either the success or failure of change management.



According to the business literature, a leader must be purposeful and adaptive (27), leading the change with insight into being able to alter the four organizational elements: formal structures, work processes, belief systems, and social relations (28). Bland felt that this was the reason that curricular change usually fell into the hands of those with leadership positions ‘...usually the dean, a senior faculty member with sponsorship of the dean, or a team of faculty representing the dean...’ (10). However, according to Naylor in his review of leadership in academic medicine, managing knowledge workers requires inspiration, not supervision: ‘Success is achieved by power of reason, not by reasons of power...Colleagues are influenced and persuaded, not coerced’ (20). Thus, the change agents will have take on some qualities of a leader in order to drive the change forward, a challenge for which Naylor believes many are ill prepared. Several good resources are available to aid in this endeavour (29-32) and can be helpful to expand the teams array of leadership behaviours enhancing the likelihood of success (18). Lastly, both Bland and Kotter describe the most common pitfall of this step as not enlisting powerful enough people into the group. Although success is not dependent on the blessing of the top management, it certainly helps. Unfortunately for our group, the change was begun without support from the committee responsible for curricular change as they were trying to reduce educational hours in the pre-clinical curriculum. The new pharmacology education was therefore rolled out in a small number of courses with early-adopters with the philosophy was ‘it’s always easier to ask for forgiveness than permission’ (33).

Implementing

There are three steps in the implementation phase which should be addressed in the appropriate order, but each step also needs to be constantly maintained throughout the phase.

STEP 5: COMMUNICATING THE VISION. The change agents need to continually and consistently spread the word with regard to the vision and strategies to others within the university. Here Bland suggests two clear methods for successful communication of the vision: face-to-face interactions and demonstrations of the teaching innovation (10). Selecting the right people to support the innovation should not be difficult if the change agents seek out those teachers who could be called ‘early-adopters’ according to the diffusion of innovations theory (34). Getting the right people lined up to embrace the change can be difficult, and perhaps more difficult in academia versus other organizations as academic physicians have a strong attachment to the legacy of the methods they use to teach. This is most probably due to the fact that their educational approaches are strongly attached to the knowledge they possess and their power is



perceived to be lost with any decrease in knowledge. Academics are capable of seeing the value of change, but also may be more adverse to the possible threat it poses. Therefore, it is important to continue to motivate the early adopters with the types of reward that they seek: earned autonomy and public peer recognition (20) from the early successes described later in step six. In our example we first visited every course coordinator to offer our new teaching innovation to be used in their courses. Secondly, we chose the infection-method for spreading the education throughout the curriculum (i.e. wherever some course coordinator had heard good things about our methods, we would move in to transform their education). The thought was that the students who had been in a class with the new pharmacology content would move from one course to the next sharing their experiences and enthusiasm. However, this did not prove to be the case. We speculate that this process failed due to the persistent manner in which courses are taught in independent silos. Students approach each class as a new entity and see their role as passing the course before moving on to the next (35). Thus, we used our positive experiences with the early adopters (see step 6) to make modifications to our strategies and proceeded to make repeated visits to the remaining majority resistant to the change. Our goal was to have the number of courses utilizing our pharmacology content to grow to such a sufficient size that we could oppose any opposition that would develop in the future to thwart the change.

STEP 6: WORKING TO REMOVE THE OBSTACLES TO SUCCESS. Previously in the second step of this step-wise approach to managing change in a curriculum, the institutional factors that could hinder the success of the change effort were identified. During the implementation process, Kotter states that the change agents together with their supportive coalition should work to remove the obstacles to the transformation process, and encourage non-traditional ideas, activities and actions with regard to the innovation to foster its acceptance (36). The top concern for every institution will be time. In the curricular change that Guze managed, she stated 'After all, the curriculum already is fixed in size, and any additional topic will mean that something else must give way' (37).

As to be expected, this can be the most exasperating step for instituting change, and it has been the step in which we have spent the most effort. In our example, we employed various techniques to empower the course coordinators to adopt the changes proposed. Most actions involved removing barriers where course coordinators perceived an extra time requirement. These included providing non-binding resources to the coordinators such as creating computer-based education methodologies for free according to the specifications of the coordinators, providing staff time to support the assessment of students learning of these methodologies, and creating and giving lectures on the topic of pharmacology in the course. We found that these commitments enabled us to introduce pharmacology



into the course and that the pharmacology remained even after our time commitments were greatly reduced.

STEP 7: DEMONSTRATING SUCCESS. In Kotter's '8 steps to Transforming your Organization' he states leaders should be planning for and creating short-term wins. Bland agrees with him. Her 'Features associated with enduring curricular change' include enlisting the participation of members of the institutional society, performing meaningful evaluations that enhance ownership of the project and finally rewarding those who participate in the innovation (10). So how can change agents within in a medical school environment reward those over the short term who have worked to implement the new strategies? In today's environment this is an easy task as there is increasing support for research into the effectiveness of educational interventions. For example, we measured the performance of students at baseline and have measured the effects of our efforts with a range of indices now accepted in the medical educational literature. In our experience, these types of wins only provide satisfaction for a job well done for the supportive coalition. Kotter missed the fact that these wins need to be communicated in a meaningful manner. Presentation of the research results will institute pride in the individuals involved. However, the presentation of research results at a national or international meeting does little to influence those working the problem back at the institution. One possible solution is to have course evaluation expanded beyond Likert scale based student evaluations and create opportunities for the presentation of meaningful data to curriculum committees (38). It is important to note that these short term wins will also be different from measuring the specific outcome of the innovation. For example we are unable to measure any change in the prescribing habits of physicians until a cohort goes through the curriculum and graduates, but we can show changes in teacher time, student use and effect on student's grades as a result of our pharmacology education.

Institutionalizing

STEP 8: SOLIDIFYING THE CHANGE TO THE POINT OF SUSTAINABILITY. Finally, in step 8 there is institutionalization of the new approach. At this point (perhaps after a few years of effort) any change could be considered the 'New way of teaching' according to Bland, but she does not provide any insights into the specific management of the institutionalization time period. Kotter, however, describes this step as the point of consolidating improvements and producing still more change. He warns that many change agents will try to declare victory too soon. We agree, as we have found that there is a big difference between a 'New way of teaching' and the 'Just the way we do things' culture described by Bland et al.. In his article, Kotter states that those who best communicate how the ways and means are



linked to the results of the change will be most successful (36). In addition, the change needs to no longer be dependent on the leadership team, and the processes created by the change will continue even after those most identified with it move on. And this should be expected, as Hays mentions ‘- the people that negotiated the mission, designed the program and oversaw the pioneering phase – inevitably move on...seeking new opportunities for effecting change once the innovation is in place’ (15). Also, if specific resources have been utilized in the implementation process, the innovator will need to shore up continued support from institutional leadership (38). It is in step eight that our example of changing pharmacology education currently resides. Although our strategies have been introduced throughout the curriculum, we are now working to change the systems, structures, and policies that are not consistent with our vision. People resistant to the change can seize upon any incongruity and lead the process down another path. For example, the effort to incorporate the new Bologna process (39) for harmonizing education throughout Europe has introduced a new hurdle to continuing our change process. The reason is that others were able to understand how our pharmacology education fit into the current curriculum, but question whether the methodologies are consistent with how the new bachelors and masters phases will be taught. Hence, we have plans to continue writing and promoting our vision for the time to come. It is still too early to determine how significant the impact will be, and thus the success. Our program has a lot of supporters, but as always, there are people trying to cling to the old way of teaching.

FINAL THOUGHTS

As our example of a cross-functional discipline has shown, cross-curricular educational changes can be initiated from within the ranks of the institution. We developed this new model for creating change as we felt it would be more appropriate than those written from an authoritative perspective. We hope that others who are in a similar position (i.e. poised to integrate a new educational process or method into the curriculum), can use the model and our experiences as a guide.

It is interesting to note that professional change managers from the business consulting profession claim that the best managers of change are those that remain objective. The stresses created from the small victories and set-backs experienced by the manager can often times inhibit the change effort and cause burn-out before the final step is reached. We need to remind ourselves of this risk as we manage change in the curriculum of medical schools. The teachers are very much aware of the potential outcomes and try to influence them. It is, therefore, imperative that a comprehensive assessment plan is simultaneously developed and followed along with the change program. Fortunately, the change agents often establish the need for



the change with data that could serve as a baseline for the outcomes that are be influenced and assessed. These outcomes can then be reassessed after the educational intervention has taken place, and they should be repeated over time and with each subsequent alteration based on the results. As an example, the TRC began by establishing that physicians associated with Leiden University did a poor job of communicating therapeutic information in referral letters, and correlated these results with the students' inability to do the same. We were able to introduce our educational changes in the curriculum based on the assumption that with increased knowledge and practice, medical students can improve their communication of therapeutic information. In the subsequent years, we have tracked both the teachers' adoption and students' use and learning of our new pharmacology learning strategies. When the data indicated a response less than we expected from either of these two constituencies, we altered our strategies for reaching them. However, what remains to be shown is that our original assumption regarding the relationship between knowledge and performance was correct, but this can only be shown when an entire cohort completes the curriculum.

Although managing the change process is laborious and a long if not continuous process, creating and communicating change should not be difficult for teachers who are accustomed to the task of educating young people to become professionals. It seems that managing change is much like teaching, as Goss states: 'Those who climb on the reinvention roller coaster are in for a challenging ride...Reinvention is a demanding up and down journey – an adventure, to be sure. And it is destined to be that way' (40).



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