Assuring Public Health Professionals Are Prepared for the Future: The UAB Public Health Integrated Core Curriculum

SYNOPSIS

In response to calls to improve public health education and our own desire to provide a more relevant educational experience to our Master of Public Health students, the University of Alabama at Birmingham (UAB) School of Public Health designed, developed, and instituted a fully integrated public health core curriculum in the fall of 2001.

This curriculum combines content from discipline-specific courses in biostatistics, environmental health, epidemiology, health administration, and the social and behavioral sciences, and delivers it in a 15 credit hour, team-taught course designed in modules covering such topics as tobacco, infectious diseases, and emergency preparedness. Weekly skills-building sessions increase student competence in data analysis and interpretation, communication, ethical decision-making, community-based interventions, and policy and program planning.

Evaluations affirm that the integrated core is functioning as intended: as a means to provide critical content in the core disciplines in their applied context. As public health education continues to be debated, the UAB public health integrated core curriculum can serve as one model for providing quality instruction that is highly relevant to professional practice.
After many years of apathy and neglect, the public health profession is enjoying a resurgence of interest and renewed attention. From policy makers to the general public, a recognition is dawning that the institution of public health is important not only to individual health and safety, but to national security.

That the public health infrastructure is weak and has an inadequate number of sufficiently prepared professionals is no secret. As early as 1988, the Institute of Medicine penned the now-familiar phrase “public health is in disarray”; a more recent report by the Bureau of Health Professions (2000) noted that the public health workforce has diminished over the past 30 years from an estimated 500,000 public health workers in the 1970s (or one for every 457 individuals) to an estimated 448,254 in 2000 (or one for every 635 individuals).1,2 In November 2002, the Institute of Medicine issued a clarion call for higher quality, well-educated public health professionals.3 Though not the sole solution, one element in efforts to better prepare the public health workforce of and for the future is the relevance and quality of the curricula found in degree programs in public health, the primary source of education and training for public health practitioners.

In the U.S. as of June 2004, there were 34 schools and 55 programs of public health accredited by the Council on Education for Public Health (CEPH) to offer the Master of Public Health (MPH) degree. Included in the accreditation criteria is the requirement that each program include knowledge of the core disciplines of public health. These are defined as behavioral sciences, biostatistics, environmental health, epidemiology, and health administration/management.4 While these criteria have guided the development of core curricula in public health degree programs seeking accreditation since 1993, the criteria specify neither the number of credit or contact hours nor the content of course work in these areas, and no postgraduate examination is required for certification in public health. The typical MPH program provides didactic instruction in the individual core disciplines, didactic instruction in a chosen specialty area, opportunities for short-term field experiences, and a final project or capstone course. Internships and capstone courses are intended to provide the medium through which students can meld the knowledge acquired through their individual courses of study, though the limited time available for these components of the curriculum does not allow for extensive integration of material, particularly when the material is presented in discrete courses. In our experiences at one School of Public Health, this disconnect in the MPH curriculum was highlighted through the experiences of students in a case study-based capstone course instituted several years ago as part of an overall curriculum reform effort.5 In this course, students are assigned to interdisciplinary teams that then analyze and resolve actual public health problems. In both the observed performance of the students and in their evaluation comments, we noted a lack of preparedness for successful interaction with students from different disciplines and for the cohesive application of approaches to a problem from different disciplinary perspectives. Students questioned why they hadn’t been asked to solve problems earlier in their studies, or why they hadn’t been taught the interrelationships between the disciplines in approaching public health issues. This clearly has implications for their professional practice and their likely level of success in the public health workforce.

While the addition of field-based internships and capstone courses has undoubtedly strengthened students’ ability to synthesize and apply theory and textbook/lecture-based material to public health work, these may not be enough given the short duration of public health masters degree programs. We explored several options for enhancing our curriculum and strengthening the capacity of our students to engage in meaningful public health work immediately upon graduation. We chose to redesign our MPH core curriculum, essentially substituting one seamless, integrated core for the six-seven individualized core classes previously required of all MPH degree candidates.

**ASSESSMENT**

Schools and programs typically meet the MPH core curriculum accreditation requirement by offering a set of courses, each specific to one of the required disciplines. Students must complete a standard curriculum or a selection of courses from a defined list.6 Given that MPH programs tend to be two years or less in duration, this core curriculum often comprises a sizable portion of the total required credit hours for an MPH degree.4 The School of Public Health at the University of Alabama at Birmingham was no different from other schools and, until the Fall of 2001, required all MPH students to complete the following core curriculum:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BST 601</td>
<td>Biostatistics I</td>
<td>3</td>
</tr>
<tr>
<td>BST 602</td>
<td>Biostatistics II</td>
<td>3</td>
</tr>
<tr>
<td>ENH 600</td>
<td>Fundamentals of Environmental Health</td>
<td>3</td>
</tr>
<tr>
<td>EPI 600</td>
<td>Introduction to Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>HB 650</td>
<td>Behavioral Science and Health: An Overview</td>
<td>3</td>
</tr>
<tr>
<td>HCOP 600</td>
<td>Introduction to Population-Based Health Programs</td>
<td>3</td>
</tr>
<tr>
<td>IH 602*</td>
<td>Biological Basis of Public Health</td>
<td>3</td>
</tr>
</tbody>
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*IH 602 could be waived for students with previous medical or related clinical degrees or substantial background in the Biological Sciences.

In 1996 as part of a five-year strategic plan, the School chose to re-examine the core curriculum and recommend an alternative that would better meet the needs of future public health professionals. Several sources of information were utilized to assess the existing core curriculum, including course evaluations completed by students, course enrollment patterns, exit interview surveys completed by all students at the time of graduation, alumni surveys, and interviews with department chairs and core course instructors. We also used information gleaned from focus groups with employers, current students, and the community at large.

This assessment led us to several conclusions:

1. Though the core was intended to be the basis for the subsequent discipline-specific content, not all students completed the core before enrolling in other...
courses; some students completed core courses in the final terms of their programs rather than in the first terms as expected.

2. Many students questioned the value of the core courses and the rationale for requiring them, viewing many of them as a mediocre distraction from the content they preferred, that within their chosen discipline.

3. There was little to no communication among core course instructors resulting in, at best, duplication of content and, at worst, discontinuity or seemingly conflicting content.

4. Quality of instruction varied fairly dramatically from course to course and sometimes from year to year; there was little oversight of the appropriateness of the content outside of that provided within the academic departments responsible for the courses.

5. At the time of graduation, students did not believe they possessed a command of all of the core disciplines sufficient to utilize the information and skills in professional practice, and had little sense of how the disciplines related to one another or how they might be applied.

6. Alumni reported that they were not equipped to meet the challenges of the practice field, lacking, in particular, data analysis and interpretation skills.

Armed with this information, the CEPH accreditation requirements for Schools of Public Health,\(^4\) and the competencies developed by the Faculty/Agency Forum subsequent to the 1988 Institute of Medicine Report,\(^7\) we set about redesigning the MPH core curriculum. To begin, we established several guiding principles:

1. The MPH core curriculum should be the collective responsibility of the faculty and not the individual responsibility of specific departments.

2. The MPH core curriculum should serve as the basis for all MPH curricula and, as such, should be the first course(s) taken and never the last.

3. The MPH core curriculum should emphasize the development of skills, in addition to the acquisition of content knowledge.

4. The MPH core curriculum should emphasize practice and therefore the application of discipline-specific knowledge and skills.

5. The MPH core curriculum should demonstrate the integration of the disciplines and should provide opportunities for students to practice this integration.

6. The MPH core curriculum should eliminate redundancy, but not sacrifice critical content.

7. The MPH core curriculum should emphasize the highest quality instruction.

**DEVELOPMENT**

As did other groups before us, we considered the Institute of Medicine’s admonitions for academic public health in its Future of Public Health report and the subsequent sets of competencies recommended by various public health professional groups, as well as the Ten Essential Public Health Services.\(^1\),\(^5\)\(^8\) In the end, we chose to use as a framework the five core disciplines required by the Council on Education for Public Health and the six skill sets described by the Faculty/Agency Forum.\(^6\)\(^7\) We also agreed that a focus on practice was essential to bringing this instruction to life in a meaningful way, and we agreed that the material from the independent disciplines would have to be presented as it is used in practice: in an integrated manner. We hoped that such an approach would better prepare our graduates to interact successfully with professionals from other disciplines and would better focus the MPH on the development of specific skills that were necessary in the field, regardless of practice setting. These skills included data analysis and training in specific computer analysis software; applications of various disciplines in practice; communication, particularly to diverse audiences; health policy development; and program administration and management.

We quickly determined that to succeed in our dual goals of integrating disciplinary instruction and skill development, a different type of course structure was necessary, one that allowed for dynamic interdisciplinary discussion and that set aside specific time for skills-building exercises. Further, we had to organize this course in such a way that students could also enroll in discipline-specific courses in order to meet all requirements for graduation within the expected time frame of one to two years.

We chose to provide our instruction as a series of modules, each focusing on a critical issue in public health. We selected topics that reflected the breadth of public health and allowed not only for thorough interdisciplinary examination, but also focused attention in each of the specific core areas as well as cross-cutting issues (e.g., ethics) and broader content areas, including international health and maternal and child health. We agreed on a set of learning objectives for the course while recognizing and articulating discipline-specific learning objectives from each component of the course (Figures 1 and 2).

**THE MODEL**

C.E.A. Winslow noted in 1953 that “public health is not a branch of medicine or of engineering, but a profession dedicated to a community service which involves the cooperative effort of a dozen different disciplines. The essence of the schools of public health is the bringing together of various disciplines and teaching them to work together to solve problems by approaching them as total problems.”\(^9\) Fineberg et al.\(^10\) summarized the recommendations from major reports on Schools of Public Health over an 80-year period beginning with the 1915 Welch-Rose Report and noted several themes including the following: the basic content of the public health curriculum should be broad in scope and should include the fundamental public health disciplines, epidemiology and biostatistics, as well as the relevant methodologies and content from the biological, behavioral, social, and environmental sciences. Over time, increasing emphasis has been given to the importance of acquiring key skills, as well as knowledge.\(^10\)

With this in mind, we developed a fully integrated core
curriculum, team-taught by faculty representing each of our academic units including the five core disciplines and maternal and child health. This coincides with the six-department structure of our School of Public Health. The course is 15 credit hours over two semesters—nine hours in the fall, six hours in the spring. (With rare exception, students are admitted only in the fall semester.) The core is structured around a series of topical modules through which discipline-specific content as well as the integration and application of that content is presented and discussed. These topics include the history of public health, hanta virus, tobacco, polio, lead, breast cancer, sexually transmitted disease (including HIV), injury control, food safety, strategic planning, and disaster management. The module topics provide an anchor for the discussion of the content from each individual discipline, and also provide an opportunity to study an issue of past or current importance to public health in some depth. The organization of the lectures is further structured to illustrate the interrelationships of the disciplines as well as their individual and collective contributions to the public health topic being addressed. The typical structure of the content is illustrated in Figure 3, which represents the first module in the spring semester of the integrated core on lead.

Lectures are complemented by weekly two-hour lab sessions of no more than 20 students per lab that are facilitated by two teaching assistants recruited from advanced masters and doctoral students. The size of the class (typically around 100 students) limits classroom discussion, so the labs serve an important function—not only developing skills through specially designed exercises but fostering discussion of some of the weightier issues raised in lectures. A scheduled weekly “help” session provides time to go over areas in need of clarification, to review some of the more difficult concepts, and to review homework assignments and test results. Finally, attendance is expected at monthly Public Health Grand Rounds seminars featuring leaders in public health practice; at least half of these speakers over the course of the year are linked directly to the current module topic.

Students receive one grade each semester. Each topical module concludes with a computer-based 100-point quiz, focused primarily on discipline-specific content in an objective question format. Together, these quizzes account for 30% of the final grade. The weekly labs collectively account for 25% of the grade, and attendance at Public Health Grand Rounds each semester provides another five percentage points. The final exam, taken in-class each semester, accounts for 40% of the total grade and provides an opportunity for the students to demonstrate their level of understanding of the integration of the disciplines through responses to essay-type questions. An example is provided in Figure 4.

Given our desire to address the perceived lack of computing skills among our graduates, we provide instruction in SPSS and include in each Fall semester’s final exam a take-home portion that requires the students to run and interpret analyses in SPSS. This accounts for 20% of the final exam grade. In the spring semesters, students work through a group strategic planning exercise; they present their results orally near the end of class, and this too accounts for 20% of the final exam grade. Students are invited to evaluate each module and each instructor in an on-line format; each semester the course is evaluated through the usual school mechanisms.

NOTE: These are the actual objectives developed for the course and are not intended to be construed as model objectives.
THE BENEFITS

We enrolled our first class in the fall of 2001, and as of summer 2004 have completed three full years of the integrated core curriculum. As a faculty, we believe that this format offers several clear benefits over the individual course format of the past. We believe the teaching quality is improved for several reasons. We worked hard to secure the participation of our better instructors, believing that teaching quality would be important to the success of this course. Because the core is now viewed as a collective, school-wide responsibility, the selection of instructors is a shared activity; in the past, department chairs may have been more willing to assign teaching responsibilities for a departmental core course to a less productive faculty member, rather than the best qualified instructor. Given our collective commitment to this course, departments recognize an obligation to provide the best teachers possible from within each of the disciplines. We further believe that because the course is truly team taught, it attracts the better teachers; the six faculty members are expected to be present at every lecture, regardless of who is actually lecturing. We lecture to each other, as well as to the class, which increases the motivation to do one’s best. We meet weekly to review the previous week and to plan for upcoming weeks, and to offer constructive support to each other. At the beginning and at the end of each module, we participate collectively in unrehearsed, interdisciplinary discussions in front of the class. In these discussions, we challenge each other but also demonstrate a high level of respect for each other, which we believe sends an important message to the students about the value of each and every discipline in the pursuit of public health goals. It also serves as a model of a professional level of debate and conduct. We believe this provides a learning experience unlike any other that has been advanced in our School.

Second, we believe that we have the ability in this format to truly build on knowledge from one discipline to the next, from one subject to the next. Because we attend each other’s lectures, we can tailor our individual lectures to reinforce or to complement previously presented material or to hint at material to come. The interdisciplinary discussions at the beginning and end of each module allow us to reflect on material presented, to put what may appear to be disparate content into an integrated context, to draw connections from earlier material to present material, and to pose new ideas for consideration by the class.

Third, we believe we are providing all the content covered in the individual courses while also providing enhanced content through our efforts to integrate material. We are able to provide a superior product without sacrificing any of the fundamental content, and we are able to do it in fewer credit hours. We are also able to discuss issues that are specific to particular populations, be they international communities, the elderly, or mothers and children, further broadening the learning experience of the students beyond their individual disciplines. In addition, the structure is flexible enough to allow us to introduce and discuss topics of current interest, and to modify lecture content as necessary, given changes in the world in which we learn and work. During the past three years we have included such urgent or emergent topics as 9/11, anthrax, sudden acute respiratory syndrome (SARS), influenza, estrogen replacement therapy, and obesity, among others. The team approach coupled with the flexibility inherent in the structure allowed us to quickly review the recommendations in the more recent
Institute of Medicine report on public health education and to affirm, enhance, or modify content to assure we were including exposure to the new areas recommended for public health instruction: genomics, informatics, communication, cultural competence, community-based participatory research, global health, policy and law, and public health ethics. Each was either already included or could be readily incorporated.

**Figure 4. Sample final exam questions, Integrated Public Health Core Curriculum**

**Sample Question 1:**

In order to control the possible spread of SARS (Severe Acute Respiratory Syndrome) around the globe, it is very important to have a means of case identification. Fever is currently being used as a screening tool in special populations (travelers, school children, etc.) to identify suspect cases for implementation of disease control measures.

1a. Using the concepts of sensitivity and specificity, describe the advantages and disadvantages of using fever as a screening test for SARS.

1b. Please discuss whether you would prioritize maximizing sensitivity or specificity of a screening test for SARS and why. (Assume you cannot do both.)

1c. Then, assuming you want to discourage the further spread of SARS, provide one example of a behavioral intervention you would recommend and one example of a policy recommendation you would recommend to accomplish this goal.

**Sample Question 2:**

Environmental Tobacco Smoke (ETS), also known as passive or sidestream smoking, is an environmental exposure receiving a great deal of public health, legal, and political attention. Among the many possible adverse health effects linked to ETS, illnesses among children are of particular concern. Recent studies have reported the following associations between ETS and several childhood illnesses:

- Ear infections: OR = 3.6; 95% CI (2.7, 4.3)
- Asthma: OR = 2.3; 95% CI (1.1, 4.7)
- Muscular dystrophy: OR = 1.1; 95% CI (0.8, 1.6)

2a. Comment on the magnitude and statistical significance of each of these associations.

2b. Explain the concept of dose-response, and give an example of what a positive dose-response relationship might look like using childhood asthma and ETS.

2c. The following policy actions have been used to reduce the prevalence of active cigarette smoking in the United States:

1) Increased cigarette tax
2) Prohibition of smoking in the workplace
3) Public information and advertising campaigns

For each of these actions, describe whether and how the action has been effective in reducing adult smoking.

2d. Pick one of these actions and discuss whether it could be effectively used to reduce children’s exposure to ETS.

Fourth, we feel strongly that the addition of the lab sessions enables us to build well-defined skills in a cross-disciplinary format, all of which are applicable to the practice setting. In addition to computing and data analysis and interpretation, these labs focus on various aspects of applied epidemiology, written and oral presentation skills, qualitative methods of data collection, risk assessment and risk communication, strategic planning, program management, ethical decision-making, and policy analysis. These labs also help promote integration, as the students often work in small groups assigned by the teaching assistants to maximize diversity across the disciplines.

Finally, we know that this structure assures that students acquire this fundamental knowledge early in their academic careers, rather than at the end, or scattered throughout their curricula as a function of their scheduling requirements.

**THE COSTS**

Obviously, an undertaking of this magnitude involves some costs. First and foremost, we must admit that this format requires a substantial amount of faculty time. In the fall semester, six faculty members are in class for up to seven hours a week, in addition to the hour used for ongoing planning and quality monitoring. In the spring we are in class for up to five hours per week in addition to the one hour weekly meeting. Though lecture time is reduced for each faculty member relative to the teaching requirements of an individual course, preparation time can be increased as previously prepared lectures are often modified, based on other content covered in class. This amount of in-class time, while enriching the learning environment for the students, represents a real opportunity cost for the faculty, who are otherwise not engaged in other academic pursuits. This is of particular concern for more junior faculty, who have other pressures to develop and establish independent research careers. In our School, the expectation is that faculty teach two courses per year; this curriculum represents five courses over two semesters and is not the only teaching responsibility these academic faculty members have. Each of us teaches at least one other course during the academic year; none of us feels that participation in the core curriculum has detracted from the quality of teaching we provide in our individual courses.

The weekly lab sessions are led by graduate teaching assistants. Assuming an average class size of 120 requires six lab sessions per week, each staffed with two teaching assistants. These teaching assistants also maintain office hours, assist with weekly help sessions, and proctor quizzes and examinations. They meet for one hour each week to prepare for the week’s lab and to discuss the previous week’s experiences. We initially underestimated the amount of time this would take and, as a result, the fees collected for the lab portion of the course did not fully cover the expense of the teaching assistants. Despite this, our experience suggests that this investment is well worth the cost, as the teaching assistants provide invaluable assistance to the students and enrich the course in myriad ways.

Fatigue is a cost we did not anticipate. To cover all of the content we deemed necessary and still allow students to begin their discipline-specific studies or to earn an MPH on a part-time basis, we elected to spread the 15 credit hours...
over two semesters. This makes for a very long course over what seems an interminable amount of time. After the first year, we modified the arrangement of lectures so that we never have any single subject over more than a two-hour period, built in some additional discussion, and added consistent homework assignments. The “cost” of team teaching is also the loss of independence on the part of faculty, who typically have singular responsibility for their own courses. The interdependence that is the hallmark of this type of course requires a level of give-and-take that is unusual in the instructional realm of academe.

Finally, while we believe the format to be superior, it does prove daunting to the students, who find they have an almost overwhelming amount of material to absorb right from the beginning of the course. Within the first three weeks they are introduced to five different subject areas, six different teaching styles, and any number of concepts, terms, acronyms, and formulas. Despite these potential problems, students typically do well in the course and by the spring semester have gained an appreciation for the spirit and intent of the course.

**EVALUATION**

Because this model replaced the previous model wholesale, it has been a challenge to evaluate. Each year we compare student evaluations of the integrated core curriculum to the evaluations of previous individual core courses and also compare the current year to the previous year(s). The first year’s evaluation scores were consistent with those of previous courses, i.e., no worse, but subsequent years have indicated improvements in students’ perception of the quality of the material, the instruction, and the structure. We believe this is due in part to the diligence with which we pursue quality improvements and the willingness of the faculty to make changes where changes are clearly indicated. Data gathered from annual alumni surveys also suggests a positive trend. Compared to alumni who graduated prior to the implementation of the integrated core, those who participated in the integrated core indicated that they were better prepared in “integrating public health disciplines in approaching, analyzing and resolving public health problems” (80% vs. 58% very prepared); “interpreting and communicating data analyses” (76% vs. 48% very prepared); “communicating with other public health professionals” (78% vs. 58% very prepared); “communicating risk to different audiences” (62% vs. 45% very prepared); and “identifying and analyzing ethical arguments” (78% vs. 40% very prepared). There was virtually no change in the areas of “conducting basic data analysis” (99% vs. 97% very or somewhat prepared) and “consideration of various study designs and selection of appropriate statistical analyses” (99% vs. 98%).

Anecdotally, faculty in the capstone case study course that we have been teaching both prior to and following implementation of the integrated core believe that the students are better prepared now than they were in the past. The students work together more effectively in interdisciplin ary teams, they analyze their case studies more thoroughly, and they are much better presenters. Faculty in courses that depend on the core material as a prerequisite have also observed that the more recent students, those who have completed the integrated core, are better prepared for the higher level material. In an attempt to better quantify some of these welcome observations, in late spring of 2003, the School contracted with an independent team of evaluation experts to provide some preliminary assessments of the integrated core. This report affirmed a high level of support for the core by students, faculty, and administration, and a shared belief that the benefits of the core outweigh the costs. Specifically, respondents to the evaluation surveys indicated a high level of satisfaction with the core and a preference for this mode of instruction in providing a holistic view of public health, promoting the ability of students to work as members of a team, integrating content across the disciplines, applying core knowledge to real-world public health problems, applying core course content to other specialty courses, and promoting faculty availability.

An earlier study of an interdisciplinary core curriculum in a health professions college indicated positive evaluations by students and faculty alike. Though the interdisciplinary team-teaching approach placed an additional burden on faculty time, 87% of the faculty expressed a willingness to continue teaching in this fashion. This evaluation also indicated that 96% of participating faculty agreed that interdisciplinary team teaching had helped increase their appreciation of the other health professions.

The challenges that remain, as noted by this evaluation and by our own observations, include keeping material current, modifying module topics over time to better reflect the state of the art of public health practice, achieving a more desirable level of integration of biostatistics content across the core, sustaining the level of administrative commitment to the core given the leadership changes that are typical within the School (changes in deans, associate deans, department chairs), and maintaining among the core faculty the level of enthusiasm necessary to successfully engage in this type of instruction. Of the six faculty who comprise the core faculty team, we are entering our fourth year with three of the original faculty, one who was part of the original team and is now rejoining, one who joined last year, and one who is brand new. This level of renewal and replacement is important in keeping the content fresh, but requires additional time and effort to continually rebuild the team.

**CONCLUSION**

In an earlier report on an integrated curriculum, Helitzer and Wallenstein proposed, “a grounded approach, rather than one that expects students to inhale, if you will, a breadth of information on a multitude of apparently unrelated topics and expects them to sort out the details after they have reached a hyperventilated state of confusion around the time of graduation.” We believe we have succeeded in overcoming this problem by providing, from the very beginning of our students’ MPH education, an instructional approach that models in the classroom the interdisciplinary, integrated community that is public health in practice. Given persistent calls for public health education to be more grounded and more relevant, we recommend this model as a proven method for promoting a level of knowledge and skill for all MPH graduates that should serve them well in their future careers. After all, if we are depending on them to be the public...
health leaders of our future, it is our fundamental responsibility as educators to help them prepare to the best of our abilities.

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REFERENCES