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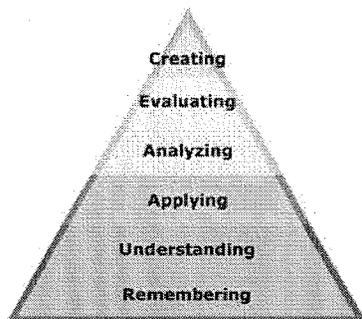
# Center for Teaching

## Flipping the Classroom

By Cynthia J. Brame, CFT Assistant Director

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*"Flipping the classroom" has become something of a buzzword in the last several years, driven in part by high profile publications in The New York Times (Fitzpatrick, 2012); The Chronicle of Higher Education (Berrett, 2012); and Science (Mazur, 2009); In essence, "flipping the classroom" means that students gain first exposure to new material outside of class, usually via reading or lecture videos, and then use class time to do the harder work of assimilating that knowledge, perhaps through problem-solving, discussion, or debates.*



*Bloom's Taxonomy (Revised)*

*In terms of Bloom's revised taxonomy (2001), this means that students are doing the lower levels of cognitive work (gaining knowledge and comprehension) outside of class, and focusing on the higher forms of cognitive work (application, analysis, synthesis, and/or evaluation) in class, where they have the support of their peers and instructor. This model contrasts from the traditional model in which "first exposure" occurs via lecture in class, with students assimilating knowledge through homework; thus the term "flipped classroom."*

What is it? | Does it work? | Theoretical basis | Key Elements | Where can I learn more? | References

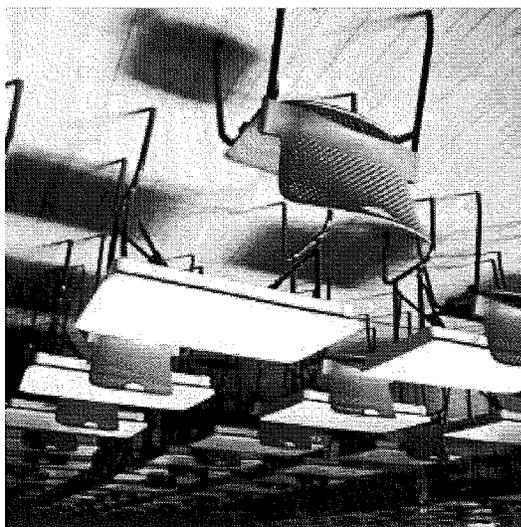
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## What is it?

### Flipped Classroom

The **flipped classroom** approach has been used for years in some disciplines, notably within the humanities. Barbara Walvoord and Virginia Johnson Anderson promoted the use of this approach in their book *Effective Grading* (1998). They propose a model in which students gain *first-exposure learning* prior to class and focus on the *processing* part of learning (synthesizing, analyzing, problem-solving, etc.) in class.

To ensure that students do the preparation necessary for productive class time, Walvoord and Anderson propose an assignment-based model in which students produce work (writing, problems, etc.) prior to class. The students receive productive feedback through the processing activities that occur during class, reducing the need for the instructor to provide extensive written feedback on the students' work. Walvoord and Anderson describe examples of how this approach has been implemented in history, physics, and biology classes, suggesting its broad applicability.



### Inverted Classroom

Maureen Lage, Glenn Platt, and Michael Treglia described a similar approach as the **inverted classroom**, and reported its application in an introductory economics course in 2000. Lage, Platt, and Treglia initiated their experiment in response to the observation that the traditional lecture format is incompatible with some learning styles.<sup>1</sup> To make their course more compatible with their students' varied learning styles, they designed an inverted classroom in which they provided students with a variety of tools to gain first exposure to material outside of class: textbook readings, lecture videos, Powerpoint presentations with voice-over, and printable Powerpoint slides.

To help ensure student preparation for class, students were expected to complete worksheets that were periodically but randomly collected and graded. Class time was then spent on activities that encouraged

students to process and apply economics principles, ranging from mini-lectures in response to student questions to economic experiments to small group discussions of application problems. Both student and instructor response to the approach was positive, with instructors noting that students appeared more motivated than when the course was taught in a traditional format.

## Peer Instruction

Eric Mazur and Catherine Crouch describe a modified form of the flipped classroom that they term **peer instruction** (2001). Like the approaches described by Walvoord and Anderson and Lage, Platt, and Treglia, the peer instruction (PI) model requires that students gain first exposure prior to class, and uses assignments (in this case, quizzes) to help ensure that students come to class prepared. Class time is structured around alternating mini-lectures and conceptual questions. Importantly, the conceptual questions are not posed informally and answered by student volunteers as in traditional lectures; instead, all students must answer the conceptual question, often via “clickers”, or handheld personal response systems, that allow students to answer anonymously and that allow the instructor to see (and display) the class data immediately. If a large fraction of the class (usually between 30 and 65%) answers incorrectly, then students reconsider the question in small groups while instructors circulate to promote productive discussions. After discussion, students answer the conceptual question again. The instructor provides feedback, explaining the correct answer and following up with related questions if appropriate. The cycle is then repeated with another topic, with each cycle typically taking 13-15 minutes.

## Does it work?

Mazur and colleagues have published results suggesting that the PI method results in significant learning gains when compared to traditional instruction (2001). In 1998, Richard Hake gathered data on 2084 students in 14 introductory physics courses taught by traditional methods (defined by the instructor as relying primarily on passive student lectures and algorithmic problem exams), allowing him to define an average gain for students in such courses using pre/post-test data. Hake then compared these results to those seen with interactive engagement methods, defined as “heads-on (always) and hands-on (usually) activities which yield immediate feedback through discussion with peers and/or instructors” (Hake p. 65) for 4458 students in 48 courses. He found that students taught with interactive engagement methods exhibited learning gains almost two standard deviations higher than those observed in the traditional courses (0.48 +/- 0.14 vs. 0.23 +/- 0.04). Assessment of classes taught by the PI method provides evidence of even greater learning gains, with students in PI courses exhibiting learning gains ranging from 0.49 to 0.74 over eight years of assessment at Harvard University (Crouch and Mazur, 2001). Interestingly, two introductory physics classes taught by traditional methods during the assessment

period at Harvard show much lower learning gains (0.25 in a calculus-based course in 1990 and 0.40 in an algebra-based course in 1999).



algebra-based course in 1999).

Carl Wieman and colleagues have also published evidence that flipping the classroom can produce significant learning gains (Deslauriers et al., 2011). Wieman and colleagues compared two sections of a large-enrollment physics class. The classes were both taught via interactive lecture methods for the majority of the semester and showed no significant differences prior to the experiment. During the twelfth week of the semester, one section was “flipped,” with first exposure to new material occurring prior to class via reading assignments and quizzes, and class time devoted to small group discussion of clicker questions and questions that required written responses. Although class discussion was supported by targeted instructor feedback, no formal lecture was included in the experimental group. The control section was encouraged to read the same assignments prior to class and answered most of the same clicker questions for summative assessment but were not intentionally engaged in active learning exercises during class. During the experiment, student engagement increased in the experimental section (from 45 +/- 5% to 85 +/- 5% as assessed by four trained observers) but did not change in the control section. At the end of the experimental week, students completed a multiple choice test, resulting in an average score of 41 +/- 1% in the control classroom and 74 +/- 1% in the “flipped” classroom, with an effect size of 2.5 standard deviations. Although the authors did not address retention of the gains over time, this dramatic increase in student learning supports the use of the flipped classroom model.

## Theoretical basis

*How People Learn*, the seminal work from John Bransford, Ann Brown, and Rodney Cocking, reports three key findings about the science of learning, two of which help explain the success of the flipped classroom. Bransford and colleagues assert that

*“To develop competence in an area of inquiry, students must: a) have a deep foundation of factual knowledge, b) understand facts and ideas in the context of a conceptual framework, and c) organize knowledge in ways that facilitate retrieval and application” (p. 16).*

By providing an opportunity for students to use their new factual knowledge while they have access to immediate feedback from peers and the instructor, the flipped classroom helps students learn to correct misconceptions and organize their new knowledge such that it is more accessible for future use.

Furthermore, the immediate feedback that occurs in the flipped classroom also helps students recognize and think about their own growing understanding, thereby supporting Bransford and colleagues' third major conclusion:

*"A 'metacognitive' approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them" (p. 18).*

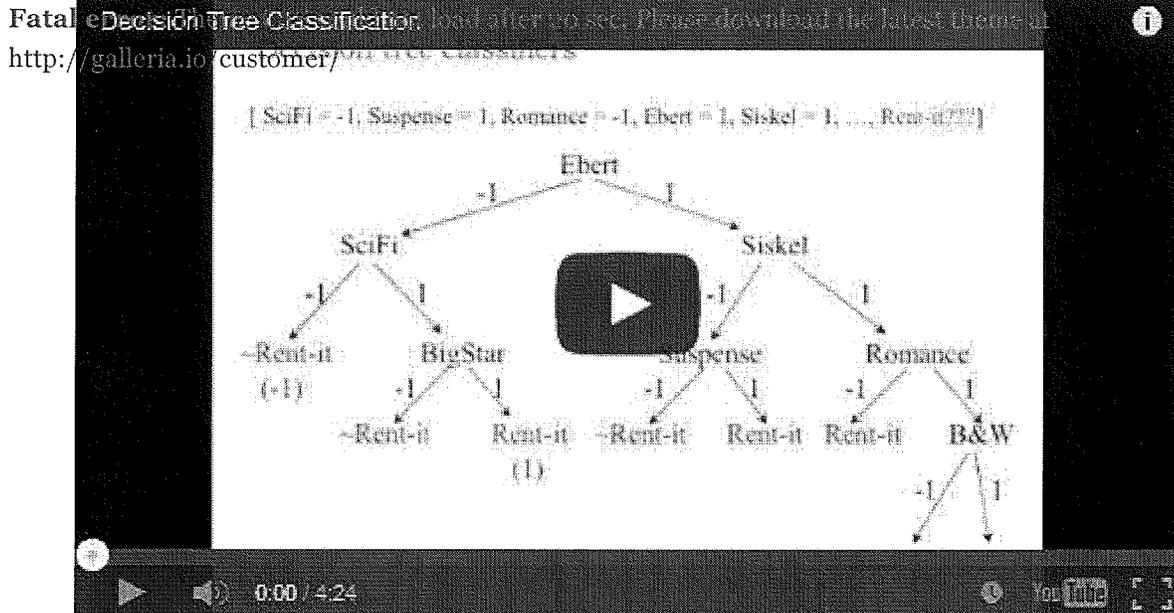
Although students' thinking about their own learning is not an inherent part of the flipped classroom, the higher cognitive functions associated with class activities, accompanied by the ongoing peer/instructor interaction that typically accompanies them, can readily lead to the metacognition associated with deep learning.

## What are the key elements of the flipped classroom?

### 1. Provide an opportunity for students to gain first exposure prior to class.

The mechanism used for first exposure can vary, from simple textbook readings to lecture videos to podcasts or screencasts. For example, Grand Valley State University math professor Robert Talbert provides screencasts on class topics on his YouTube channel, while Vanderbilt computer science professor Doug Fisher provides his students video lectures prior to class (see examples here and here). These videos can be created by the instructor or found online from YouTube, the Khan Academy, MIT's OpenCourseWare, Coursera, or other similar sources. The pre-class exposure doesn't have to be high-tech, however; in the Deslauriers, Schelew, and Wieman study described above, students simply completed pre-class reading assignments.

*Example video from Doug Fisher*



## 2. Provide an incentive for students to prepare for class.

In all the examples cited above, students completed a task associated with their preparation....and that task was associated with points. The assignment can vary; the examples above used tasks that ranged from online quizzes to worksheets to short writing assignments, but in each case the task provided an incentive for students to come to class prepared by speaking the common language of undergraduates: points. In many cases, grading for completion rather than effort can be sufficient, particularly if class activities will provide students with the kind of feedback that grading for accuracy usually provides. See a blog post by CFT Director Derek Bruff about how he gets his students to prepare for class.

## 3. Provide a mechanism to assess student understanding.

The pre-class assignments that students complete as evidence of their preparation can also help both the instructor and the student assess understanding. Pre-class online quizzes can allow the instructor to practice Just-in-Time Teaching (JiTT; Novak et al., 1999), which basically means that the instructor tailors class activities to focus on the elements with which students are struggling. If automatically graded, the quizzes can also help students pinpoint areas where they need help. Pre-class worksheets can also help focus student attention on areas with which they're struggling, and can be a departure point for class activities, while pre-class writing assignments help students clarify their thinking about a subject, thereby producing richer in-class discussions. Importantly, much of the feedback students need is provided in class, reducing the need for instructors to provide extensive commentary outside of class (Walvoord and Anderson, 1998). In addition, many of the activities used during class time (e.g., clicker questions or debates) can serve as informal checks of student understanding.

## 4. Provide in-class activities that focus on higher level cognitive activities.

Spring 2013

# The Blue Ridge Academic Health Group

Report 17. Health Professions Education:  
Accelerating Innovation Through Technology



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*Health Professions Education: Accelerating Innovation Through Technology is the 17th in a series of reports produced by the Blue Ridge Academic Health Group. The recommendations and opinions expressed in this report represent those of the Blue Ridge Academic Health Group and are not official positions of Emory University. This report is not intended to be relied on as a substitute for specific legal and business advice. Copyright 2013 by Emory University.*

**MISSION:** The Blue Ridge Academic Health Group seeks to take a societal view of health and health care needs and to identify recommendations for academic health centers (AHCs) to help create greater value for society. The Blue Ridge Group also recommends public policies to enable AHCs to accomplish these ends.

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## Introduction

*Our academic health centers are white-knuckled in fear that their historic missions of education, service and research are threatened from the outside. . . . Yet, a greater threat may lie within the halls of academe. If we remain dedicated to minor revisions of past educational approaches, our prospects will be dim indeed. (Don E. Detmer, MD, 1997)<sup>1</sup>*

*We are reaching a tipping point where education and educators can use technology to reach almost every person on the planet inexpensively. However, the result may not look like the conventional university experience we recognize today. These are exciting times for educators, but it remains to be seen how these developments will change the structure of education, influence the purpose of institutions, and shape the role of professors. These developments may feel threatening, but they also offer exciting opportunities to reach a much larger and broader audience with our lectures, to spend more time advising and mentoring students, and to improve the overall learning experience for all. (Stephen Carson and Jan Philipp Schmidt, 2012)<sup>2</sup>*

Over the past decade, a multitude of organizations have called for the reform, overhaul, and transformation of health professions education.<sup>3-16</sup> Although there may be differences in emphasis among these groups, there is widespread agreement on the nature of needed changes. In general, health professions education needs to do the following:

- Expand focus on new areas that are foundational to the success of clinicians in the 21st century (e.g., working in teams, patient-centeredness, communication, informatics, population-based and evidence-based care).
- Strengthen ability to measure competencies of learners.
- Improve efficiency of the educational process and address issue of costs required to become a health professional.
- Be responsive to the learning styles of students.
- Prepare students to be lifelong learners.
- Produce an adequate number and appropriate balance of health professionals.

Achieving these objectives will impact health professional schools' curricula, faculty, infrastructure requirements, and budgets in addition to requiring changes in organizational culture. While the tripartite mission of an academic health center (AHC) yields organizational synergies, it also results in the educational enterprise competing with patient care and research for limited resources. Moreover, some of the needed changes are beyond the control of academic health centers. Indeed, well-intentioned unilateral actions may have unintended consequences. Hence, there is a need for coordination and thoughtful participation of all the stakeholders involved, including the organizations that accredit schools, certify and license health professionals, and pay for patient care. The task of educational reform is vast and complex; multiple actors must align their policies; uncertainty abounds and is exacerbated by the changes under way within the health care system; and scarce resources make it critical that any changes be made with great care and thought. Despite a growing sense of urgency, progress has been slow. As a result, the evolution of educational approaches has not kept pace with market changes and innovations in health care delivery, and health professional educational processes are not aligned with health system needs.

Meanwhile, online learning (also known as e-learning, Internet-based learning, Web-based instruction, distance learning, computer-aided instruction) is on the rise and creating waves, if not a tsunami, for higher education.<sup>17</sup> In 2012, online learning reached a new milestone with the emergence of massive open online courses or "MOOCs" and accompanying for-profit and non-profit platforms that provide access to MOOCs. Of particular note, Stanford's free online course on artificial intelligence attracted 160,000 students from 190 countries (with 5% of students completing the course); a president of a top-ranked university was ousted in part for failing to respond quickly enough to the online course environment (but was later reinstated); and *The Chronicle of Higher Education*, *The New York Times*, and *Time* each focused on MOOCs and the reinvention of higher education within the span of a month.<sup>17-22</sup>

These developments are occurring against the

backdrop of increasing questions about the ever rising cost and value of traditional residential education.<sup>23</sup> Despite facing ambiguity on the effectiveness of online educational approaches, perceived threats by faculty, and additional costs for already burdened budgets, universities have been forced to grapple with the online learning movement and to determine whether and how to incorporate it into daily operations, and they are being pushed to do so at a more rapid pace than they are accustomed to moving. Higher education institutions stand at a pivotal juncture, with opinions divided on what the future holds. Some observers predict that higher education will change more in the next decade than in the past 100 years and that 50% of the colleges and universities operating in the United States in 2013 will not exist in 2063.<sup>24</sup> Other analysts contend that it will take a decade for solid business models for MOOCs to emerge, and still others caution that some for-profit online education companies entering the market are a “sack of vapor.”<sup>25, 26</sup>

These disparate developments—the need for health professional education reform and the online movement—present leaders of AHCs and health professional schools with a compelling, indeed critical set of questions that motivates this report:

In light of the complexity associated with needed reforms, what can health professional schools and academic health centers do in the near term to make progress toward the envisioned future for health professions education?

How can AHCs and health professional schools capitalize on the potential benefits offered by online learning and computer-assisted instruction to move toward our shared vision for health professions education?

How can health professional schools and AHCs leverage education technology to jump-start needed changes in health professional education and accelerate innovations that will pave the way for longer term and larger scale transformations?

The Blue Ridge Academic Health Group (Blue Ridge Group) begins this report with the endpoint—the desired destination for health professions education—and ends the report with a set of

recommendations for moving toward that destination. Given the anticipated fast pace of change in online education, the report challenges AHCs to embrace a small set of immediate actions that can be implemented while the longer term recommendations are being progressively adopted. This report will not explore in depth the full range of actions that are needed to achieve optimal reform of health professions education. The Blue Ridge Group recognizes that the recommendations in

**How can health professional schools and AHCs leverage education technology to jump-start needed changes in health professional education and accelerate innovations that will pave the way for longer term and larger scale transformations?**

this report are insufficient to achieve the ultimate end goal but believes that there are actions that can move toward the endpoint and that, by building momentum and gaining experience, larger changes may be stimulated.

To understand how AHCs should respond to the need for dramatic changes in health professions education and the

rapidly changing higher education landscape, the Blue Ridge Group surveyed initiatives and institutions on the frontier of higher education and health professions education innovation. These “bright spots” do not provide a simple answer to how to reform, transform, advance, or overhaul health professions education.<sup>27</sup> They do, however, help us understand the forces that are shaping higher education and highlight how AHCs can take advantage of emerging tools to jump-start progress toward our desired destination.

The rapid pace of change and daily reports of new developments in the online movement required the Blue Ridge Group to take a snapshot in time (i.e., fall 2012) as the basis of its analysis. This report focuses on health professional undergraduate education (e.g., in schools of medicine and nursing) rather than the entire education continuum being impacted by online learning (i.e., elementary school through continuing professional education).

## The destination: A multi-faceted vision for health professions education

Two key concepts underpin the work of the Blue Ridge Group. First is the need for AHCs to meet the needs of society as well as the individual needs of the patients they serve and the students they teach. Second is the concept of a value-driven health system and the need to maximize return on investment for dollars spent in health care, education, and research. Building on the vision for health professions education that has emerged over the past decade, the Blue Ridge Group explicitly applies these two concepts to its understanding of what health professions education should offer in the future and articulates the vision for health professions education from the perspective of four key stakeholders.

From society's perspective, health professional education should do the following:

- Produce an adequate number and appropriate balance of health professionals as needed to meet the needs of the population. This includes achieving greater representation of historically under-represented minorities across the health professions.
- Ensure that all health professionals are competent in their respective domains, proficient in working in teams that include patients and families and that cross a range of settings, and able to work in a learning-oriented and technology-facilitated health care delivery system.
- Produce health professionals who are prepared to evolve in response to the changing needs of the population and the health care system.
- Yield a positive return on public investment in health professions education.

From the health professional student's perspective, health professional education should do the following:

- Be flexible,
  - allowing students to move as quickly or slowly through the content as needed to gain mastery, taking into account their knowledge and strengths upon entry to health professional school and their ultimate objectives for practice, and
  - allowing students to use the educational

methodologies/tools that best suit their learning styles.

- Enable each student to achieve mastery in his/her domain while also gaining proficiency in functioning effectively in a multi-disciplinary, inter-professional team; in a learning health care system; and as a lifelong learner.
- Minimize the time required to become competent by exposing students to knowledge that is truly relevant and providing experiences that are essential to achieving competency.
- Be integrated over time as health professionals move from undergraduate to clinical practice (or in the case of physicians, from premedical to undergraduate medical to residency and fellowships, to practice).
- Be affordable.

From the faculty member's perspective, health professional education should do the following:

- Be valued, supported, and rewarded by the organization (i.e., academic health center).
- Provide opportunities for innovation and collaboration across disciplines and institutions.
- Provide opportunities to engage students in learning activities that promote collaboration and personal growth for teachers and learners.

From the academic health center's perspective, health professional education should do the following:

- Attract a diverse population of students.
- Engage faculty and allow them to focus on skills and knowledge that are best transmitted through personal interaction with and among students.
- Capture and track costs and quality outcomes.
- Be self-supporting.

Some of the changes needed to achieve this vision depend on actions by groups outside of AHCs. For example, time must be found to address new areas in the curricula without increasing the length of training. Rather than add these important areas on top of the existing curriculum, institutions will need to reduce time spent on some areas within the current curriculum. Yet schools cannot risk making these changes unilaterally since students must pass the licensing board exams, which are based on the current curriculum. In the case of medicine, the Federation

of State Medical Boards will need to agree to such changes. But equally challenging, all of the disciplines that are currently represented in the curriculum will need to agree on the determination of what constitutes “core” content and a reallocation of time in the curriculum. A comprehensive examination of such changes is beyond the scope of this report but is a desired task that needs to be “owned” by relevant educational organizations. Rather, this report explores which elements of the vision for health professions education can be supported through creative, thoughtful application of currently available and emerging online learning approaches and tools that are accessible to and within the purview of AHCs.

This vision for health professions education creates additional requirements for the educational enterprise of AHCs and health professional schools. Specifically, AHCs and health professional schools jointly need to do the following:

- Foster far greater flexibility in educational processes to accommodate the individual student’s starting point, learning style, life situation, and long-term objectives and to give students and graduates far more control of when, where, how, and what to study as they work toward achieving the needed competencies.
- Be more nimble with respect to modifying the curriculum and performance improvement efforts within AHCs, introducing advances in clinical knowledge or pedagogy innovations based on the science of human cognition, adapting to changing demands for numbers and types of health professionals, and overcoming timing constraints often faced in interdisciplinary training.
- Provide as many opportunities as each student needs to master competencies and capture and document student performance across time and settings.
- Measure and track costs and effectiveness for each component of the educational enterprise (e.g., individual lectures and simulations) and find efficiencies that save money for the institution and time (and money) for students.
- Implement technological innovations that support curricular changes and process enhancements.

## The changing landscape of higher education

In fall 2010, more than 6.1 million students in degree-granting postsecondary institutions (31%) were enrolled in at least one online class.<sup>28</sup> The growth rate for online enrollment slowed somewhat in 2010 but continued to exceed the rate of growth in total higher education student population. The online movement is notable, not only for its size, but also for the many variations it takes. Traditional residential universities that offer online certificate or extension programs have been joined by purely online universities (both for-profit and nonprofit). The University of Massachusetts offers 25 different online bachelor degree options through UMassOnline and makes no distinction between online and on-campus credits earned.<sup>29</sup> The for-profit University of Phoenix had more than 450,000 students enrolled in 2010.<sup>30</sup> Western Governor’s University (WGU), a private, nonprofit, multi-state online learning university with 20,000 students, charges less than \$3,000 for tuition for a flat-rate six-month term and has not raised tuition for four years.<sup>31</sup>

This movement is by no means limited to higher education and reaches down to kindergarten. For example, more than 6 million unique users access the Khan Academy’s free library of 4,000 videos each month. These short videos are aimed at K-12 learners, focus primarily on math and science, and are supplemented by problem sets that enable students to demonstrate mastery of concepts.<sup>32</sup> As time passes, increasing numbers of students entering college will have had some kind of online learning experience.

As Table 1 highlights, college and university students are likely to encounter a range of course types during their post-secondary education. In some online courses, a student may hear a recorded lecture that is synchronized to a set of slides, take online tests, and sometimes have the opportunity to participate in online discussion groups (with or without a faculty member). In other instances, considerable resources are invested in developing highly interactive learning modules that may include animations, interactive diagrams, and simulations with embedded assess-

Table 1: The range of online learning experiences that have emerged in higher education<sup>28</sup>

Course type	General description
Traditional	“Sage on the stage.” Content is presented orally or in writing. There is face-to-face interaction between students and instructors. Some technology such as “clickers” or student response systems may be used in large classes to facilitate student interaction.
Web-facilitated	Web-based technology such as a learning management system is used to support a face-to-face course. Course materials such as the syllabus and assignments may be posted online. Tests may be administered online.
Blended/hybrid/flipped	Substantial portion of content is delivered online; often reduces number of face-to-face meetings; may use online discussions among students and instructors. Students may be expected to view a recorded lecture before class. Face-to-face sessions can then be interactive learning experiences designed to activate prior knowledge and solidify understanding.
Online course	The majority or all of content is delivered online; may use online discussion; no face-to-face meetings.

ments.<sup>30</sup> Regardless of the level of interactivity provided in an online course, a technological infrastructure in the form of a learning management system that allows content sharing and tracking of student progress is essential.

While the scale of online learning is impressive, much of it replicates what has gone on in the classroom for centuries and merely constitutes a change in distribution method.<sup>21</sup> Although human cognition research has expanded understanding of how people learn, these insights have largely not yet made their way into most physical or virtual classrooms.

Nonetheless, applying online technology to current teaching processes does yield benefits. A 2012 study that compared traditional lectures (i.e., three to four hours of face-to-face instruction per week) to a hybrid format (i.e., machine-guided instruction combined with one hour of face-to-face instruction) found that learning outcomes were essentially the same for the two formats.<sup>33</sup> Cost simulations based on these results led researchers to conclude that the hybrid instruction model applied to large introductory classes offers potential to reduce instructor compensation costs in the long run. In addition to allowing faculty to teach more students in a single course, online courses

reduce classroom space needs for universities, extend reach of the university beyond the campus, and eliminate the need for faculty to give the same lectures each semester, thereby freeing them up for other activities. Online courses offer students more flexibility with respect to when and how often they receive knowledge as students can listen to a lecture at a time of their own choosing and as often as they want.

Of potentially greater significance, online educational approaches offer tangible ways to transform the educational process. There is growing realization that traditional didactic lectures are less effective at achieving student mastery of knowledge than lessons that incorporate student problem solving.<sup>34,35</sup> By reducing time required to lecture during face-to-face sessions, faculty can increase time spent engaging students in discussion or problem-solving activities. Learning management systems offer the capacity to capture data on individual learner progression, thereby enabling a customized educational experience. For example, the Khan Academy tracks student progress in solving problems and when a student demonstrates mastery of a given concept, it recommends new topics for the student to explore. Further, as organizations compile data for

Table 2: Evolution in access to higher education courses and courseware

Traditional closed courses	OpenCourseWare (OCW)	Massive open online courses (MOOCs)
Students pay tuition for access to content that is delivered face-to-face or online. Time frame for courses is controlled by institution. Online closed courses allow students some flexibility within the overall structure. Students who meet institutional requirements earn a degree.	Course materials originally designed for use within degree granting programs are made freely available for use at any time. They are not intended to serve as a stand-alone course, and there is no opportunity to earn a formally recognized credential.	Free courses that require registration. MOOCs are offered during a finite period. Students have flexibility within the general structure of the course. Students who meet requirements may earn a credential that verifies they have successfully completed the course.

populations of students, they have greater ability to analyze the effectiveness of specific learning modules and to gain insights into how students learn most effectively.

Two developments associated with the online learning movement—the idea of sharing course content for free and the platforms that enable such sharing with large numbers of students—may ultimately provide the tipping point for the reinvention of higher education. As Table 2 outlines, online courses and course content have expanded from the traditional closed model to include open access to courseware and free course offerings from elite institutions. Although these innovations are focused on external audiences for colleges and universities, they are also impacting the education of students on campus.

**OpenCourseWare (OCW)** is based on the premise that there is value in freely sharing courseware that has been developed for use in face-to-face courses.<sup>36</sup> Courseware may include syllabi, lecture notes, assignments, exams, and sometimes recorded lectures. It was originally intended for use as a teaching resource for educators around the world. Surprisingly, the majority of users turned out to be students looking to supplement their own instruction or self-learners curious about the topic. OCW began with a single institution (Massachusetts Institute of Technology) in 2002 and in 10 years has grown into a consortium of 280 institutions, 100 live OCW sites, and 21,000 courses. OCW inspired a broader movement of Open Educational Resources (OER)

that includes an increasing number of open access journals and textbooks. OCW and OER have been enabled in large measure by the emergence of public copyright licenses such as Creative Commons, which gives licensors a standardized, easy way to grant copyright permissions to their work while retaining credit for it.<sup>37</sup> OCW content is not only supporting higher education around the globe, but it has also shown impact on communities. Two entrepreneurs in Haiti used MIT OCW content to learn about circuits to develop solar-powered street lights for use in some of Haiti’s poorest communities.

The growth of OCW highlights several important lessons for higher education leaders:

- Educational content can be decoupled from those who create it. “Commoditizing” course content enables more efficient creation and use.
- There is strong demand for free content from trusted sources.
- There is a large pool of individuals worldwide who seek to learn for the sake of learning.
- A common technological platform that enables content sharing for a shared goal can foster greater and rather swifter collaboration than previously observed in higher education.

While OCW and OER continue to grow in size and influence, they have been joined by a growing set of **shared learning platforms** and **massive open online courses (MOOCs)**. In late 2011, MIT formed MITx to support education on campus and around the world. This online interactive learning platform organizes and presents

### Overview of a MOOC

In 2012, MITx offered a free online Circuits and Engineering (6.002) course for which 154,000 individuals registered and more than 7,100, or approximately 5%, passed the final exam. Students for this course ranged in age from 14 to 74 and represented 160 countries. The course included video lectures and demonstrations, practice exercise, homework assignments, exams, and an online interactive lab designed to replicate its real-world counterpart. A team of professors and teaching assistants supported a discussion forum

and actively sought feedback from participants to improve the learning experience.<sup>38</sup> Some learners developed enhancements for the course such as online text viewers for mobile devices, while others requested that the website for the course be maintained after the course concluded so that students could continue interacting via the discussion forums, and still others used content from MIT's OpenCourseWare project to create their own follow-up course (i.e., 6.003z Signals and Systems).<sup>39</sup>

course material to enable students to learn at their own pace, includes online laboratories and discussion forums, enables assessment of individual students' work, and allows certification from MITx for students who demonstrate mastery. The sidebar describes the first MOOC offered by MITx. MIT has since partnered with Harvard

to establish **edX**, a nonprofit online learning platform that offered seven free courses in 2012. The edX Consortium has expanded to include the University of Texas with its nine academic institutions and six health science centers, UC Berkeley, Georgetown, and Wellesley, with future plans to include several international universities.

Table 3: The four spheres of MIT's educational portfolio<sup>40</sup>

External	OCW (OpenCourseWare)	Global MITx (MOOCs)
	<ul style="list-style-type: none"> <li>■ Comprehensive publication of materials used in MIT courses (~2,150 courses)</li> <li>■ Targeted at learners and educators worldwide</li> <li>■ Online communities</li> <li>■ Dissemination platform for MIT faculty</li> </ul>	<ul style="list-style-type: none"> <li>■ MIT-caliber online courses with assessment and certificates</li> <li>■ Targeted at top-level learners</li> <li>■ Materials developed by faculty</li> <li>■ Select portfolio of courses</li> <li>■ Online communities</li> <li>■ Delivered on edX platform</li> </ul>
Internal	MIT Residential	Residential MITx
	<ul style="list-style-type: none"> <li>■ Campus-based education</li> <li>■ Faculty innovation in education</li> <li>■ Re-imagines residential education via experiments</li> <li>■ Blended online and classroom learning</li> <li>■ Enhanced by MITx, OCW, and edX technologies</li> </ul>	<ul style="list-style-type: none"> <li>■ Online courses and modules for use in MIT's residential education programs</li> <li>■ Targeted at MIT students</li> <li>■ Online communities</li> <li>■ Delivered on edX platform</li> <li>■ Experimentation into how online courses can enhance campus-based instruction</li> </ul>

As outlined in Table 3, MIT's educational portfolio has evolved to include four inter-related spheres of activity. As a result of its leadership in open courseware and nonprofit approach to a shared learning platform, MIT has positioned itself to expand the impact of its faculty globally through OCW, extend its reach to students who can successfully complete MITx courses, and create an infrastructure that allows continual learning about effectiveness of its instructional approaches and extends the capacity of its faculty for residential students by reducing the time required for lecturing.

MIT is not alone in this arena. In 2010, **Udemy** ([www.udemy.com](http://www.udemy.com)) was launched as a way for individual instructors to share their online course content for free or for a small fee that goes to the instructor. In 2012, two Stanford University professors offered an artificial intelligence course online for free. More than 160,000 students registered for the course and although only 5% finished it, 8,000 students in one term constitute considerable reach. Of note, the course was designed with short lectures (i.e., eight minutes) and many problems that force students to learn by doing. Along the way, faculty modified the course based on feedback from students and determined when quiz questions were unclear based on the number of students who missed them. Further, students developed enhancements for the course such as interactive tools for practicing what they were studying and translating the course into other languages. The professors who offered this course went on to found **Udacity** (<https://www.udacity.com/>), a for-profit venture for offering MOOCs that as of October 2012 had 400,000 registered students from 125 countries and offered 14 courses.

In 2012, two other Stanford professors created **Coursera**, a company that "partners with the top universities in the world to offer courses online for anyone to take, for free."<sup>41</sup> Both Coursera and the universities incur costs in developing and offering the courses; contracts stipulate that if a revenue stream emerges, the company and universities will share it. As of October 2012, 33 universities had joined Coursera, and 200 courses were in the course catalog. This set of universities creates a pool of 1.4 million students. In Febru-

ary 2013, the American Council on Education's College Credit Recommendation Service recommended college credit for five courses offered by Coursera. Another organization, **Course Gateway** (<http://www.coursegateway.com/>), seeks to meet global demand for post-secondary education and is focusing on "licensing and bundling online courses to provide customized curricula to both single and aggregated institutional buyers."

This is a rapidly evolving market with new players and concepts appearing almost daily. For instance, in fall 2012 four open education sites (Peer 2 Peer University, OpenStudy, Codecademy, and MIT OCW) launched a "mechanical MOOC" to teach a computer programming language without a professor using existing open courseware, online tools, and an email distribution list.<sup>42</sup>

It is also an uncertain market. Past efforts to monetize online learning failed,<sup>30</sup> and revenue streams for these newly formed companies have not yet crystalized. Nonetheless, the rapidly changing milieu has created the sense that universities need to jump in or risk getting left behind. And while free access to university courses is growing exponentially, consumers will be faced with the need to judge the quality of the content offered.

The growth of MOOCs and the learning management systems that support them pinpoint the power of having access to vast amounts of data on how students interact with courses and how well they master the content. A new era has arrived for the evaluation of the effectiveness of alternative instructional approaches. The potential to significantly increase our understanding of the factors that influence teaching effectiveness and learning and to build curricula and face-to-face and online courses that are based on that science represents a potentially huge leap for higher education.

Sharing content among institutions also offers the potential for dramatic change in higher education by reducing the costs of transmitting the knowledge to students while improving the quality of the learning experience. Rather than every college and university offering the same set of lectures each semester, they could choose to use recorded lectures from their own institution or elsewhere and use their time to work with students on activities that promote true mastery of

knowledge and critical thinking skills. Given the considerable resources it takes to create interactive online learning modules, development costs can be shared among institutions. Faculty and students can also provide feedback to the creators of the recorded lectures or interactive modules, thereby improving the quality of the course over time.

Robust online learning offerings provide institutions and students greater flexibility and control. Students may be able to select from a set of learning activities developed for different learning styles that help them achieve mastery of content, perhaps in less time. Faculty can obtain immediate feedback from students on what is or is not working in the course and make adjustments immediately if they so choose. All of these features contribute to the potential to improve the quality of educational processes while managing the cost of those processes. At their best, online learning technologies enable teachers to design lessons that take advantage of advances in cognitive/learning science in a way that the traditional lecture format fails to do, to provide a way to capture data on whether and how students are learning for further analysis and a deepening of the understanding of what works, and to respond to students' needs for flexibility in schedule as well as differing needs in time and approach for mastering content.

#### **Essential components for building online capacity**

The infrastructure for the educational process has become more complex with the advent of online learning and shared courses. While the basic elements of sharing content, interacting with students, assessing students, and credentialing students remain the same, what once required a professor, a classroom, and exam bluebooks now requires a way to convert content into an online format, store that content, provide access to the content asynchronously, interact with the students online, assess students' mastery of content, and track progress over time. Thus, in addition to faculty and physical space for blended courses, the online educational infrastructure must include **authoring tools** and/or a **learning content man-**

**agement system** to create and manage the content as well as an institutional **learning management system with embedded analytic tools** to provide student access to content, support interactive elements, offer both normative and summative assessments, and track student progress. Further, institutions that seek to share their content need to decide whether to join a **shared learning platform** (e.g., Coursera, edX, Udacity, or others) or to offer their content as OpenCourseWare. Finally, organizations need to develop internal capacity to support the development of online learning. Faculty need support in both technological and pedagogic dimensions of designing, creating, and implementing online courses or modules. They also need guidance on copyright and intellectual property issues associated with creation of online courses. Looking ahead, the learning management system for health professional schools will need to support and integrate with e-portfolios that enable competency validation for students and practitioners throughout their careers.

#### **Leveraging technology for health education innovation**

Online learning and computer-aided instruction efforts are already under way in many health professional schools. These tools are being used to facilitate knowledge acquisition, improve decision making, strengthen visual diagnosis (enhancing perception variation), improve skill coordination, practice rare and critical events, conduct team training, and improve psychomotor skills.<sup>43</sup> They range in level of interactivity for students, degree of fidelity in accurately simulating the intended task or environment, and resources required to develop. Table 4 presents examples of ways that health professional schools are using technology in support of education.

The challenge for AHCs and health professionals is to determine how these approaches can be used to strengthen their educational processes in the near term and to make progress toward a new vision for health professions education in the longer term. As they grapple with this challenge, AHCs and health professional schools must

consider the potential benefits, costs, limitations, and effectiveness of the technologies and approaches under consideration. There are scant data to answer these questions. Thus, as discussed subsequently in **Emerging Research Agenda**, significant attention must be given to formulating and implementing a robust research agenda. In the meantime, organizations will be well served to learn from efforts within and outside of their walls. Toward that end, several approaches to leveraging online technology and other educational technologies within health professional education are presented.

*phases of education there is a clear goal always in mind—namely, the preparation of an individual to provide clinical care for patients—a doctor. For decades we have presumed that time on task equated with appropriate levels of mastery of the abilities needed to become a physician. Over the last recent decades there has been an ever growing call for competency-based rather than time-based approaches to medical education. The explosion of technology-based learning and assessment tools potentially positions medical educators to move forward with competency-based educational models. (James Woolliscroft, MD, 2012)*

**University of Michigan Medical School: Focus on continuous learners**

*The end is the beginning. Medical education is a continuum. However, for the initial formal*

**The University of Michigan Medical School (UMMS)** approach to building online learning capacity is shaped by several factors. UMMS begins with the competencies needed to graduate

Table 4: Examples of online learning and computer-aided instruction tools currently in use or in development at health professional schools

<p><b>Online learning infrastructure (accessing content/measuring outcomes)</b></p> <ul style="list-style-type: none"> <li>■ Learning management system for accessing online courses and modules and tracking progress within them (within institution)</li> <li>■ Shared learning platforms (e.g., Coursera, OCW)</li> <li>■ ePortfolios for building longitudinal records of student and faculty performance</li> </ul> <p><b>Knowledge transfer/acquisition</b></p> <ul style="list-style-type: none"> <li>■ Online/blended/hybrid/flipped courses (see Table 1), interactive learning modules such as case studies</li> <li>■ Apps for learning or practicing a specific skill</li> </ul> <p><b>On-demand access to knowledge</b></p> <ul style="list-style-type: none"> <li>■ Online access to entire curriculum</li> <li>■ Availability of key resources on iPad or related technology</li> <li>■ Customized search engines for accessing institutional resources and beyond</li> </ul> <p><b>Practicing skills and testing knowledge</b></p> <ul style="list-style-type: none"> <li>■ Virtual patients</li> <li>■ Virtual microscopes</li> <li>■ Simulation centers</li> <li>■ Simulated emails to assess knowledge, professionalism, and communication skills</li> <li>■ Spaced education games</li> <li>■ Serious games</li> <li>■ Avatars</li> </ul>
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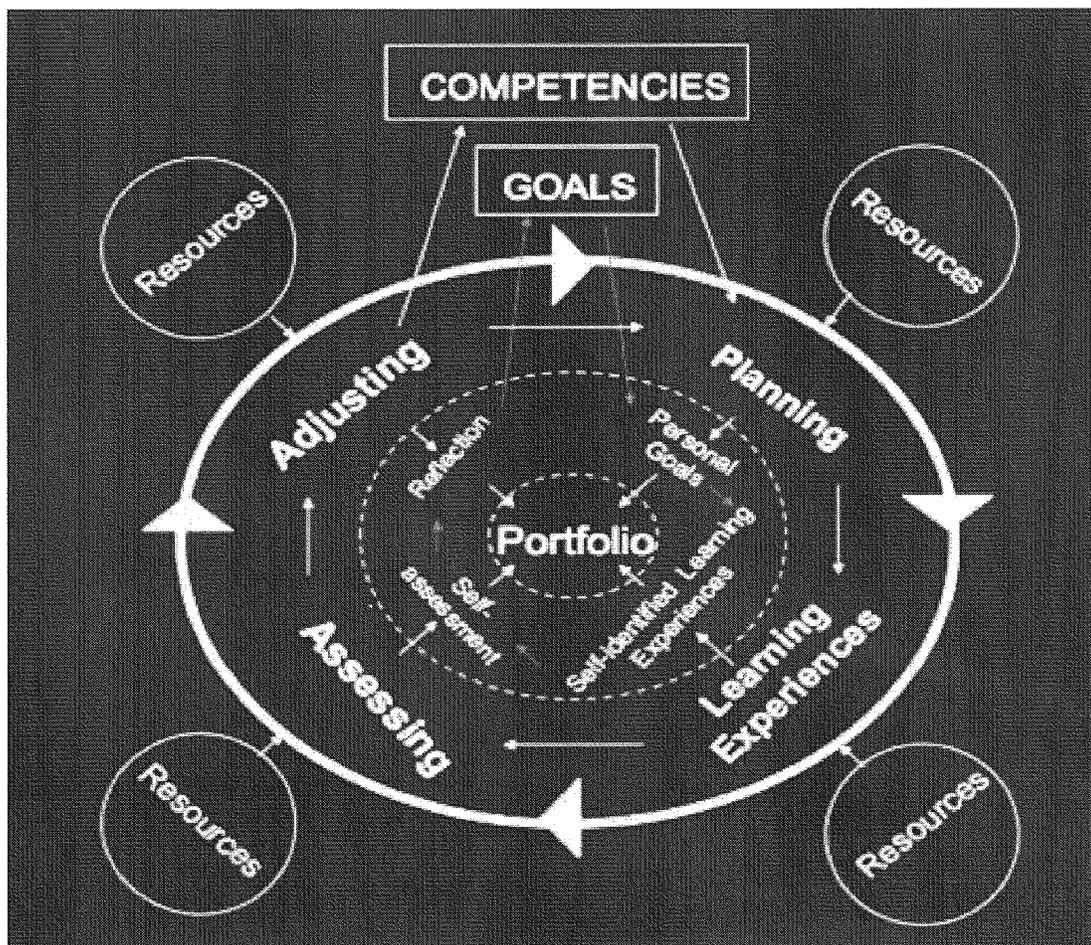
and the student's personal goals. These competencies extend beyond mastery of facts to development of skills, attitudes, and habits associated with excellence in practice and lifelong learning. Thus, UMMS is working to create tools that allow students to practice synthesizing disparate information and accessing information and resources from a variety of sources as well as self-assessment and reflection. UMMS's approach is also motivated by the understanding that students do not study the way that faculty did and are more likely to follow their own pattern of learning. Finally, UMMS's view that technology can enhance learning and student assessment is balanced by recognition that rigorous evaluation of whether the actual transfer of skills is achieved is imperative.

The student portfolio (see Figure 1)<sup>44</sup> will be

at the core of the University of Michigan Medical School's approach to achieving competency-based medical education. The interactive tool currently being developed as part of a comprehensively integrated learning architecture will support self-directed learning by helping students articulate their personal goals and plan their learning experiences, monitor their progress, reflect on their experiences, and access resources at the UMMS and beyond. It will also provide access to targeted learning objects tied to specific competencies.

The student portfolio will be supported by a range of online technology that is already being used to support self-directed learning and enhance traditional face-to-face classes. Among the initiatives under way at UMMS are the following:

Figure 1<sup>44</sup>



- First- and second-year lectures have been digitally recorded for ubiquitous search and access by students.
- The Professional Skill Builder (PSB), a web-based, multimedia, interactive case simulation program, allows students throughout their four years to work through clinical cases to practice history taking, physical examination, and diagnostic test selection, thereby reinforcing and integrating classroom and clinical learning.
- Third-year students have access to additional online cases through a subscription to iInTime, designed to address gaps and stimulate self-directed learning when students do not encounter specific core clinical conditions.
- The histology class is taught using virtual microscopy throughout the first year of medical school ([www.med.umich.edu/histology/courseinfo.html](http://www.med.umich.edu/histology/courseinfo.html)).
- Simulated electronic mail has been tested as a way to improve third-year medical student electronic communication skills with patients and family members.
- Advanced Medical Therapeutics is a self-directed, interactive, on-line course that is required for fourth-year students, designed so that they build applied knowledge in the clinical context and fully participate in the course while traveling for residency interviews.
- iSeek allows all medical school students, faculty, and staff to search and view all online educational materials (including streamed lectures and PowerPoint presentations) in the undergraduate medical school curriculum, with future capabilities planned to search the medical literature and electronic health record.

Looking ahead, UMMS is testing the use of digital avatars in advanced communication scenarios and, in collaboration with Coursera, developing blended lecture snippets with embedded assessment to deliver full courses online. Looking more broadly, UMMS has been an active participant in open.michigan, an open courseware initiative of the University of Michigan that allows faculty to share their educational resources such as downloadable lectures, YouTube videos, and SlideShare presentations with the global learning community. As of October 2012, 98 UMMS faculty were participating and 13 M1 and 10 M2

sequences were available, with 263,987 views to 29 UMMS videos and 38,925 views to 214 UMMS lectures.

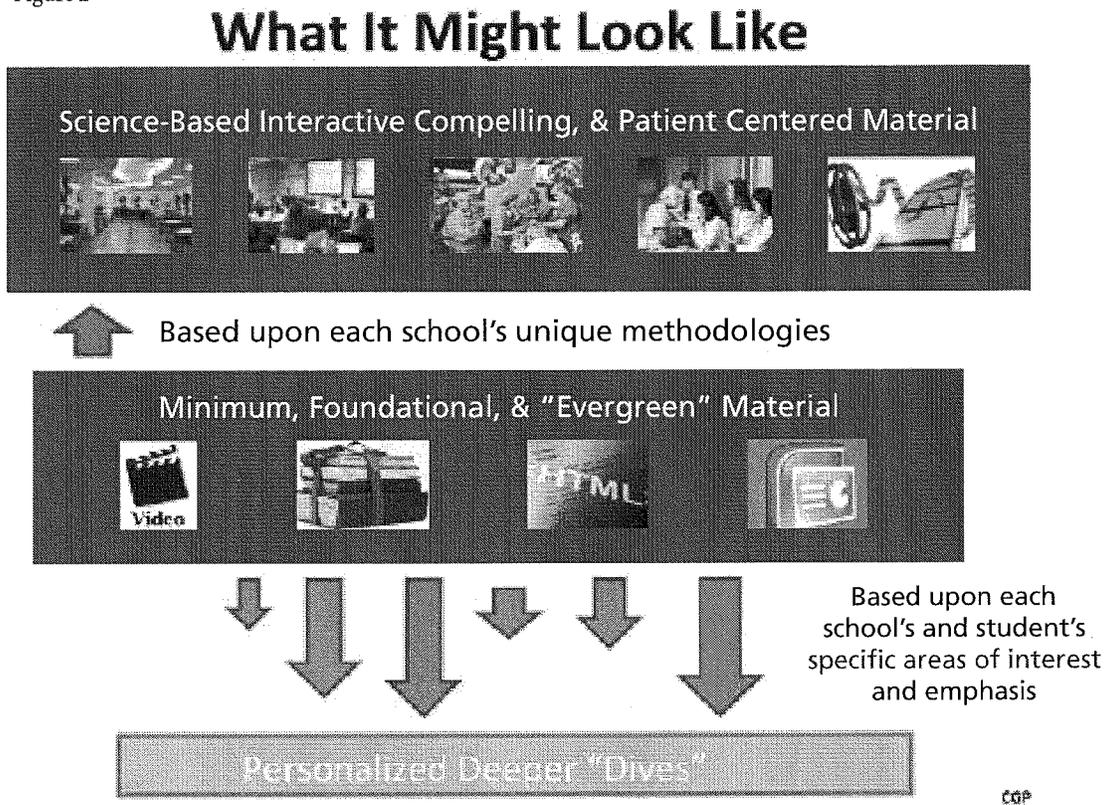
### **Stanford University: Flipping the classroom**

*Burgeoning and constantly expanding medical knowledge, the new generation of technologically savvy and enabled learners, and the rising costs of higher education demand the exploration of more efficient and effective modes of health professional education. The ability to produce and deliver high-fidelity content to local and widely dispersed learners on innovative platforms creates the opportunity to fundamentally alter the way in which health professionals can be educated.*  
(Charles Prober, MD, 2012)

The Stanford School of Medicine approach to leveraging online learning is built upon a model that delineates three types of knowledge (material) that students will encounter. (See Figure 2). First, there is the foundation or core of knowledge that all students across all schools of medicine must master. Second, there is knowledge associated with “deeper dives” that individual students or institutions may choose to explore according to learners’ personal interests and passions or institutional strengths and priorities. The opportunity to individualize learning experiences is an important element of this model. Third, mastery of both types of knowledge is aided by “science-based, interactive, compelling, and patient-centered material” that serves to engage the learners in ways that underscore the relevance of the core content and facilitate long-term retention of critical knowledge.

This model is exemplified in the recent redesign of the medical school’s core biochemistry course, which eliminated most of the traditional lectures. In the place of lectures, instructors developed short online presentations that students were expected to view prior to class. Class time primarily was devoted to interactive discussions of case studies that highlighted the biochemical bases of various diseases. Student attendance for the optional interactive sessions rose to more than 80% from 30% attendance at the lectures the prior year.<sup>45</sup> Other interactive approaches identified for future flipped classes include multi-station exer-

Figure 2



cises, team-based problem solving, game playing, debates, live patient presentations, standardized patient interviews or examinations, and high-fidelity medical simulations.

The Stanford Medical Interactive Learning Initiative (SMILI) was developed to underscore the need to develop richly interactive sessions to complement any online instruction. SMILI facilitates the education of teachers and learners in the pedagogical basis and structure of interactive learning; organizes, conducts, and assesses pilot projects; and provides resources to help with the design, production, implementation, and assessment of courses utilizing some of the new learning strategies. SMILI's web presence (<http://med.stanford.edu/smili/>) was developed to expand understanding of the benefits of interactive learning and to encourage faculty to become involved. SMILI provides specific guidelines, based on pedagogical research, on how to structure effective video lectures (e.g., eight to 15 minutes in length, focused on a specific topic, enhanced with embedded quizzes, reinforced

by reading materials and other resources).

In August 2012, Stanford University created an Office of the Vice Provost for Online Learning (VPOL). This is only the third vice-provost-level office created by the university in approximately 20 years and underscores the university's commitment to online learning. In November 2012, the VPOL invited faculty to submit proposals for online and blended courses that would provide an innovative learning experience and include a plan for researching the impact on student learning. This seed grant program has funded 31 faculty projects from across the university, including 10 at the School of Medicine.

Stanford also is pursuing collaboration opportunities such as developing platforms for hosting the didactic content and working with other academic health centers to contribute to content creation and strategies for the interactive sessions. The long-term goal is to improve medical education domestically and to facilitate distribution of medical knowledge globally.

### **New York University School of Medicine: Toward a knowledge syncytium**

By establishing the Division of Educational Informatics (DEI) in 1987, New York University (NYU) created the foundation for leading-edge use of information technology in support of medical education. This division seeks to create a knowledge syncytium, “a learning and problem-solving environment which supports access to information unfettered by time and space.”<sup>46</sup> In addition to building the infrastructure necessary to support online and computer-aided instruction within NYU, DEI has focused on providing students with access to all curricular content, creating applications that foster student-centered learning and that allow students to practice skills as often as needed, and sharing their content with other schools. DEI plays a key role in the implementation of NYU’s new medical school curriculum, C21, and in collaboration with the NYU College of Nursing developed a curriculum to strengthen inter-professional education.

In addition to putting the entire curriculum from undergraduate to graduate medical education online so students can look ahead or back, DEI’s activities include developing the following:

- e-Portfolios that will integrate qualitative and quantitative data on instructors and learners
- The Virtual Microscope that replaces uses of physical microscopes and allows students to navigate, annotate, and collaboratively view high-resolution digital histology slides. (This code has been released as open source.)
- WISE-MD modules that are web-based educational tools, designed for integration into the third-year medical student surgical clerkship curriculum. The modules present a comprehensive picture of patient care, including core knowledge, technical skills, professionalism, and the clinical reasoning skills that guide the physician’s decision-making process. These modules are available for licensing through UMed ([www.med-u.org](http://www.med-u.org)).
- The BioDigital Human that allows students to view life-sized digital content on a screen in the anatomy lab as a supplement to their experience with cadavers
- VP21, a web-based experience that allows students to manage virtual patients and to col-

laborate in virtual teams (<http://cloud.med.nyu.edu/ecosystem/>)

With funding from the Macy Foundation, DEI collaborated with the NYU College of Nursing to develop a shared curriculum for nursing and medical students (NYU 3T: Teaching, Technology, Teamwork). The program comprises web-based learning modules, interdisciplinary team virtual patient assignments, a mannequin-based inter-professional simulation, and a clinical cross-over where nursing students shadow a physician and medical students shadow a nurse. Preliminary evaluation of the program showed that the computer-assisted instruction improved students’ knowledge and that students showed positive changes in their attitudes.<sup>47</sup> The curriculum, including the web-based modules, virtual patient curriculum, and simulation cases are freely available from the NYU DEI site.

### **Johns Hopkins University School of Public Health: Extending reach and impact**

While Johns Hopkins University’s (JHU) interest in part-time education dates back more than 100 years, the Bloomberg School of Public Health (BSPH) established JHU’s first formal distance education division in 1996. Motivated by the need to support researchers who were working on BSPH projects around the world, BSPH initially offered five online courses for 36 students. Today, BSPH offers 113 for-credit online courses for full- and part-time students working toward master’s degrees. In 2005, BSPH launched its open courseware project as a way to get critical content in the hands of people who need it—especially public health workers grappling with urgent issues in the field. Today, BSPH provides access to the courseware for more than 100 courses. In 2012, JHU joined Coursera, and in a short period of time had eight courses on the platform and 175,000 students registered for these courses.

Like MIT, BSPH used OCW to extend its reach and meet global needs for its content. The degree-granting online programs provide flexibility to students who need to fit their studies around a full-time job. All of JHU’s schools now offer online programs, with 16,000 students enrolled each semester. These programs are profitable and help maintain the fiscal strength of the individual

schools. Interestingly, previous conversations among the schools did not result in agreement to share a common learning management platform despite the potential to save costs by doing so. With the arrival of Coursera, however, there was unanimous interest in signing a university-wide agreement, which allowed the schools flexibility on when and how they posted courses on the Coursera site.

#### **University of California-Irvine School of Medicine: iMedEd**

UC Irvine has built a digital, interactive learning environment for its students. Since 2010, the iMedEd Initiative has provided each entering student an Apple iPad that houses the entire first-year curriculum, including outlines, handouts, and textbooks, as well as hundreds of medical applications (apps). The tablets have been updated to include course materials required for the second and third year as students have progressed forward in their studies. Complementary technologies such as digital stethoscopes and portable ultrasound devices with supporting instructional content enhance the learning experience. To maximize the benefit of this educational platform, lectures have been transformed to include short, topic-based podcasts and small-group discussions.

### **Emerging and maturing educational approaches**

Technological advances, cognitive science, and new perspectives on existing educational tools are widening the range of educational approaches that health professional schools can use to enhance the learning of their students.

#### **Electronic health records as a needed skill and as a learning tool**

All health professional students need to learn how to use electronic health records (EHRs) to be proficient. They likely will encounter different EHRs over the course of their education and careers, so they need a general understanding of EHR systems and their effective use as well as exposure to different kinds of EHRs. Further, the increasingly

available prompts and clinical decision support within the EHR also are educational tools. In a 2010 survey of medical school deans, more than 90% of respondents thought that excluding student notes from patient records would negatively impact education. A 2008 survey of third-year medical students in outpatient clinics reported that students asked more history questions and ordered more clinical preventive tests as a result of EHR prompts.<sup>48</sup>

Yet many hospitals do not allow students to enter notes into EHRs because of concerns about violations of Medicare fraud regulations on student notes and teaching physician use of such notes. Recent developments in the form of data “handles” may offer institutions a way to work around this constraint. In short, all data entered by a student could easily be tagged with a unique handle that allows faculty to review student notes and for student notes to be excluded from the official/legal record.<sup>49</sup> Alternatively, schools can provide access to EHR systems specifically designed for students. The University of Victoria developed the Interdisciplinary Electronic Health Record Educational Portal (UVicIED-EHR Portal), a web-based portal that provides students with access to multiple EHRs as a way for them to interact with the systems using “dummy” data and provide exposure to different EHR designs and features. The portal allows educators to “teach students how to effectively and efficiently use a HIS [health information system] in the safety of the classroom and laboratory setting.”<sup>50</sup>

#### **Spaced education: Applying cognitive science to improve knowledge retention**

Spaced education (SE) is an online learning methodology based on psychological research that shows that educational encounters repeated over time increase acquisition and retention of knowledge and that the process of testing alters the learning process to improve knowledge retention.<sup>51</sup> SE can be applied across a wide range of topics and shared among institutions. In one trial of a spaced education game focused on anatomy, histology, cardiology, and endocrinology, students received an automated email containing a link to multiple choice questions.<sup>52</sup> Upon submitting an

answer to a multiple choice question, the student received the correct answer, a summary of the curricular learning points, explanations of why the answers were correct or incorrect, and links to additional educational material. The game would repeat the question in three weeks if answered incorrectly; six weeks if answered correctly. The goal of the game was to retire 100 questions so the length of the game depended on students' baseline knowledge and ability to learn and retain knowledge from the SE questions and answers. This game was well accepted by medical students and demonstrated effectiveness in teaching core content and validity in testing medical student knowledge.

#### **Virtual patients: Health care's flight simulators**

Virtual patients or computer-based clinical case simulations present students with real-life clinical scenarios that enable them "to emulate the roles of health care providers to obtain a history, conduct a physical exam, and make diagnostic and therapeutic decisions."<sup>43</sup> Virtual patients are often viewed as a safer and more efficient way for students to apply relevant knowledge and practice clinical skills. They provide a way for schools to ensure student exposure to both common and rare clinical conditions. Virtual patients vary in their design, implementation, and effectiveness.<sup>53</sup> They are accepted by students, particularly students who have had limited clinical contact.<sup>54</sup> Compared with no intervention, they are associated with higher learning outcomes. Compared with a non-computerized intervention, there is no or only a small effect. Beyond quantitative improvement, however, virtual patients address logistical barriers and provide opportunities for students to work in teams on the cases and provide interactive learning opportunities that can fit into the schedules of busy practitioners. This educational technology shows great promise as a way to tailor learning experiences to the needs of students but also requires rigorous evaluation to determine which formats and implementation approaches are most effective.

#### **Simulation centers: The pinnacle of education technology?**

Human patient simulation (HPS) uses mannequins or models to offer students an immersive, active experience; engage emotional and sensory learning; foster critical thought and communication; and animate basic science in clinical context. Such experiences require learners to synthesize knowledge and demonstrate skills before putting them into practice. Simulation centers provide a way for individual students to train for specific, complex tasks and for multi-disciplinary groups of students (and practitioners) to build competence in functioning as a team while grappling with realistic patient scenarios. Further, HPS allows students to demonstrate competency in specific areas. In nursing, simulations are often part of the screening process by employers.

Eighty-seven percent of nursing schools are using high-fidelity mannequins and are spending millions of dollars in resources and faculty time revamping curricula to incorporate simulation.<sup>55</sup> In some instances, schools are anticipating a future in which nurses will need to demonstrate proficiency in simulations to retain their licenses. In other cases, nursing schools are striving to expand their capacity. NYU College of Nursing (CON) has doubled in size to 800 students since 2007 and is challenged to find clinical sites and faculty to teach the increasing enrollment. As a result, NYU CON has committed to replace 50% of undergraduate clinical hospital time with simulation.

Medical schools are making large investments in simulation as well. In 2010, UC Irvine School of Medicine opened a 3,000-square-foot, state-of-the-art simulation facility that includes a multi-disciplinary critical care area that can be used to simulate an emergency department trauma bay, a full-scale operating room, a critical care unit, an obstetrics suite, or a patient ward.<sup>56</sup> Task trainers support diagnostic and therapeutic skills development. These facilities are being used to prepare medical and nursing students, residents, fellows, practicing physicians, and EMS personnel. They are equipped with teleconferencing and video recording so that teaching can be shared globally.

A recent meta-analysis of 609 technology-en-

hanced simulation training studies that compared simulation with no intervention (i.e., no training) concluded that simulation “is consistently associated with large effects of knowledge, skills, and behaviors and moderate effects for patient outcomes.”<sup>57</sup> The authors noted that key questions remain on when and how to use simulation most effectively and cost-efficiently. Another recent meta-analysis of the effects of simulation training in central venous catheterization concluded that simulation-based education was associated with significant improvements in learner outcomes and with improved patient outcomes in some areas (i.e., fewer needle passes and pneumothorax) but was not associated with reduced risk in arterial puncture or catheter-related infections.<sup>58</sup>

The National Council of State Boards of Nursing has embarked on a three-year, 10 institution study that will compare the clinical competence of three cohorts of students who experience different levels of simulation as nursing students (50%, 25%, and 10%). Researchers will collect National Council Licensure Examination pass rates for the study students and will track the students through their first year of practice. Final results are expected in 2014.<sup>59</sup>

## Potential benefits and limitations

The benefits of educational innovation enabled by technology can generally be characterized as improving the quality and efficiency of the education process. These technologies offer health professional schools the means to improve quality dimensions of specific concern for their students—tailoring learning experiences (including the need for repeated practice to master skills) and adapting to diverse learning styles, supporting team learning that fits into the varying schedules of health professional students, and assessing and tracking competency of students. They also offer the potential to educate increased numbers of health care professionals who are better prepared within and across disciplines to produce higher value health care for patients and society at a reduced cost per student. These benefits derive in large measure from four capabilities that are

enabled by education technology:

- Authentic contexts for learning and assessment
- Uncoupling of instruction from place and time
- Standardization of instruction and assessment
- Greater ease in sharing content within and among institutions

Table 5 presents the potential benefits that stakeholder groups are likely to experience when institutions implement educational technology.

While educational innovation enabled by technology offers many potential benefits, it does not currently address all aspects of health professional education. Importantly, it does not fully replace personal interaction among faculty and students that are required for humanistic and ethics education and absorbing professionalism. It cannot replace role modeling, patient interaction, or real-time supervision and accompanying opportunities to observe practices such as “fuzzy logic” (i.e., decision making with imprecise data). It cannot assess or teach emotional intelligence and empathy. Educational technology can help students be fully prepared for their first interactions with patients, but only through real experience can students achieve true mastery. Purposeful integration of these approaches into the full continuum of health professional education and continuing education remains a challenge.

## Obstacles

There are significant obstacles to achieving the vision for health professions education presented early in this report (see Table 6). The first hurdle to overcome is the collective inability within the health care community to imagine a different future for health professions education. Health education leaders must articulate a compelling vision that will enable myriad individuals and organizations to imagine a fundamental change in the paradigm of health professions education and stimulate them to take actions that lead to the envisioned future. Equally important, organizational cultures and leaders must adapt to implement needed changes and support the new paradigm. Organizational culture must shift from hierarchical, autonomous, competitive, individualistic, and

expert-centered to collaborative, team-based, service-based, mutually accountable, and patient- (or student-) centered.<sup>60</sup> So too, future leaders will need to focus on collaboration and team work, translational science, strategic thinking, and breakthrough approaches rather than individuals, basic or clinical science, tactics, and incremental approaches. They will need to be competence-centered rather than knowledge-centered and will face a more diverse workforce that values professional (including ethical) fulfillment over status and titles.

Systemic obstacles to achieving the vision must be confronted on multiple fronts—from pre-health education of students, to financing of graduate medical education, to the health care delivery system. The standard pre-health curriculum is not well aligned with emerging requirements for health professions students. Constraints on funding for GME slots prevent medical schools from increasing the number of students to meet anticipated health care needs. Within the delivery system, team-based approaches to providing patient care are the exception rather than the rule, and there has been little attention to or investment in team preparation by health care delivery organizations. As a result, students receive little exposure to team-oriented patient care during clinical rotations.

Perhaps most critical and daunting is the set of challenges associated with moving toward competency-based health professions education. As illustrated in Figure 3, a host of organizations influence the education and certification of health professionals. These groups face their own stakeholders and financial incentives that are often in conflict with desired changes in health professions education. Yet to make real progress toward the desired competency-based education of health professionals, these organizations will need to reach consensus on fundamental issues and invest in the development of tools and infrastructure that support competency-based education. Specifically, the following are needed:

- Clear definition and continued refinement of competencies within disciplines and identification of competencies that are common across all disciplines
- National assessment tools that assess the com-

petencies beyond knowledge recall, including the ability to use technology

- Ability to move to the next level of training upon competency demonstration independent of formal training cycles/dates

While there has been some progress in these areas, such as the 2011 expert panel that identified core competencies for collaborative practice and the newly formed National Center for Interprofessional Practice and Education at the University of Minnesota, accelerated alignment of regulators, payers, delivery organizations, and accreditation agencies around competency-based approaches is essential to building the foundation for a reformed health professions education system supported by innovative use of technology.

In addition to the broad challenges to health professional education reform, there are also obstacles specific to the development and implementation of effective educational technology for health professional students. Some faculty may feel threatened by or not prepared for the changes associated with widespread use of educational technology and may therefore resist organizational efforts to expand online learning and reduce the number of traditional lectures. Some may resist having their lectures recorded or shared with other institutions as it puts their teaching under greater scrutiny. Faculty may also demonstrate “institutional narcissism” and the belief that only content developed at their school should be used to teach their students. This resistance stifles collaboration among schools and curtails the ability to achieve economies of scale in creating and using content.

Health professional school leaders lack evidence to make the case for greater investment in this arena. They also lack information to support decisions about which of the many and ever-changing new approaches, platforms, and technologies will best fit an organization’s needs. Finally, as all health professional schools face tight budgets, the availability of funding for the investments required for these innovations is limited.

Capturing the potential efficiencies offered by these technologies will require AHCs to confront difficult questions. By reducing the constraint of lecture hall size, does this technology allow class

Table 5: Potential benefits of innovative education supported by technology

Stakeholder	Benefits
Students	<ul style="list-style-type: none"> <li>■ Learner control               <ul style="list-style-type: none"> <li>□ When and how to learn</li> <li>□ Able to access knowledge at any time</li> <li>□ Take as much or as little time to learn material</li> <li>□ Opportunity to practice skills as needed</li> <li>□ Establish habit and skill of life-long learning</li> </ul> </li> <li>■ Enhanced, realistic visualization</li> <li>■ “Learning science” approach increases likelihood that content will be mastered more efficiently and retained longer</li> <li>■ Enhanced experience with learning processes</li> <li>■ Access to vast repertoire of expertise</li> <li>■ Ability to cover more topics in online modules than in didactic lectures</li> <li>■ Shortened time to reach competency for some students and as much time as needed for other students</li> <li>■ Performance tracked over time so that able to demonstrate competency (shift from “time in chair” to attainment of milestones)</li> </ul>
Faculty	<ul style="list-style-type: none"> <li>■ Increased engagement and satisfaction through greater interaction with students and opportunity for continuous innovation</li> <li>■ Increased awareness of concepts and ideas that learners find difficult to master</li> <li>■ Ability to identify specific learning needs of individual students</li> <li>■ Iterative improvement in content and teaching methodologies</li> <li>■ Ease of updating content and refining pedagogical methods</li> <li>■ Reduced time delivering repeated lectures increases time available for more intellectually meaningful educational and scholarly initiatives</li> </ul>
Institution	<ul style="list-style-type: none"> <li>■ Increased ability to adapt curriculum to societal needs</li> <li>■ Increased nimbleness in making curricular changes</li> <li>■ Enhanced collaboration and knowledge sharing within and among organizations</li> <li>■ Reduced risk to patients through use of safe, controlled environments for teaching skills</li> <li>■ Increased transparency and accountability regarding the quality and cost outcomes of the education experience</li> <li>■ Documentation of learner behavior and outcomes is built into the system and can be used to improve processes</li> <li>■ Increased ability to meet the needs of nontraditional students with other responsibilities, which may increase diversity of the student population</li> </ul>

Table 5, continued

Stakeholder	Benefits
Institution	<ul style="list-style-type: none"> <li>■ Increased capacity to do the following:               <ul style="list-style-type: none"> <li>□ Educate more health professional students without replicating all costs</li> <li>□ Shorten time (and potentially reduce costs) for some students to achieve competency and complete training</li> </ul> </li> <li>■ Enhanced resources and new economies of scale</li> <li>■ Increased capacity of existing physical plant and potential to reduce capital needed for new facilities</li> <li>■ Optimized faculty time via reduced repetitive lecture demands and increased time available for mentoring, educational innovation, focus on humanism and professionalism, communication skills, and scholarly contributions</li> <li>■ Decreased logistical problems of inter-professional education</li> <li>■ Increased capacity to assess and analyze what is being taught and to manage curriculum</li> <li>■ Increased alignment with expectations of 21st century students (Will use of educational technology become a way students differentiate among health professional schools?)</li> </ul>
Society	<ul style="list-style-type: none"> <li>■ Health professionals better prepared to meet societal needs (enhancing the quality of patient, family, and community care while making better use of finite resources)</li> <li>■ Public resources for teaching health professionals are optimized</li> </ul>

sizes to be expanded so that costs per students are reduced? If schools are sharing online lectures, are fewer or greater numbers of faculty or subgroups of faculty (e.g., tenure track) needed? Do schools need faculty with a different skill set who are capable of developing and using online approaches and facilitating interactive learning experiences rather than offering traditional lectures? If the teaching faculty of an institution changes shape over time, how will the patient care and research missions be impacted? Will research related to the educational enterprise receive increased recognition? AHCs will be well served to begin contemplating such issues as part of their strategic planning so that they have time to implement anticipated shifts over time (e.g., implement changes as hiring opportunities emerge).

## Enablers

Enablers that will support and accelerate diffusion of educational technology among health professional schools fall into two broad categories—institutional enablers and national/collaborative enablers.

Institutional enablers include the following:

- A clear statement of where the institution is headed with educational process innovations and greater use of education technologies (including online learning), why the institution is making greater investment in these technologies, and how expected benefits will be achieved
- An organizational culture that embraces collaboration, focuses on competency-based education, encourages breakthrough thinking, and is student- (rather than faculty) and ultimately patient- and outcomes-centered

Table 6: Obstacles

Current learning state	Future learning state
Rigid hierarchy	Flexible hierarchy
Individual expertise and autonomy are valued	Team-based learning is valued anticipating team-based clinical care <ul style="list-style-type: none"> <li>■ Team-based expertise</li> <li>■ Individual roles requiring definition</li> <li>■ Competency requirements defined by the role</li> <li>■ Learning content requirements defined by the role</li> </ul>
Learning is content oriented	Learning is content and competency oriented <ul style="list-style-type: none"> <li>■ Simulation used for competency learning and assessment</li> </ul>
Inconsistent emphasis on professionalism	Faculty time devoted to professionalism with an understanding of how health delivery metrics are influenced by professional behaviors (HCAPs, CGCAPs, engagement tools such as Gallup)
Inadequate focus on EHR technology	Emphasis on the role of EHR & informatics in tracking “pay-for-value” reimbursement metrics
Inadequate focus on benchmarking	Understanding how quality, safety, service benchmarks for individual patients and populations of patients, physicians, and care teams, are used to improve clinical processes and outcomes
Faculty-centered <ul style="list-style-type: none"> <li>■ Time on task proxy to knowledge acquisition</li> </ul>	Student/resident/physician-centered <ul style="list-style-type: none"> <li>■ Variable time to knowledge acquisition</li> <li>■ Competency-based</li> </ul>

- Clinical and academic missions and incentives that are aligned with a new paradigm for health professions education and practice accompanied by shared accountability across the AHC for making needed changes
  - Credible faculty champions who can share experiences and knowledge with other faculty
  - Faculty who are supported in the transition through investments (i.e., time and resources) to develop new skills
  - Technological and pedagogical resources, including expertise and technical infrastructure, which are adequately funded and developed to keep pace with anticipated changes.
- National/collaborative enablers include the following:
- A shared compelling vision for health professional education that is embraced by the health care community
  - Standards for sharing educational content and tracking students across settings and time
  - Platforms for sharing content
  - Communities of practice that share best practices
  - Organizations that are willing to share content (either for free or via licensing)
  - A research agenda to fill key gaps in our understanding of the effectiveness of technologies and approaches
- In addition to the emerging shared learning management platforms (e.g., Coursera, Udacity) and open source content (OpenCourseware), several collaborative enablers focused on health professions education are already in place.
- The **Association of American Medical Colleges (AAMC) Medical Education Research Certificate (MERC) Program** (<https://www.aamc.org/members/gea/merc/>) “is intended to

provide the knowledge necessary to understand the purposes and processes of medical education research, to become informed consumers of the medical education research literature, and to be effective collaborators in medical education research.” The courses are targeted for clinicians and other educators who desire to learn research skills that will enable collaborative participation in medical education research projects. Strengthening medical education research skills among faculty will increase an institution’s ability to evaluate internal educational technology activities and to participate in multi-institution studies.

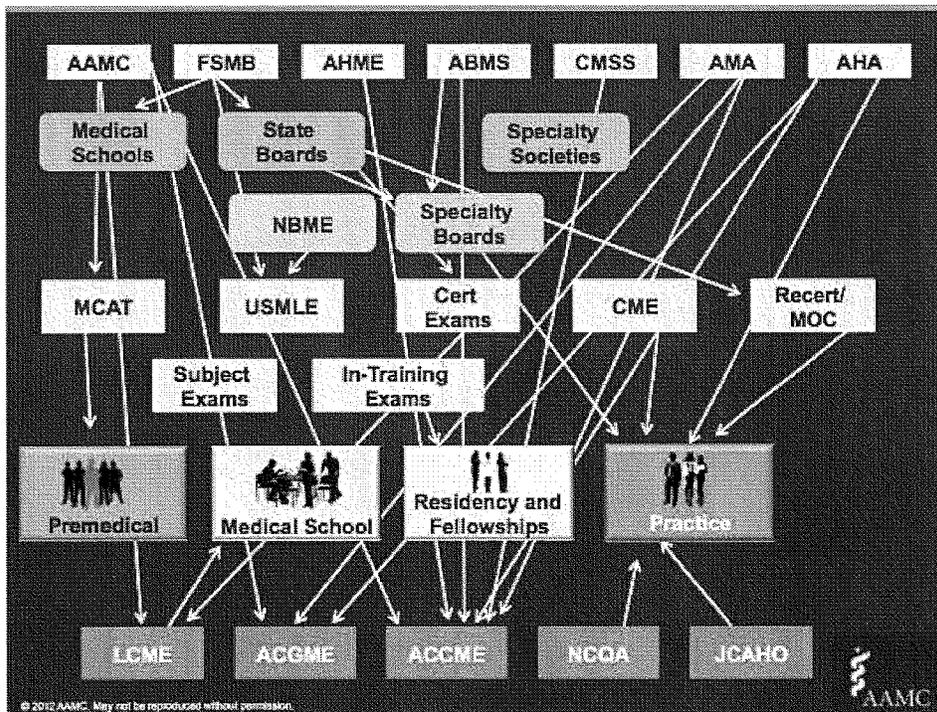
The **Institute for Innovative Technology in Medical Education (iInTIME)** (<http://www.iintime.org/>) was established in 2006 to advance medical education through the collaborative development, maintenance, and research of innovative and comprehensive computer-assisted instruction programs. Through MedU, iInTIME provides a platform for sharing and accessing virtual patient cases and other medical education programs for third-year students across a range of disciplines (pediatrics, radiology, genetics, internal medicine, family medicine, and surgery).

In addition to providing a platform for sharing content, iInTIME offers authoring software and training resources to support medical educators in the development of virtual patient cases. Further, “the broad use of MedU cases fosters an active cross-disciplinary community of medical educators.”

The **MedBiquitous Consortium** (<http://www.medbiq.org/>) creates technology standards that allow organizations to exchange educational content and track learner activities and profiles. These standards support flow of data to track professional achievement and share learning resources. MedBiquitous emphasizes lifelong learning and continuous improvement by practitioners as it seeks to enable better patient outcomes.

**MedEdPortal** (<https://www.mededportal.org/>) is a clearinghouse for high-quality, peer-reviewed health education tools. The free service is provided by the AAMC in partnership with the American Dental Association. The mission of MedEdPortal is to promote “educational scholarship and collaboration by facilitating the open exchange of peer-reviewed health education teaching and assessment resources.” More than 10,000 national

Figure 3



and international health education institutions in 195 countries are accessing and utilizing MedEd-Portal content. Users include schools of medicine, dentistry, osteopathy, nursing, pharmacy, and public health, as well as the general public.

The **National Center for Interprofessional Practice and Education** (<http://www.ahceducation.umn.edu/nexus-ipe/>) was launched in September 2012 at the University of Minnesota with a five-year funding commitment from the Health Resources and Services Administration (HRSA) and four leading foundations. This public-private partnership will identify ways to “improve health, enhance patient care, and control costs through integrating interprofessional practice and education.” The center is focused on five core domains: leadership; collaborative practice and health system transformation; education and training; research, evaluation and scholarship; and innovative and novel models.

**OPENPediatrics** (<http://www.openpediatrics.org/>) is an open self-directed learning platform that promotes sharing of knowledge about care of ill children through three key functions—information on demand, social networking capability, and education on general principles and optimal practice in pediatric care. This beta test site is aimed at the global community, but once broadly available the learning modules on this site could also serve health professional students and practitioners in the U.S. Further, this approach could be adopted by other specialties.

## Emerging Research Agenda

*The widespread adoption of information technologies has led to a corresponding growth in the development of sophisticated, realistic teaching resources. However, our understanding of how these resources might best be incorporated into the curriculum is inadequate, as advances in what could be created often outpace our ability to understand how they should be developed or used.<sup>43</sup>*

What do we know about the effectiveness of online learning or computer-aided instruction for health professions students? In general, research-

ers have found that these methodologies are more effective than no intervention (i.e., no instruction) and slightly more effective than or comparable to traditional teaching approaches.<sup>35</sup> One meta-analysis of studies on Internet-based instruction involving health professions learners concluded that (1) compared with no intervention, online learning (Internet-based learning, or IBL) yielded large positive effects and that Internet-based instruction was effective across a variety of learners, topics, and contexts; (2) differences in effects compared with those of non-Internet instructional methods were generally small; and (3) some methods of IBL may be more effective than others.<sup>61</sup> This study did not, however, find evidence on which to base guidelines for future implementations of IBL. A subsequent study by the same researchers focused on direct comparisons of one IBL intervention for health professionals against another.<sup>62</sup> Researchers identified a “modest number” of studies for analysis and therefore qualified their conclusions in terms of “highlighting promising areas for future research.” They concluded that interactivity, practice exercises, repetition, and feedback improve learning outcomes and that interactivity, online discussion, and audio improve satisfaction in IBL for health professionals.

Perhaps most important in these and other early studies is the emerging research agenda for this domain. The research agenda would include, but is not limited to the following:

- Do these technologies impact the applied knowledge and skills of health professional students and contribute to the continued refinement of competencies?
- Which of these technologies are most effective overall, and does effectiveness vary across types of learners, stages of learning, and various content areas?
- When should online learning or other educational technologies (e.g., virtual patients, spaced-education games, apps) be used?
- How can online learning be effectively implemented? Under what conditions could online learning be used exclusively to achieve student competency? When does it best serve to augment small-group learning?

- How do skills developed on simulators transfer to patients?
- What is the cost-benefit of these technologies? Do these technologies yield savings in the educational process within individual institutions or across groups of institutions? Do they improve quality of education? Is there a positive return on investment?
- Can the effective use of these educational approaches and technologies be linked to improved patient outcomes?

As a first step, researchers need to develop shared frameworks for research, consistent definitions of interventions and comparison interventions, and common outcome measures.<sup>63</sup> Working from shared frameworks, interventions, and outcomes will permit replication across learner groups and different educational objectives. Further, as more institutions begin to use shared learning platforms, the data pool for analysis will grow considerably and enable larger, multi-institution studies.

## Recommendations

The Blue Ridge Group concludes that innovative use of educational technologies, including but not limited to online learning, offers the potential to make progress toward specific elements of the vision for enhanced health professions education. These technologies can

- Facilitate greater flexibility for several dimensions of the health professional educational enterprise
- Create a wide variety of practice opportunities for students
- Enhance quality and increase efficiency of teaching processes
- Enable measurement and tracking of costs and outcomes of educational processes
- Capture and track student performance

To take advantage of these technologies, both institutional and national capacity in the form of a technological infrastructure and technical and pedagogic expertise need to be strengthened. To achieve desired efficiencies, core content must be identified, platforms for sharing content must be

adopted, and institutional hubris must be overcome. Greater investment at the institutional and national levels is needed to support diffusion and evaluation of the technologies. Institutional and national leaders need to increase awareness of the benefits of these tools and associated changes in teaching processes, but they should also be cognizant of the limitations of the technologies under consideration. AHC and health professional school leaders should also understand that while there is considerable potential in sharing content among institutions, how that content will be used will vary because of differing needs and foci of AHCs and schools. That is, one size will not fit all.

### Institutional initiatives

AHCs have varying levels of experience with educational technologies. Yet virtually all AHCs have implemented clinical information systems and can draw upon that experience as they seek to increase use of educational technologies as a means of improving quality and efficiency of education processes. Just as with clinical information systems, AHCs and health professional schools should follow a structured process for expanding use of educational technologies. They should

- Conduct a needs analysis that will serve as the basis for selecting which technologies and approaches to adopt
  - Develop business and implementation plans
  - Expand institutional capacity to support technological and pedagogic innovations
  - Evaluate effectiveness of implemented technology and approaches to determine which should be continued, modified, or eliminated and share results with the broader community
- Needs analysis*—As a first step, AHCs and health professional schools should do the following:

- Identify organizational needs that can be met through innovative use of education technologies
- Define the value that the institution seeks to capture through increased use of educational technologies
- Inventory existing initiatives and resources within their schools and across the university including faculty, staff, students, and partners already engaged in innovative approaches as well

as investments in technology already in place, such as use of EHRs for teaching and research

- Increase organizational knowledge of external resources that can be adopted
- Assess whether existing learning management systems can support evolving needs (e.g., greater use of online lectures, incorporating content from other institutions, sharing content with other institutions, creating student and faculty portfolios)
- Identify the approaches most relevant for their institutional situation, student needs, and mission

*Business and implementation plans*—In developing the business plan, AHCs and health professional schools should do the following:

- Articulate the business model for expanded use of educational technologies within the schools and across the AHC (e.g., does the institution seek to achieve efficiencies to offset costs, improve quality for same costs, expand throughput, capture revenues from new sources)
- Identify the level and mix of resources needed to capitalize on the technologies and innovations (i.e., financial, human, technological) and consider whether the needed faculty skill set will evolve over time
- Identify funding sources
- Determine the optimal mix of internal development, institutional partnering, and outsourced development
- Determine which platforms for sharing content are optimal

In developing an implementation plan, AHCs and health professional schools should do the following:

- Determine how they can build on existing internal and external resources
- Identify ways to encourage a climate of innovation and breakthrough thinking (e.g., allocate funding for pilots that test novel approaches to education technology)
- Identify champions and recognize efforts already under way through existing communication channels
- Establish mechanisms to bridge existing “islands of innovation” (e.g., hold a university-wide conference where faculty, staff, and stu-

dents can share their work, fund joint projects that cross departments or disciplines)

- Set specific organizational goals, develop clear expectations for faculty and staff, and align performance incentives to desired outcomes

*Expand institutional capacity*—To expand institutional capacity to develop and apply educational technologies that meet organizational needs, AHCs and health professional schools should do the following:

- Allocate time and provide training opportunities for faculty to develop skills and gain experience in developing and using new educational technologies and approaches (e.g., developing online learning modules and leading more interactive face-to-face sessions)
- Establish support services that provide educational design/pedagogic expertise and technical expertise (e.g., app development, copyright clearance and intellectual property for content that is to be shared)
- Upgrade or replace the existing infrastructure to achieve a robust learning management system, authoring tools, student portfolios, faculty portfolios, ability to use content developed elsewhere, and ability to share content with other institutions
- Encourage development of learning communities or communities of practice by region, professions, common interests, or other delineators to enable and accelerate knowledge sharing

*Evaluate effectiveness*—To provide guidance on future educational technology initiatives, AHCs and health professional schools should do the following:

- Require that all educational technology initiatives funded internally include an evaluation that measures effectiveness for learners and the degree to which organizational goals are met
- Support faculty training in health professions education research
- Encourage participation in multi-institution studies

#### **National initiatives**

The Blue Ridge Group identified the following actions to accelerate diffusion of education technology among AHCs and health professional

schools with the goal of improving the quality and efficiency of educational processes and ultimately strengthening the health professions workforce:

- As a professional community, we must insist that accrediting, licensing, and certifying agencies align their processes to support the innovations described in this report as well as the broader changes needed (e.g., movement toward competency-based education) for transformation of health professions education.
- AHCs and health professional school leaders and representatives of licensing and certifying agencies should identify “commodity” curriculum components and encourage adoption as a standardized core across institutions to gain economies of scale and allow faculty to focus on individualized and group learning experiences as a way to improve quality and efficiency in the learning process.
- AHC leaders and national professional organizations should increase awareness regarding the potential for technology to transform health professions education, including impact on quality, cost, and outcomes of education.
- AHC leaders and national professional organizations should create a national collaborative to accelerate and coordinate development of a framework and tools for assessment and dissemination of innovative educational approaches (including use of technology) designed to improve the quality and efficiency of health professions education.

Collaboration will be key to achieving desired outcomes. The full benefits of these technologies and approaches will be achieved only if institutions come together to do the following:

- Share best content
- Ensure that content is inter-operable
- Share best practices and experience
- Rigorously assess impact of technology and innovations and provide feedback on quality of content
- Identify opportunities for reducing costs by working together

Specific goals for the collaborative would include creating a community of users and developers, identifying and publicizing existing resources that can help facilitate advancement of these initia-

tives (e.g., MedEdPortal), stimulating action on development of core and commodity curriculum components, achieving consensus on research priorities, establishing pilots to test effectiveness, expanding awareness and creating a sense of urgency, and developing tools that organizations can use as they consider and implement educational technologies.

## Conclusion

*Most new movements start this way: hundreds or thousands of individuals and groups, working in different fields and different locations, start thinking about change using a common language, without necessarily recognizing those shared values. You just start following your own vector, propelled along by people in your immediate vicinity. And then one day, you look up and realize that all those individual trajectories have turned into a wave. (Steven Johnson)<sup>64</sup>*

The shortcomings in health professions education and the growing wave of online learning create unprecedented challenges and opportunities for AHCs and health professional schools. Pioneering institutions are highlighting how educational technologies and approaches based on cognitive science can be used to address health professions education deficits and offer greater value to students. Shared learning management platforms offer new ways for schools to share content, assess effectiveness of various educational tools, and reduce costs. These technologies support innovation and enable collaboration among schools and across disciplines. To maximize the impact of online learning technologies, AHC leaders need to articulate a new vision, pool resources, confront structural barriers, and establish a mechanism for sharing content and best practices.

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## About the Blue Ridge Academic Health Group

The Blue Ridge Academic Health Group (Blue Ridge Group) studies and reports on issues of fundamental importance to improving the health of the nation and our health care system and enhancing the ability of the academic health center (AHC) to sustain progress in health and health care through research—both basic and applied—and health professional education. In 16 previous reports, the Blue Ridge Group has sought to provide guidance to AHCs on a range of critical issues. Previous reports identified ways to foster a value-driven, learning health care system for our nation; enhance leadership and knowledge-management capabilities; aid in the transformation from a paper-based to a computer-based world; and address cultural and organizational barriers to professional, staff, and institutional success while improving the education of physicians and other health professionals.

Reports also focused on updating the context of medical professionalism to address issues of conflict of interest, particularly in the relationship between academic health professionals and institutions and their private sector partners and sponsors; quality and safety; and improved care processes and innovation through the use of informatics. One key report explored the social determinants of health and how AHCs could reshape themselves to address this critical dimension of improving health. The group also issued a policy proposal that envisioned a new national infrastructure to assure ongoing health care reform, calling for a United States Health Board; identified opportunities and the most critical challenges for AHCs and their partners as the Accountable Care Act (ACA) was implemented and examined ways in which AHCs could leverage their unique characteristics and capabilities through the ACA to improve health care, research, and training systems.

For more information and to download free copies of our reports, please visit [www.whsc.emory.edu/blueridge](http://www.whsc.emory.edu/blueridge).

## Previous Blue Ridge Reports

See <http://whsc.emory.edu/blueridge/publications/reports.html>.

**Report 16:** *Academic Health Center Change and Innovation Management in the Era of Accountable Care*. 2012.

**Report 15:** *The Affordable Care Act of 2010: The Challenge for Academic Health Centers in Driving and Implementing Health Care Reform*. 2012.

**Report 14:** *The Role of Academic Health Centers in Addressing the Social Determinants of Health*. 2010.

**Report 13:** *Policy Proposal: A United States Health Board*. 2008.

**Report 12:** *The Emerging Transformational Role of Informatics*. 2008.

**Report 11:** *Health Care Quality and Safety in the Academic Health Center*. 2007.

**Report 10:** *Managing Conflict of Interest in AHCs to Assure Healthy Industrial and Societal Relationships*. 2006.

**Report 9:** *Getting the Physician Right: Exceptional Health Professionalism for a New Era*. 2005.

**Report 8:** *Converging on Consensus? Planning the Future of Health and Health Care*. 2004.

**Report 7:** *Reforming Medical Education: Urgent Priority for the Academic Health Center in the New Century*. 2003.

**Report 6:** *Creating a Value-driven Culture and Organization in the Academic Health Center*. 2001.

**Report 5:** *e-Health and the Academic Health Center in a Value-Driven Health Care System*. 2001.

**Report 4:** *In Pursuit of Greater Value: Stronger Leadership in and by Academic Health Centers*. 2000.

**Report 3:** *Into the 21st Century: Academic Health Centers as Knowledge Leaders*. 2000.

**Report 2:** *Academic Health Centers: Good Health Is Good Business*. 1998.

**Report 1:** *Academic Health Centers: Getting Down to Business*. 1998.



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# 7 THINGS YOU SHOULD KNOW ABOUT...™ FLIPPED CLASSROOMS

## Scenario

For the past two weeks, Kyle has been taking a flipped course in designing food gardens. Before he attends each class, he watches videos of short lectures recorded or recommended by his instructor. Each lecture comes with a brief online quiz that offers him immediate feedback on whether he missed any essential points. Today as he enters class, he glances at the schedule on the whiteboard. For the first half hour, teams will discuss how the content of the video lectures on microclimates, insect predation, and disease control will inform their team projects. Professor Dalton circulates among the tables to see if anyone has questions.

Kyle's team will be repurposing an area the size of an urban backyard into a visually appealing garden that is also a functional food source. It's part of the larger class project to reclaim a strip of city land by building a demonstration food garden. "I think we should bring in disease-resistant blueberries, grapes, and pome fruits," says Coleen, looking at the rough drawings they have made so far. Dalton stops to look over their design. "Check the nursery catalogs on the front table," he suggests. "Disease-resistant strains are clearly marked in their listings." As they search the catalog and discuss which diseases might be a problem in dwarf apples, pears, blueberries, and grapes, Kyle enters their cultivar choices in their Google Docs space. They are turning to a discussion of microclimates and plant placement when a chime signals discussion is over.

In the second half of the class, team members each retrieve two flat boxes from the front of the class. One box contains a stack of pins and various leaves preserved in plastic. The second box has a foam insert topped by a paper grid; each square is labeled with a nutritional deficiency or a disease common to food plants. During the next half hour, each team is to identify the disease or nutritional deficiency and pin the correct leaf in the right spot on the grid. Dalton is on hand, directing attention to clues and sometimes challenging their choices.

As he leaves, Kyle reflects that the hands-on activities have given him a far better grasp of the information and more confidence in what he has learned than he could have gotten from an in-class lecture.

## 1 What is it?

**The flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed.**

Short video lectures are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions. The video lecture is often seen as the key ingredient in the flipped approach, such lectures being either created by the instructor and posted online or selected from an online repository. While a prerecorded lecture could certainly be a podcast or other audio format, the ease with which video can be accessed and viewed today has made it so ubiquitous that the flipped model has come to be identified with it.

The notion of a flipped classroom draws on such concepts as active learning, student engagement, hybrid course design, and course podcasting. The value of a flipped class is in the repurposing of class time into a workshop where students can inquire about lecture content, test their skills in applying knowledge, and interact with one another in hands-on activities. During class sessions, instructors function as coaches or advisors, encouraging students in individual inquiry and collaborative effort.

## 2 How does it work?

There is no single model for the flipped classroom—the term is widely used to describe almost any class structure that provides prerecorded lectures followed by in-class exercises. In one common model, students might view multiple lectures of five to seven minutes each. Online quizzes or activities can be interspersed to test what students have learned. Immediate quiz feedback and the ability to rerun lecture segments may help clarify points of confusion. Instructors might lead in-class discussions or turn the classroom into a studio where students create, collaborate, and put into practice what they learned from the lectures they view outside class. As on-site experts, instructors suggest various approaches, clarify content, and monitor progress. They might organize students into an ad hoc workgroup to solve a problem that several are struggling to understand. Because this approach represents a comprehensive change in the class dynamic, some instructors have chosen to implement only a few elements of the flipped model or to flip only a few selected class sessions during a term.

## 3 Who's doing it?

**A growing number of higher education individual faculty have begun using the flipped model in their courses.** At Algonquin College, a video production class has been using this model to explain the workings of editing software, a procedure that is notoriously difficult to explain in a standard lecture. Short tutorial video lectures let students move at their own pace, rewind to review portions, and skip through sections they already understand,

more >>

## THINGS YOU SHOULD KNOW ABOUT...™ FLIPPED CLASSROOMS

meaning students come to class able to use the software and prepared to do creative projects with their peers. A particularly successful example of a blended and flipped class in accounting at Penn State accommodates 1,300 students. In-class time is used for open discussion, a featured guest speaker, or hands-on problem solving where instructor support is supplemented by student assistants. At Harvard University, one physics professor not only employs the flipped model but has also developed a correlative site, Learning Catalytics, that provides instructors with free interactive software enabling students to discuss, apply, and get feedback from what they hear in lecture.

### 4 Why is it significant?

In a traditional lecture, students often try to capture what is being said at the instant the speaker says it. They cannot stop to reflect upon what is being said, and they may miss significant points because they are trying to transcribe the instructor's words. By contrast, the use of video and other prerecorded media puts lectures under the control of the students: they can watch, rewind, and fast-forward as needed. This ability may be of particular value to students with accessibility concerns, especially where captions are provided for those with hearing impairments. Lectures that can be viewed more than once may also help those for whom English is not their first language. **Devoting class time to application of concepts might give instructors a better opportunity to detect errors in thinking**, particularly those that are widespread in a class. At the same time, collaborative projects can encourage social interaction among students, making it easier for them to learn from one another and for those of varying skill levels to support their peers.

### 5 What are the downsides?

The flipped classroom is an easy model to get wrong. Although the idea is straightforward, **an effective flip requires careful preparation**. Recording lectures requires effort and time on the part of faculty, and out-of-class and in-class elements must be carefully integrated for students to understand the model and be motivated to prepare for class. As a result, introducing a flip can mean additional work and may require new skills for the instructor, although this learning curve could be mitigated by entering the model slowly.

Students, for their part, have been known to complain about the loss of face-to-face lectures, particularly if they feel the assigned video lectures are available to anyone online. Students with this perspective may not immediately appreciate the value of the hands-on portion of the model, wondering what their tuition brings them that they could not have gotten by surfing the web. Those who see themselves as attending class to hear lectures may feel it is safe to skip a class that focuses on activities and might miss the real value of the flip. Finally, even where students embrace the model, their equipment and access might not always support rapid delivery of video.

### 6 Where is it going?

As the flipped class becomes more popular, **new tools may emerge to support the out-of-class portion of the curriculum**. In particular, the ongoing development of powerful mobile devices will put a wider range of rich, educational resources into the hands of students, at times and places that are most convenient for them. Greater numbers of courses will likely employ elements of the flipped classroom, supplementing traditional out-of-class work with video presentations and supporting project-based and lab-style efforts during regular class times. At a certain level of adoption, colleges and universities may need to take a hard look at class spaces to ensure they support the kinds of active and collaborative work common in flipped classes.

### What are the implications for teaching and learning?

The flipped classroom constitutes a role change for instructors, who give up their front-of-the-class position in favor of a more collaborative and cooperative contribution to the teaching process. There is a concomitant change in the role of students, many of whom are used to being cast as passive participants in the education process, where instruction is served to them. **The flipped model puts more of the responsibility for learning on the shoulders of students while giving them greater impetus to experiment**. Activities can be student-led, and communication among students can become the determining dynamic of a session devoted to learning through hands-on work. What the flip does particularly well is to bring about a distinctive shift in priorities—from merely covering material to working toward mastery of it.

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## Understanding the Flipped Classroom: Part 2

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By Pamela Kachka

*Editor's Note: Part 1 of this article looked at the history of the flipped classroom. Today we look at what it takes for someone to teach effectively in a flipped classroom.*

Although the flipped classroom is garnering a lot of attention of late, simply flipping the classroom alone does not increase student success. The instructor must seize the opportunity to guide and interact with the students. Looking at this new definition of homework in a flipped classroom, there are many details to consider. Flipping doesn't work when the home lectures (in whatever form they take) are too long or simply replace valuable teaching from the instructor. Lecturing is more effectively presented in small chunks and as brief as possible. A good guideline is to keep the videos at or less than 10 minutes. A talking head video, where the camera points at the instructor and the instructor simply talks for 10 minutes does not work well. If possible, it is important to make the video engaging with multi-media (Houston and Lin, 2012). Many use screen capture software such as Jing or Camtasia. Also, Firefox has add-ons that can be used to screen capture and record as well. Many resources make the task of creating a quality, engaging homework lecture quite manageable. It is also worth considering that the lecture does not have to be a lecture at all.

While potentially daunting, planning and preparation can make or break a flipped classroom. The first step is to require students to compile any questions they have after watching the video. If the students have no questions, then some suggest requiring the students to summarize the topic to demonstrate understanding. Ideally, the instructor will sort the questions before class and develop scenarios to address them. The instructor attempts to avoid teaching what students already understand. This is the most difficult part, especially if students do not supply questions. The upside is that collecting questions over time builds a quality library to continue the process in future terms (November, 2012).

Actual class time is spent briefly reviewing content and checking for understanding (Houston and Lin, 2011). The instructor helps the students unpack the content. Students work on problems while the instructor circulates. The instructor can hear and correct misunderstandings on the spot. Students learn how to think and the instructor learns what topics cause confusion for the students (Berrett, 2012). This is one format for a flipped classroom session. In Dr. Eric Mazur's physics classes at Harvard, he follows the same general principal but he has a very effective system for the students to teach one another their understanding and convince one another of correct answers. Truly any use of the class time that includes application and practice of concepts with more access to the instructor takes advantage of the opportunities that flipping a classroom provides.

What about common concerns regarding the flipped classroom process? A primary concern addresses students with poor or no Internet access outside of class. This is always a concern when the activities outside class rely on technology, but there are ways to accommodate the access to technology deficiency, such as burning the lecture onto a DVD.

The other big concern exists through all stages of education history. What if the student does not do the homework? As long as there has been homework, there have been students who fail to complete homework and simply show up for class unprepared. While this is an understandably valid concern, failure of some to complete homework should not be the reason to dismiss the flipped classroom concept. Instructors can track the knowledge gained from homework or they can adjust class activities for unprepared students if they are in fact unprepared. Some test for understanding through the questions students ask after watching the homework. When students ask questions that can be found in the lecture or prep material, it is clear they did not prepare. Quizzes are used frequently to track understanding of the lecture content and most LMSs allow you verify (to some degree) that students viewed the lecture (Houston and Lin, 2012).

Trends come and go in education. Flipping a classroom is not a new concept to education. Using video lectures to present lecture content as homework, thus freeing up valuable face-to-face class time is the latest trend born out of a years old method. If the concept is good enough to exist for years and years, updating it for 21st century learning seems, at face value, to be a pretty good idea. It does take a little work, but planning, implementing and revising are all doable tasks and each effort builds a block upon which the next term can be built.

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## Critical care in the age of the duty hour regulations: Circadian-based scheduling, standardized handoffs, and the flipped classroom?\*

**T**rainee duty hour regulations remain profoundly controversial and consequential nearly a decade following their implementation. Despite this, there has been relatively little rigorous study of the impact of duty hour regulations in intensive care (1). In this issue of *Critical Care Medicine*, Dr. Emler and colleagues (2) make an important contribution to the literature on duty hours. This work represents the first controlled study of the implementation of a shift-work schedule, combined with a curriculum on optimal sign-out practices, vs. a traditional every fourth night call schedule without a sign-out curriculum, at a tertiary care academic center.

Several features of the study design are notable. First, the intervention schedule was designed based on the best evidence for circadian-based shift scheduling design: forward-cycling shifts with short strings of nights. Second, the implementation of the shift scheduling was coupled with a structured sign-out curriculum in the intensive care unit in order to mitigate the effect of shift work on the continuity of care. Third, the impact of the intervention was based on several essential continuity of care metrics as well as a 360° assessment, as perceived by patients' families, nursing staff, attending staff, and the subjects of the intervention, the critical care fellows.

There was no significant difference between control and intervention scheduling on mortality or readmission rates, although the shift schedule intervention was associated with a significantly lower length of stay and increased number of

discharges. There were no statistically significant differences in surveyed perceptions of continuity of care or family satisfaction, between control and intervention periods, although the nurses and attending physicians were more satisfied with the shift schedule intervention than the traditional every fourth night call schedule. The study is not without significant limitations, as noted by the authors. Most notable was that nearly half of the fellows were exposed to the intervention and the control schedule over the study period, raising the risk that these crossover effects may have decreased the study's ability to detect differences between groups. In addition, at the end of the rotation, there was no standardized assessment on the relative acquisition of knowledge between the two groups.

What important issues emerge from this work? First, our understanding of how intensive care unit structure and process impact outcome remains a relatively underdeveloped area of scientific inquiry in critical care medicine. More than 40 yrs have passed since Donabedian proposed the classic framework that quality of health care can best be assessed and improved by examining its three essential components: structure, process, and outcome (3). Since that time, far more effort in critical care has been placed on rigorously assessing outcomes than systematically assessing how intensive care unit structure and processes influence these outcomes (4). Many factors impact healthcare outcomes that are beyond the control of clinicians, whereas process measures are generally "actionable" and can be incorporated into a critical care unit's routine operations (5). The initiative to reduce healthcare-acquired infections, through the adoption of standardized checklists and practices, is a remarkable example of how increased focus on process measures can drive improved critical care outcomes.

Second, future research related to the impact of duty hour regulations will only benefit from global collaboration

with our colleagues in critical care and other high risk industries. We can build upon lessons learned from those who already have confronted the challenge of a work hour restricted environment that requires frequent patient handoffs and limits learning opportunities. Literature has emerged on the impact on continuity of care of the European Work Time Initiative (that limits the work week to an average of 48 hrs). Similarly, multiple reports from other high-risk industries on the threats associated with work schedules consistently find that many of the worst accidents over the past several decades have occurred in the early hours of the morning (6). What is clear from both the medical and workplace safety literature is that 24-hour (or greater) shifts are hazardous, and they appear to be more error-prone than systems reliant on shorter shifts. On the other hand, it is possible to devise an equally risky shift work schedule involving too many nights in a row, without attention to principles of good schedule design coupled with effective patient handover processes (7). In sum, no schedule is perfect. All are associated with trade-offs that the critical care community will need to assess with greater scrutiny going forward.

Last, where have all the students gone? Emler and colleagues found no difference in conference attendance; indeed, fellow attendance at the didactic "noon" conference was 42% for both the intervention and control group. Surely other programs have equally experienced the relentless erosion in attendance by trainees at intensive care unit conferences? If shift work becomes more widely adopted and subsequently drives a substantial portion of the training experience to long series of nights, with the necessary days off to accommodate the switch from day to night and then back again, this trend will only accelerate. Yet, what educational system would tolerate learners missing long sequences of the curriculum without devising an effective solution to replace the old paradigm? A viable solution

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\*See also p. 3129.

Key Words: circadian-based scheduling; duty hour regulations; internet-based learning; patient handoffs; postgraduate medical education

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may well be on the horizon. The rapidly expanding movement across secondary and college education, as well as the military, to provide more educational content via the internet for “asynchronous learning” allows more time for valuable instructor-led teaching to focus on critical thinking skills—a concept known as “blended learning” or the “flipped classroom.” Internet-based learning modules also provides the instructor with potentially new and highly sensitive measures to track individual student assessment and guidance. For trainees, the internet-based classroom education is always available to them regardless of their particular shift schedule (8, 9).

The age of the duty hour presents fundamental challenges to the practice and teaching of critical care medicine that will only be addressed by evolving and evaluating new practices based on the same rigor and intensity the field has brought to lung

injury, sepsis, and other critical care disorders over the past several decades.

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## Postresuscitation treatment targets—Time to emphasize normoxia?\*

Until recently, concerns about the impact of hyperoxia on secondary neurological injury after cardiac arrest were largely theoretical. Animal models have shown worse brain injury in a hyperoxic milieu following both traumatic brain injury (1) and cardiac arrest (2–4), probably due to potentiation of reperfusion injury and specifically the generation and effects of reactive oxygen species (5, 6), but human data were lacking, and there seemed little reason to insist that clinicians immediately titrate down the  $F_{iO_2}$  of patients recently resuscitated from a cardiopulmonary arrest to achieve a normal  $P_{aO_2}$ . It may be time to reconsider.

Secondary brain injury induced by hyperoxia is both physiologically plausible and well supported by animal research. A

recent review and meta-analysis of animal studies of hyperoxic resuscitation demonstrated that in data pooled from six studies, animals receiving 100% oxygen for 60 mins after resuscitation had significantly worse neurological dysfunction scores than animals receiving either room air or titrated  $F_{iO_2}$  (7). Human data are less robust, but two publications, one from the American Emergency Medicine Shock Research Network investigators (8) and the other by the Study of Oxygen in Critical Care (SOCC) Group from Australia and New Zealand (9), showed strong unadjusted associations between higher  $P_{aO_2}$  and mortality. These trials, both in large multicenter databases, differed in their conclusions after multivariable analyses due to significant differences in statistical approach, but both raised red flags and suggested further investigations are urgently needed.

In this issue of *Critical Care Medicine*, investigators at Vanderbilt focused on the highest arterial  $P_{aO_2}$  during the initial 24 hrs of care of 170 patients admitted after cardiac arrest, treating  $P_{aO_2}$  as a continuous variable. They noted the median  $P_{aO_2}$  values of survivors were lower (198 mm Hg) than nonsurvivors (254 mm Hg), and in a regression model that adjusted for confounding effects of age, time to return of spontaneous

circulation, presence of shock, bystander cardiopulmonary resuscitation, and initial heart rhythm found an independent association of high  $F_{iO_2}$  with in-hospital mortality (odds ratio death 1.439 for each 100 mm Hg increase above  $P_{aO_2}$  of 54) and poor neurological outcome (odds ratio poor outcome 1.485 for each 100 mm Hg increase above  $P_{aO_2}$  of 54) (10). Although small, this study provides additional retrospective evidence that reflex administration of high  $F_{iO_2}$  in the hours following return of spontaneous circulation may be a very bad idea, and begs the question of whether gains in mortality and neurological recovery could be achieved by rapid downward titration of the  $F_{iO_2}$  to a normal arterial oxygen tension.

Some readers may object to the lack of adjustment for severity of illness by typical measures such as Acute Physiology and Chronic Health Evaluation or Simplified Acute Physiology Scores, but these tools have not been well validated in cardiac arrest patients (11, 12). In patients surviving to be hospitalized after cardiac arrest, the strongest predictors of outcome have uniformly been the time from arrest to return of spontaneous circulation and the initial heart rhythm, and these confounders are both present in the investigators’ models. Confounding factors that would

### \*See also p. 3135.

Key Words: heart arrest; hyperoxia; induced hypothermia; neurological function; survival

Dr. Nielsen received grant support from Swedish Heart and Lung Foundations and AFA Insurance Foundation. Dr. Seder has not disclosed any potential conflicts of interest.

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## EDUCATION WEEK

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Includes correction(s): September 4, 2012

Schools Open Doors To New E-Learning Rules, Ideas

Complete Coverage ▶

### Educators Evaluate 'Flipped Classrooms'

**Benefits and drawbacks seen in replacing lectures with on-demand video**

By Katie Ash

A growing number of educators are working to turn learning on its head by replacing traditional classroom lectures with **video tutorials**, an approach popularly called the "flipped classroom." Interest in that teaching method was in full view this summer at the International Society for Technology in Education annual conference in San Diego, where almost every session on the topic was filled to capacity.

The movement was inspired partly by the work of Salman Khan, who created a library of free online tutoring videos spanning a variety of academic subjects, known as the **Khan Academy**, which many view as a touchstone of the flipped-classroom technique. But, much like the Khan Academy itself, the approach is attracting increasing scrutiny—and criticism—among educators and researchers.

The term "flipping" comes from the idea of swapping homework for class work. Students typically are assigned the video-watching for homework, freeing up class time that used to be spent listening to lectures for hands-on activities and application of knowledge, which used to serve as homework.

However, as most educators who have begun to use the technique are quick to say, there are a multitude of ways to "flip" a classroom. Some teachers assign a video for homework, while others allow students to watch those videos in class. Still others make videos for the lesson, but do not require students to watch them at all, giving students a variety of resources and allowing them to choose what they utilize to learn the required information.

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**Schools Open Doors to New  
E-Learning Rules**

But just as the Khan Academy has recently come under fire from some in the education blogosphere for what critics say is flawed pedagogy, the flipped-classroom technique has also garnered criticism from some who believe that flipping is simply a high-tech version of an antiquated instructional method: the lecture.

"My concern is that if you're still relying on lecture as your primary mode of getting content across, ... you haven't done anything to shift the type of learning that's occurring," said Andrew Miller, an educational consultant who works with the Alexandria, Va.-based professional-development group ASCD and the Novato, Calif.-based Buck Institute of Education, which works to promote project-based learning in classrooms.

"That's not how all of us learn," he said. "Just because you flipped your classroom doesn't mean your students will watch the videos. How are you engaging your kids?"

Ramsey Musallam, a chemistry teacher at Sacred Heart Cathedral Preparatory, a private Catholic high school in San Francisco, shares Mr. Miller's concerns.

"Everyone initially thought that [flipping] was an innovative way [to teach] because we're so rooted in this idea that students don't like homework," he said. "However, when you step back a little bit, what you're looking at is simply a time-shifting tool that is grounded in the same didactic, lecture-based philosophy. It's really a better version of a bad thing."

Mr. Musallam, who is also an adjunct professor at the University of San Francisco's college of education, began flipping his classroom in 2006, but after noticing little difference in student learning despite the extra in-class time for labs and hands-on activities, he shifted his perspective.

He still uses flipping as an instructional technique, but instead of giving students the video initially, they first go through an exploratory, guided inquiry-based period. Next, the students receive basic instructions and materials to complete lab work and observe the phenomena they are studying.

Only then, "when I feel that they can't form any more ideas on their own," does Mr. Musallam make videos to address misconceptions and provide instruction, he said.

Delaying the direct instruction as much as possible increases students' curiosity, he said.

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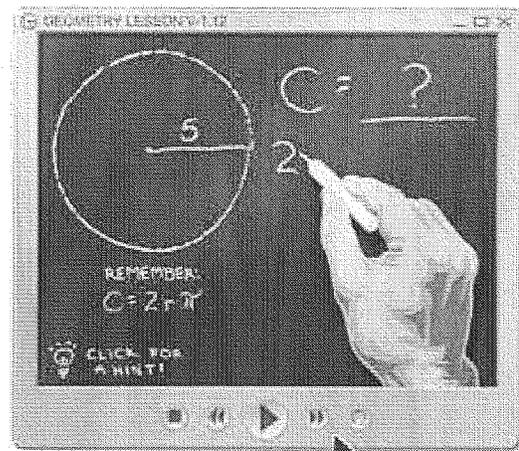
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—Illustration by Chris Whetzel

Using the flipping technique is not necessarily negative, Mr. Musallam said, but teachers should be realistic about what it really is.

"I say keep the flip alive, but lower the volume and think about it like we think about anything," he said. "It's a thing you do in the context of an overarching pedagogy," not the pedagogy itself, he said.

### Sharing Questions

Jonathan Bergmann, the lead technology facilitator for the 600-student K-8 Kenilworth school district in Illinois, is considered one of the pioneers of the flipped movement. He and his former fellow teacher Aaron Sams began using the flipping technique in 2006 at the 950-student Woodland Park High School in Woodland Park, Colo., to teach chemistry.

The pair created videos of their lectures and posted them online for their chemistry and Advanced Placement chemistry classes during the 2007-08 school year. They required the students to take notes on the videos and come to class with one thoughtful question to share.

The teachers found that the technique allowed them to spend more time with students one-on-one and to provide just-in-time intervention when students needed it. They also noticed an uptick in test scores in the students using the flipped-class technique.

Soon they began visiting other schools that were curious about the method and hosting conferences on flipping. They recently co-wrote a book called *Flip Your Classroom: Reach Every Student in Every Class Every Day*, published in July of 2012 by the International Society for Technology in Education and the ASCD.

"You need to figure out the answer to the question: What's the best use of your face-to-face instruction time?" Mr. Bergmann said.

After the first year, he and Mr. Sams made adjustments to the flipped classroom, moving from what they call the "traditional" flip to the "mastery based" flipped classroom.

In the mastery-based model, students are not required to watch videos at home on a specific day. Instead, they are given an outline for each unit that includes all the resources they might need for each objective, including videos, worksheets, and textbook excerpts. They can then work through the material at

### Tips for Flipping

**1.** Don't get hung up on creating your own videos. While some believe that students prefer to see their own teacher in the videos, others recommend harnessing the educational content that is already available on the Web. Resources such as the Khan Academy, YouTube EDU, and PBS can provide well-produced video content for your students.

**2.** Be thoughtful about what parts of your class you decide to "flip" and when. Deciding to flip part of your lesson will not automatically make it a better lesson. You have to be intentional about when to flip and clear about what the benefit will be for students.

**3.** If possible, find a partner to create videos with. Students enjoy hearing the back-and-forth conversation of two teachers, especially when one teacher plays the role of mentor while the other plays the role of learner.

**4.** Address the issue of access early. Survey your students to find out what technology they have at home, and find alternatives for students who lack Internet access. Alternatives may mean burning the videos onto DVDs or creating lists of places where students can go online.

**5.** Find a way to engage students in the videos. Just having students watch videos instead of listening to lectures doesn't guarantee that they will be more engaged.

their own pace, even taking tests and quizzes and performing labs when they are ready rather than as a whole class.

Using technology to create test-question banks that could be randomized, so that no two students receive the same test and may receive completely different questions altogether, made the mastery flipped model

possible, said Mr. Bergmann. Requiring students to take notes on the videos, ask questions about the videos, or engage in discussion about them will help ensure that they watch and absorb the material.

SOURCE: Education Week

possible, said Mr. Bergmann.

### 'Self-Paced Became No Pace'

Deb Wolf, a high school instructional coach for the 24,000-student Sioux Falls district in South Dakota, also uses the mastery technique. Instead of letting students have complete control over their pace, though, she sets deadlines to keep everyone on track.

"For students who had not been challenged in the classroom, this was an opportunity for them to just fly," she said. "For others, it was an opportunity to take the time that they needed to move slower. And for some, self-paced became no pace," and teachers had to step in and create deadlines.

Ms. Wolf began flipping her chemistry class at Roosevelt High School in the spring of 2008 after hearing about the technique from Mr. Bergmann and Mr. Sams. During the 2008-09 school year, all the chemistry teachers in her school flipped their classrooms, and the next year, the district applied for a federal American Recovery and Reinvestment Act grant, which Ms. Wolf facilitated, that provided professional development for the district's 35 math and science teachers around technology in the classroom.

"Most of them took away from that grant the idea that they could use technology to help provide students opportunities to master content in a variety of ways so that time became the variable, ... not learning," she said. "We didn't have 35 teachers that all suddenly flipped their classrooms, but the take-away was that by harnessing technology, they provided students the opportunity to master what they didn't master the first time."

Still, engaging reluctant learners continues to be a challenge, said Ms. Wolf.

"[Our teachers] realized that we were dragging [such learners] along. They may have been in class, but they weren't engaged. I know that we weren't meeting all of their needs in the traditional classroom, and I'm not sure that we were meeting their needs in a flipped classroom either," she said.

Like Mr. Musallam, Ms. Wolf emphasized that flipping is one approach in a wider framework of instructional methods to help reach students.

"You can't just hand the flipped classroom off to an ineffective teacher and say you're going to transform the classroom," she said. "It's not going to make a bad teacher a good teacher."

Students and teachers at the Havana Community Unit School District's 1,100-student high school in

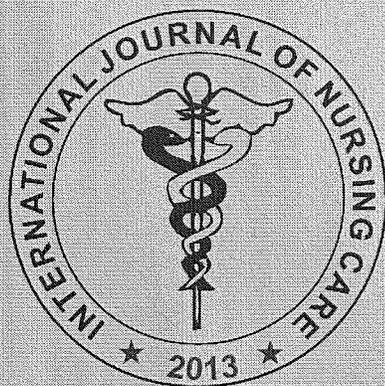


rural central Illinois will try their hands at the flipped technique when the entire school flips this fall.

In a district where 65 percent of the students qualify for free or reduced-price lunch, Superintendent Patrick Twomey hopes that flipping the school will help address the inequalities that hamper the high school's population of students deemed at risk academically.

"[In the current model], one student goes home to educated parents who can help him with his homework, while another student goes home and gets no help," Mr. Twomey said. "In the flipped model, both of those kids come back to the classroom after receiving the content, and now all of the help with the homework is given by the expert in the field."

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# Mothers Awareness Regarding Danger Signs of Neonatal Illnesses at a Selected Hospital in Trivandrum

Accamma Oommen<sup>1</sup>, Manju Vatsa<sup>2</sup>

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## ABSTRACT

Neonatal mortality and morbidity are the greatest challenges in the current health care scenario. Majority of neonates die because mothers fail to identify danger signs of illness, and inappropriate/ delayed care seeking. The present study was undertaken to assess mothers' awareness regarding danger signs of neonatal illnesses and to identify the factors influencing their awareness in a tertiary hospital at Trivandrum.

This descriptive cross sectional survey was conducted among mothers of 70 infants attending OPDs and admitted in postnatal wards of a multispecialty tertiary hospital in Trivandrum, enrolled through purposive sampling. Interviews were conducted with mother using a validated structured interview schedule. The data were analysed using SPSS.

Results showed that all mothers (100%) knew when to seek care for their neonates and majority (77.1%) received information from their family members. The mean knowledge scores of mothers regarding newborn danger signs was  $57.1 \pm 8.0$  (67.2%), which was good. Out of seventy mothers, 3 (4.3%) had very good knowledge, 51 (72.9%) good knowledge, and 16 (22.9%) average knowledge. The knowledge scores were less than 50% only for convulsions (47.6%) and hypothermia (38.3%). Improvement in mothers' knowledge was significantly associated with increasing age ( $p < 0.01$ ). The study concluded that educational interventions needs to be provided for post natal mothers, before discharge, regarding danger signs in newborns, especially regarding convulsions and hypothermia.

**Keywords:** *Danger Signs, Newborn Illness, Post Natal Mothers*

## INTRODUCTION

Children are the greatest gift from God. Children form the foundation of any nation and healthy children grow up to become productive nationals. India has the highest number of under-five child deaths, and a mortality rate that puts it in the top fifty of countries with the highest under-five mortality rates.<sup>1-2</sup> The current under five mortality rate in India is 51, infant mortality rate is 44 and neonatal mortality rate is 31 per thousand live births.<sup>3-6</sup> Neonatal deaths account for nearly two-thirds of infant and half of under-five mortality rates. Nearly 27 million babies are born in India each year

which accounts for 20% of global births. Among these, 1.0 million die before completing the first four weeks of life. This accounts for nearly 25% of the total 3.9 million neonatal deaths worldwide. About 40% of neonatal deaths occur on the first day of life, almost half within three days and nearly three-fourth in the first week.<sup>7-9</sup>

Many newborn lives are lost due to parents failing to recognize warning signs and sick children not being taken to health facilities on time, and because many mothers do not have sufficient knowledge on the protective value of breastfeeding.<sup>10-12</sup> Harmful traditional practices in newborn care like cord applications, delaying breast feeds, mixed feeding, pre lacteal feeds, prolonged bathing, ineffective thermal protection, practicing home remedies for neonatal illnesses, also lead to delays in seeking appropriate medical care thereby aggravating neonatal illnesses and mortality.<sup>13-15</sup>

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One of the component in reducing the newborn mortality and morbidity is early recognition of sick newborn and the danger signs of illness and initiation of prompt treatment. Most of the signs of illness in newborns are non-specific.<sup>16</sup> Danger signs in the present study refer to conditions and circumstances that are superimposed on the normal course of events which can be a threat to the life of newborns as specified in the IMNCI module of the Government of India.

Dongre AR et al reported from Wardha in 2009 that majority 55 (76.4%) of mothers identified fever as a newborn danger sign. Out of 72 mothers, 29 (40.3%), 16(22.2%) and 10(13.9%) identified difficulty in breathing, poor sucking and lethargy/unconsciousness as newborn danger signs respectively. Only 7(9.7%) and 2(2.8%) could identify convulsion and hypothermia as newborn danger signs respectively.<sup>17</sup>

A study conducted by Awasthi S et al from Uttar Pradesh showed that out of 200 caregivers, 183 (91.5%), 73(36.5%), 131 (65.5%) and 138 (69.0%) identified fever, jaundice, diarrhoea and vomiting as newborn danger signs respectively. Only 5 (2.5%), 19(9.5%) and 5 (2.5%) caregivers recognized bleeding from cord, low temperature and convulsion as newborn danger signs respectively.<sup>18</sup> Sreeramareddy CT et al reported from Nepal (2006) that mothers were aware that fever (51%), child becoming sicker (45.2%) and drinking poorly(42.5%) are danger signs of neonatal illness.<sup>19</sup>

Now a days because of early discharge of mothers and newborns from hospital, responsibility of mothers about recognizing the newborn danger signs has increased. Effective and early management at home level and prompt health care seeking behavior for the newborn danger signs serve as a backbone in reduction of newborn mortality. A study conducted by Bhandari S et al among 200 urban and rural mothers from North India concluded that the mean percentage of knowledge score of mothers regarding danger signs of illnesses in newborns was 39.3% (urban mothers: 44.7%, rural mothers: 32.9%).<sup>20</sup>

Mother's knowledge of danger signs influence care seeking and in turn neonatal mortality. The investigators clinical experience with mothers from Kerala showed that mothers had different levels of knowledge regarding danger signs of neonatal illnesses. Awareness of danger signs is directly related to identification of illness among neonates, thereby appropriate, timely and qualified care seeking. Majority of the studies on knowledge and perception of mothers

regarding danger signs in newborn babies in published literature are from northern (NMR in UP-40) and central (NMR in MP -41) India where neonatal mortality rates are high. A few citations were available from areas with low neonatal mortality rates (NMR in Kerala-7).<sup>2</sup>

Hence the present study was undertaken to assess the awareness of mothers about danger signs of newborn illnesses in southern Kerala. The objectives of the study were: to assess the knowledge of mothers regarding danger signs in newborns and to determine the association of knowledge of mothers with selected personal and demographic variables

## MATERIAL AND METHOD

This descriptive cross sectional study was conducted in postnatal wards and immunisation clinics of Sree Gokulam Medical College Hospital, (SGMCH) Trivandrum. SGMCH is a 750 bedded multi-specialty hospital with all general and specialty departments. The post natal ward is 30 bedded and immunisation clinic ensures immunisation services for infants and children six days a week. The hospital has a four bedded labour room and also a Neonatal Intensive Care Unit with eight beds.

The study was approved by the ethical committee of SGMCH and informed written consent was obtained from all the participants.

This study included mothers of infants who were admitted in the postnatal wards/ attended immunisation clinic at SGMCH and understood English/ Malayalam, and excluded mothers whose babies were critically ill and who were not willing to participate. Purposive sampling technique was used to select the sample of mothers. Pilot study was conducted to determine the sample size. To obtain 99% confidence interval and a relative precision of 5% based on the mean knowledge score ( $55.2 \pm 8.14 / 85$ ) of pilot data; a total sample size of 58 mothers was calculated. However 70 mothers were recruited for the study.

Data were collected in April/May 2013. Mothers, awareness about dangers signs of neonatal illnesses were assessed using a semi-structured interview schedule developed by Bhandari S and Vatsa M<sup>20</sup>. The tool was identified and permission was sought from the authors. The tool had CVI of 1.0 and reliability 0.96. The tool was translated to Malayalam and retranslated to English and tried out. It included items relating to various signs and symptoms of neonatal illnesses and

actions to be taken in three sections with a maximum possible score of 85. The score of each mother was converted to percentage and were categorized (based on quintiles) as: very good (>80%), good (60% to 80%), average (40% to 60%), poor (20% to 40%) and very poor (<20%).

Data analysis was done using SPSS. A p-value of 0.05 was taken as significant. Association between variables was computed using chi square test, t test and Mann Whitney U test.

## FINDINGS

The mean age of the mothers was  $25 \pm 3.36$  years. More than half of the mothers were Hindus (55.7%), and nearly half (45.7) were graduates, 81.4% housewives, and 64.3% had monthly family income of more than five thousand rupees. Majority (90%) of mothers resided in Panchayat area, and was from joint families (55.7%). More than half of the mothers had only one child (54.2%) and mode of delivery of the last child was spontaneous vaginal delivery (58.6%). All mothers (100%) knew when to seek care for their neonates. The instances mentioned were any change in the baby's look or behaviour like poor feeding, reduced activity, increased sleep, fever, jaundice etc. Majority of mothers

received information from their family members (77.1%) about danger signs of newborn illnesses. Only 5.7% mothers got information from nurses and 1.4% from doctors. (Figure 1)

Mothers had good knowledge regarding newborn danger signs as the mean score was  $57.1 \pm 8.0$  (67.2%). Out of seventy mothers, 3 (4.3%) had very good knowledge, 51 (72.9%) good knowledge, and 16 (22.9%) average knowledge. None of the mothers had poor or very poor knowledge. The minimum total score was 35(41.2%) and maximum was 74 (87.1%). The details of knowledge scores are described in table 1.

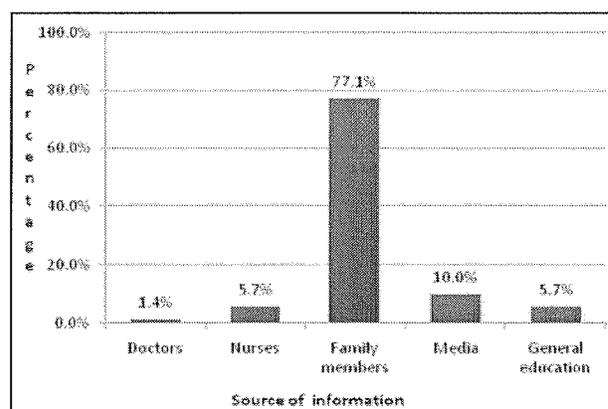


Fig. 1. Source of information about danger signs

Table 1: Knowledge scores of mothers regarding newborn danger signs

Criteria / Danger signs	Mean $\pm$ Standard Deviation of Knowledge score	Mean Percentage of knowledge score (%)	Score Category for Knowledge
Total	$57.1 \pm 8.0$	67.2	Good
Hypothermia	$2.3 \pm 0.9$	38.3	Poor
Hyperthermia	$4.1 \pm 1.0$	67.8	Good
Convulsions	$1.9 \pm 1.3$	47.6	Average
Lethargy	$6.1 \pm 1.1$	76.2	Good
Skin pustules	$2.9 \pm 0.8$	72.5	Good
Severe jaundice	$2.7 \pm 1.3$	54.0	Average
Respiratory distress	$4.4 \pm 1.6$	62.9	Good
Severe dehydration	$4.8 \pm 1.5$	59.9	Average

The knowledge in the sub areas was variable. The mean percentage knowledge scores regarding specific danger signs were: hypothermia (38.3%), hyperthermia (67.8%), convulsions (47.6%), lethargy (76.2%), skin pustules (72.5%), severe jaundice (54%), respiratory distress (62.9%), and severe dehydration (59.9%). Mothers had good knowledge regarding hyperthermia, lethargy, skin pustules and respiratory distress; average knowledge regarding convulsions, severe jaundice and severe dehydration. Maternal knowledge was poor about hypothermia in newborn babies. The percentage

distribution of mothers' knowledge on various danger signs are illustrated in figure 2. Very poor knowledge was seen in 21% of mother regarding hypothermia and 20% of mothers regarding severe jaundice.

Improvement in knowledge was significantly associated with increasing maternal age ( $p=0.006$ ). There was no association between knowledge and variables: religion, education, occupation, monthly income, area of residence, family type, type and place of delivery, and number of children. ( $p>0.05$ )

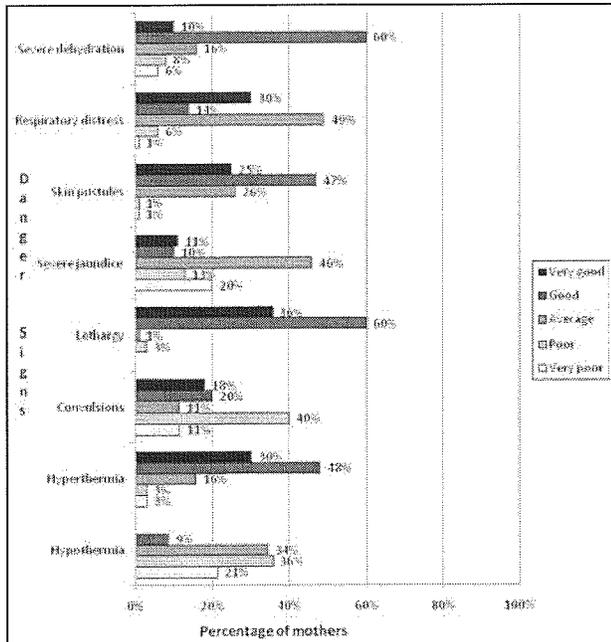


Fig. 2. Percentage distribution of mothers' knowledge for various danger signs

### DISCUSSION

All mothers (100%) in the present study knew when to seek care for their neonates and were able to identify at least four danger signs among newborns. Mothers stated that they would approach a hospital immediately if danger sign was identified in the baby. This was inconsistent with the findings of Kaushal M<sup>11</sup> et al who reported that seeking care from a qualified person was less (6%). Majority of mothers received information from their family members (77.1%). The study revealed that only 7.1 % mothers obtained information from doctors or nurses.

The mean percentage knowledge scores of mothers regarding newborn danger signs was 67.2% (good knowledge). Out of seventy mothers, 3 (4.3%) had very good knowledge, 51 (72.9%) good knowledge, and 16 (22.9%) average knowledge. The findings of the present study are inconsistent with the findings of Bhandari S<sup>20</sup> et al who reported that mean knowledge scores of mothers in Delhi and Haryana were only 39.3% (poor). This was probably because the present study was conducted among mothers of Kerala where literacy rates and health indicators are excellent.

Mothers had good knowledge regarding hyperthermia (38.3%), lethargy (76.2%), skin pustules (72.5%) and respiratory distress (62.9%); average knowledge regarding convulsions (47.6%), severe jaundice (54%) and severe dehydration (59.9%).The findings were consistent with the findings of Dongre AR<sup>17</sup> et al from Wardha and Awasthi S<sup>18</sup> et al from Uttar Pradesh who cited that majority of mothers could identify fever, lethargy, pustules and respiratory distress.

Maternal knowledge was poor about hypothermia (38.3%) in newborn babies as they did not consider hypothermia to be fatal for neonates. Hypothermia was considered near normal and nearly half of the mothers (47%) said that they would not seek care for hypothermia. It is consistent with findings of Awasthi S<sup>18</sup> et al, who cited that only 5% of mothers considered hypothermia to be a danger sign.

Determining the association of knowledge scores with selected demographic and personal variables, significant association was obtained only with maternal age (p<0.006). It was consistent with the finding of Bhandari S<sup>20</sup> et al (p=0.046) but not consistent with the findings in the same study which cited that knowledge was associated with family income (p<0.0001), education of mother (p<0.0001).

### CONCLUSION

The present study concluded that the knowledge levels of mothers regarding danger signs in neonates were good and all mothers cited that they knew when to seek care for their sick babies. Mothers had better knowledge regarding lethargy, skin pustules and least about hypothermia. The knowledge scores were less than 50% only for convulsions and hypothermia. Mothers' knowledge was significantly associated with age.

The findings of the study were limited to the verbal reports of the mothers selected by purposive sampling. The findings of the study could have been influenced by the setting (hospital). The study enlightens regarding the need for educating the mothers regarding danger signs in neonates especially with regard to hypothermia

and convulsions. Key messages related to neonatal danger signs are to be displayed in postnatal wards and OPDs. Doctors and nurses should involve in providing health education to mothers in postnatal wards before discharge and reinforce during newborn follow up clinics regarding identification and management of neonatal danger signs. Information may be disseminated through mass media as well.

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**Ethical Clearance:** Ethical committee of Sree Gokulam Medical College and Research Foundation.

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# Contributing Factors and Safety Related Lifestyle Changes among Older Persons with History of Falls

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## ABSTRACT

**Background and objectives:** Falls are one of the major problems in older persons and 5th leading cause of injury related visits to emergency department and primary etiology of accidents and deaths above 60 years of age. As the population ages, the problems related to falls and fractures are expected to grow and pose even a greater challenge to health care system. A descriptive study on contributing factors and safety related lifestyle changes among older persons with history of falls was carried out in Ludhiana district of Punjab.

**Material and Method:** A sample of 60 subjects above 60 years of age was conveniently recruited, out of which 43 (71.67%) subjects were from urban area, 03(05.00%) from semi urban area and 14(23.33%) were from rural areas. Subjects were interviewed using a questionnaire on socio-demographic profile, risk factors for falls and a home assessment checklist.

**Results:** More than half of the subjects 61.67% were females while only 38.33% were males. Study findings infer that maximum of the subjects had a history of fall twice in a year and about half of the falls were reported to occur in morning hours. Findings revealed that 92% subjects had decline in visual acuity which outweighed all the other risk factors. About 80% of the subjects were suffering from osteoporosis and vertigo, 75% from arthritis, 52% from hypertension, 45% from postural instability and 42% were suffering from diminished night vision. Maximum falls happened in bathroom (31.43%), followed by bedroom (22.86%), stairs (14.28%) and kitchen (7.14%). Major proportion (91.6%) of the bathrooms in homes had easily closable bathroom doors, high toilet seats (68.3%) and adequate size doorways (50%) while grab bars and non skid rubber mats were present in only 11.6% of the homes. The number of falls in bathroom was maximum due to the absence of grab bars and slippery floors. Most of the bedroom facilities in the homes (adequate light, easy access to switches, good condition and proper height of beds) were present except non skid rubber bedroom carpeting which was present only in 20% of the homes. Preventive measures taken by subjects for falls revealed that majority 65% of the subjects had taken no preventive measures. Only 1.67% had made changes in the bathroom.

**Keywords:** *Older Persons, Falls, Risk Factors and Safety Needs*

## INTRODUCTION

With an ageing population and emergence of injuries as a major public health problem, the burden of injuries will increase in the coming years. Since, injury happens due to a multiplicity of risk factors in different environments depending on the nature of products, prevention and control strategies has to be multiple as applicable to individual settings. It was reported that the older persons, who represent 12% of the population, account for 75% of deaths from falls. The number of falls increases progressively with both sexes and all

racial and ethnic groups. The injury rate for falls is highest among persons of 85 years of age and older. Annually, 1,800 falls directly result in death<sup>1</sup>.

George F<sup>2</sup> (2000) concluded that the risk factors for falls in the older persons can be 'intrinsic' (i.e. age related physiologic changes, diseases and medications such as polypharmacy, hypotension, inflammation of joints, hypotension, parkinsonism, auditory and visual abnormalities, foot problems, poor nutrition) or 'extrinsic' (i.e. environmental hazards like poor lighting, unsafe stairways and irregular floor surfacing. The

sedentary group fell more frequently than exercising group due to lack of stability. Musculoskeletal problems rank first, followed by visual defects, neurological illness, syncope, vestibular causes, hypertension, postural hypotension and dementia<sup>2</sup>.

Williams-Jhonson et al (2001) reported that 16% of the elderly fell from a bed or a chair/ stool while about 8% tripped over objects such as boards, garden hose, slippers, loose carpet and electrical wires. In about 58% of cases, the location/ activity associated with the fall was not stated. However, 14% were associated with slips in the bathroom. Co-morbid conditions include hypertension (37%), diabetes mellitus (21.7%), heart diseases (76%) and dementia (7.6%). A single fall is not always a sign of major problem, however recurrent falls may be defined as more than two falls in six months should be by a treatable cause and an immediate step should be taken for that<sup>3</sup>.

One of the easiest ways to prevent falls is to perform home safety inspection. Fall injuries can be reduced with a set of counter measures like antiskid flooring, better construction of houses and improved supervision by family members etc. The interventions need to be integrated in a comprehensive manner to reduce the occurrence of injuries among elderly and should focus on provision of safe environmental facilities. In India, there is paucity of research work in this direction so, the present study was undertaken to find out risk factors of fall, to assess the home safety measures of older persons, to determine the lifestyle changes adapted by older persons pertaining to their safety and to compare the history of frequency of falls among male and female older persons.

## MATERIALS AND METHOD

It was a descriptive study conducted among the older persons in the age group of 60 years and above residing in selected urban (Civil Lines, Adarsh Nagar) and rural (Mullanpur, Jainpur) areas of Ludhiana district of Punjab state. The criteria for selecting the sample was older persons of age 60 years or above with the history of fall twice or more in a year for the last 5 years. However, the roadside falls were not included in it.

Data was collected using interview schedule which included three parts. Part A included socio-

demographic data, part B included assessment sheet to assess the risk factors for falls and part- C included a home assessment checklist which was a standardized tool and contained questions regarding general household, kitchen, bathroom & bedroom related to fall and safety of older persons. Content validity of the tools was established through five experts in the field of geriatrics and nursing.

## FINDINGS

**Table 1: Socio-demographic profile of study participants N=60**

Sociodemographic Characteristics	f (%)
<b>Age (in years)</b>	
60 – 70	26 (43.33)
70 – 80	21 (35.00)
80 & above	13 (21.67)
<b>Gender</b>	
Male	23 (38.33)
Female	37 (61.67)
<b>Educational status</b>	
Illiterate	28 (46.67)
Primary education	23 (38.33)
High school & above	09 (15.00)
<b>Marital status</b>	
Never married	01 (01.67)
Married	42 (71.67)
Widow / widower	17 (28.33)
<b>Habitat</b>	
Urban	43 (71.67)
Semi – urban	03 (05.00)
Rural	14 (23.33)
<b>Living arrangements</b>	
Alone/with spouse	09 (15.00)
With children	51 (85.00)

### Sample characteristics

Study findings revealed that 43.33% subjects were from age group 60–70 years, 35% were from age group 70–80 years and 21.67% were 80 and above years of age. More than half of the subjects (61.67%) were females while only 38.33% were males. Maximum number of subjects (63.33%) were dependent on children, 23.33% had their own business, while 13.33% were pensioners. Lifestyle of the subjects depicted that 85.00% of the subjects had strenuous lifestyle while only 15.00% subjects had sedentary lifestyle which can be previewed from the table 1.

**Table 2: Profile of places of falls among older persons N = 60**

Place*	f (%)
Bedroom	16 (22.85)
Drawing room	09 (12.85)
Kitchen	05 (07.14)
Bathroom	22 (31.43)
Stairs	10 (14.28)
Verandah/lobby	08 (11.43)

\* Each person had several falls at different places and has different causes which were computed

**Places of fall among elderly**

Maximum (31.43%) of falls were reported in bathroom followed by 22.85% in bedroom whereas in drawing room, lobby and stairs, falls were near about 15%. Kitchen was the place where least percentage (7.14%) of fall happened (refer table 2).

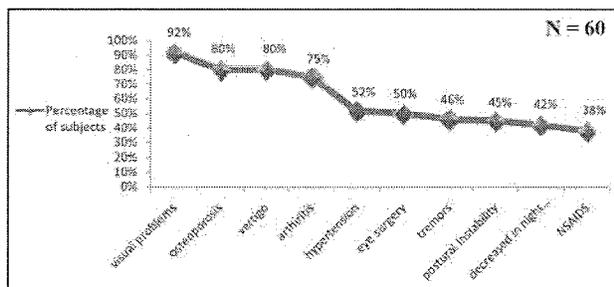
**Table 3: Causes of falls among older persons N = 60**

Cause*	f (%)
Hypertension / hypotension	17 (24.28)
Imbalance	06 (08.57)
Vertigo	15 (21.43)
Slippery floor	19 (27.14)
Weak eye sight	04 (05.71)
Weakness	09 (12.86)

\* Each person had several falls with different causes which were computed

**Causes of falls among elderly**

Study findings revealed that slippery floor (27.14%), blood pressure variations (24.28%) and vertigo (21.43%) were the main cause of falls among subjects whereas, weak eyesight, weakness and imbalance each contributed for less than 15% falls (refer table 3).



**Risk factors of fall among elderly**

Maximum number of study subjects (92%) reported visual problems while 80% were suffering from osteoporosis and vertigo, 75% from arthritis, 52% from

hypertension and 50% were having eye surgery. Less than 50% of the subjects were having tremors, postural instability, decreased in night vision and were using NSAIDs (refer figure 1).

**Table 4: Bathroom/toilet safety facility available for older persons in their homes N=60**

Bathroom facilities	f (%)
Presence of grab bars	07 (11.60)
High toilet seats	41 (68.30)
Easily closable door	55 (91.60)
Adequate size doorways	30 (50.00)
Non-skid rubber mats	07 (11.60)
Safe electric cables and plugs	27 (45.00)
Razor blades kept in a safe place	26 (43.30)

Bathroom, bedroom, kitchen and medication safety facilities to prevent fall

Majority (91.6%) of the homes had easily closable doors whereas high toilet seats were present in 68.3% of the homes. Half of the toilets were having adequate size doorways. However, safe electric cables and plugs were present in 45.0% of the bathrooms. Grab bars and non skid rubber mats were present in only 11.6% of the homes (refer table 4)

**Table 5: Bedroom safety facilities available for older person in their homes N=60**

Bathroom facilities	f (%)
Adequate lighting facilities	54 (90.00)
Easy access for light switches	54 (90.00)
Good condition of beds	56 (93.30)
Proper height of beds	51 (85.00)
Non skid rubber bed room carpeting	12 (20.00)

As depicted in table 5 that most of the bedroom facilities to prevent fall were present in majority of homes except nonskid rubber bedroom carpeting which was present only in 20.0% of the homes.

**Table 6: Kitchen safety facilities available for older persons in their homes N=60**

Kitchen facilities	f (%)
Non skid floor	46 (76.60)
Gas or electric cooking stove	58 (96.60)
Large readable 'on' and 'off' on appliances	48 (80.00)
Good Working condition of refrigerator	50 (83.30)
High platform (18inch) for refrigerator	14 (23.30)
Adequate food storage space	53 (88.30)
Easily reachable shelves at eye level	40 (66.60)
Presence of sturdy step leader	20 (33.30)
Sturdy chair with arm rest and high back	07 (11.60)
Sharp objects kept in special holders	56 (93.30)

**Table 6: Kitchen safety facilities available for older persons in their homes N=60 (Contd.)**

Kitchen facilities	f (%)
Separate storage of kitchen cleaning fluids	54 (90.00)
Presence of pot holders	25 (41.60)
Hazard free electrification	05 (08.30)
Availability of smoke detectors	02 (03.30)

As depicted in table 6 kitchen facilities like presence of gas and electric stoves (96.6%), special holder for the sharp objects (93.3%), separate storage for the kitchen cleaning fluids (90%) and adequate space for the food storage (88.3%) was present in majority of the homes but the facilities like availability of smoke detectors, hazard free electrification and sturdy chair with arm rest and high back were present only in 3.3%, 8.3% and 11.6% homes respectively.

**Table 7: Medication safety measures practiced by older persons in their homes N=60**

Medication safety measures	f (%)
Availability of first aid kit	26 (43.30)
Good lighting around medicine cabinet	24 (40.00)
Separate storage of internal and external medicines	26 (43.30)
Safe storage of medicines	45 (75.00)
Medication containers labeled in large print	21 (35.00)
Magnifying glasses for reading medicine labels	10 (16.60)
All Outdated medications are discarded	46 (76.60)
Unknown medication available	16 (26.60)

Majority (76.6%) of the homes had discarded all outdate medications and had safe storage of medicines (75.0%) while half of the homes had first aid kit, separate storage of internal and external medicines (43.3%). Least number of the homes had magnifying glasses and unknown medication available at home (refer table 7)

**Table 8: Correlation of gender with frequency of falls in older person N=60**

Gender	Frequency of fall		t' Value
	Mean $\pm$ SD	Standard Error of mean	
Male	9.68 $\pm$ 2.01	0.51	1.96 <sup>NS</sup>
Female	3.68 $\pm$ 1.79		

NS= Not significant ( $p > 0.05$ ), d.f. =58

The frequency of fall was more in males as compared to females but this difference in frequency of fall was not statistically significant that can be previewed from table 8.

## DISCUSSION

Old age and diseases go hand in hand. Falls are one of the major problems in the older persons and are considered as "GERIATRIC GAINTS." Failing to get the adequate information regarding falls in older persons, an idea to put light on this ignored aspect of life was the main purpose of this study<sup>4</sup>.

Risk factors of fall among older persons were assessed. Rank order of first 10 risk factors of fall among older persons depicts that maximum number of subjects 92% were having visual problems, 80% were suffering from osteoporosis and vertigo, 75% from arthritis, 52% were having from hypertension, half of them were having eye surgery (50%), 46% were having tremors and 45% with postural instability, 42% were suffering from decreased in night vision whereas only 38% were using NSAIDS. every subject had more than one risk factors therefore frequency and frequency percentage is computed out of 60 subjects in each category. According to the study done by George F. Fuller(2000) risk factors for falls in older persons include increasing age, medication use, cognitive impairment and sensory deficits, age related physiologic changes, diseases and medications such as polypharmacy, hypotension, inflammation of joints, hypotension, parkinsonism, auditory and visual abnormalities, foot problems, poor nutrition. Krishnaswamy B and Gnanasambandam Usha (2005) also found that risk factors for falls includes muscle weakness, a history of falls, use of four or more prescription medications, use of an assistive device, arthritis, depression, age older than 80 years and impairments in gait, balance, cognition, vision and activities of daily living.

## CONCLUSION

The study concluded that maximum of the subjects had a history of fall twice in a year and about half of the falls were reported to occur in morning hours. As far as the physical risk factors are concerned decline in visual acuity was the major risk factor responsible for fall. Most of the bedroom facilities were present in homes except non- skid rubber bedroom carpeting. The number of falls in bathroom out weighted the other places of falls. Most of the homes lacked kitchen facilities like hazard free electrification and availability of smoke detectors. It was seen that most of the homes lacked availability of magnifying glasses for reading medicine labels, and medication containers labeled in large print.

With an ageing population and emergence of injuries as a major public health problem, the burden of injuries will increase in the coming years. Since injury happens due to a multiplicity of risk factors in different environments depending on the nature of products, prevention and control strategies has to be multiple as applicable to individual settings. The interventions need to be integrated in a comprehensive manner to reduce the occurrence of injuries among elderly and should focus on provision of safe environmental facilities.

#### Strength and limitation of the study

The present study is limited in several ways. Firstly, these cross sectional data can not actually demonstrate causal connection between variables; rather they show statistical associations which may be consistent with several causal formulations. Secondly, we used the convenience sampling method, which reduces the generalizability of results. The sample size of the study is small so inferences should be made carefully about the risk factors of the fall among elderly. Finally, participants in the present study may not be representative of all elderly in Punjab. The study is having strength in that we used reliable and valid tools for data collection.

#### Nursing Implications

Nurses should be highly vigilant about the risk factors associated with fall among elderly while providing care in the hospital settings; if possible, elderly patients or their relatives should be educated about the special areas in the home where maximum fall occurs. They should also be informed about the remedial measures that can be taken to prevent fall in home settings.

#### Ethical Clearance

Written informed consent was obtained from study participants before data collection. Research Committee of College of Nursing, DMCH, Ludhiana approved the study protocols.

**Source of Funding:** None

**Conflict of Interest:** None

**Acknowledgement:** None

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# Menopausal Transition and Non Pharmacological Approach

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## ABSTRACT

With increased life expectancy, today women spend more than one third of their life after menopause. So, it is necessary to pay more attention towards peri and post menopausal phase. Although hormone replacement therapy is the most effective treatment in menopause but it has some merits and demerits. Today's need is to find out new options to deal with menopausal symptoms non pharmacologically. Each and every woman faces one or more, same or different problems during menopause and start searching for different ways to minimize menopausal discomfort and inconvenience so as to improve the quality of life. Majority of menopausal women perceive alternative and complementary therapies to be safer and more natural alternatives rather than using traditional hormonal replacement therapies in the management of menopause.

*Keywords: Menopause, Non Pharmacological Approach*

## INTRODUCTION

A woman is a God's Gift. She has to undergo different stages of life starting from birth till death. As a change is an unavoidable part of life, everyone must come to accept it. Menopause is only a mile stone in woman's life. If a woman is well adjusted, the woman will pass through these turbulent years of menopause smoothly. Menopause means woman has stopped menstruation and ovulation around the average age of 47.5 years<sup>1</sup>. Majority of the women do not respond to menopause in the same way; some may experience few or no symptoms of menopause, whereas some may experience one or more different physical and psychological symptoms<sup>2</sup>.

Globally, including the country of India, the numbers of elderly women are increasing<sup>3</sup>. Most of menopausal women report some degree of weight gain, skin changes like wrinkles, dryness of skin, itching or irritation. Because the body continues to produce low levels of the male hormone testosterone, some women may complain of growth of hairs on the chin, upper lip, chest, or abdomen<sup>4</sup>. Perimenopausal women generally report a variety of cognitive and/or emotional symptoms like fatigue, memory disorders, and irritation on small things, and sudden changes in mood. The night sweats occurring during perimenopause may also contribute to feelings of tiredness and fatigue, which can result in mood and cognitive impairment<sup>5</sup>.

There are so many therapies for the management of menopause. Hormone replacement therapy (HRT) is being used to control the menopausal symptoms that arise because of declining estrogen levels but long-term studies have shown that women on hormone therapy is at increased risk for heart attack, brain stroke as well as breast cancer. So the decision about HRT should be individual decisions after considering its risk and benefit<sup>6</sup>. Most of women prefer to avoid those risks. So they choose alternative and complementary therapies which may include homeopathy, Chinese medicine, home remedies or herbal treatments to get relieve symptoms and improve the quality of life<sup>5</sup>. Many of the symptoms of menopause and the medical complications that may develop in postmenopausal women can be lessened or even avoided by taking steps to lead a healthy lifestyle<sup>2</sup>. Vasomotor symptoms are the most frequently reported menopause symptoms across all races/ethnicities, one-third of the women (34%) used only hormone therapies, 12% used complementary and/or alternative medicines, and 16% used both for treatment of menopause<sup>7</sup>. Most of women use alternative therapies i.e. 37% for alternative remedies, 29.5% for massage therapy, 22.9% for dietary soy, 10.4% for acupuncture, 9.4% for homeopathy and 4.6% for herbalists. It is concluded that the use of alternative therapies for menopause symptoms is common and women who use them generally find them to be beneficial. The most common dietary supplements are soy (29%), ginkgo biloba (16%) and black cohosh (10%)<sup>8</sup>.

Various Ayurvedic herbs can be used during the period, which can help a great deal in strengthening and rejuvenating the female reproductive system. In addition to this, the herbs prescribed for the same can regulate the hormones and calm the emotions. Some of the examples are Aloe gel, Shatavari, Saffron and Ashwagandha. Use of complementary and alternative medicine has become part of daily practice as more patients obtain over the counter dietary supplements and herbal products<sup>9</sup>.

### **Psychological problems and remedies**

Psychological problems present among menopausal women are irritability, anxiety, mood swings, feeling of being unloved, and difficulty in making decision making<sup>10</sup>. These are usually taken care of by Joint Family Systems & Social Support<sup>11</sup>. St. John's Wort (*Hypericum perforatum*) is best used for mild-to-moderate depression and has both serotonergic and dopaminergic effects. In a recent randomized placebo-controlled trial, women on St John's wort reported improved menopause-specific quality of life and a non significant improvement in hot flushes<sup>12</sup>. There is increasing evidence suggesting that even the short term practice of yoga can decrease both psychological physiological risk factors and may reduce the signs, complications and improve the prognosis of those with clinical or underlying disease<sup>13</sup>.

### **Vasomotor problems and remedies**

Vasomotor symptoms (VMS, hot flashes and night sweats) are menopause-associated symptoms, highly prevalent, vary by race/ethnicity, and are most clearly related to the menopause transition. About 67% of all women naturally traversing the menopause report VMS<sup>14,15</sup>. Plant products including isoflavones (found in soy bean products, chick peas, red clover, beans and peas), lignans (found in whole grains, flaxseed, and vegetable oils, cereal bran, whole cereals, legumes) and coumestans (found in red clover, sunflower seeds, and sprouts) appear to have lower rates of menopausal vasomotor symptoms, cardiovascular disease, osteoporosis and breast, colon, endometrial and ovarian cancers<sup>16</sup>. Isoflavones supplementation may produce a slight to modest reduction in the number of daily flushes in menopausal women and that the benefit may be more apparent in women experiencing a high number of flushes per day<sup>17</sup>.

### **Musculoskeletal problems**

Maximum number of menopausal women suffers from musculoskeletal problems like joint pains, joint stiffness, fracture, backache and osteoarthritis. Physical activities, diet high in phytoestrogen and sunlight exposure leads to relatively low incidence of fractures during menopause. Reduced risk for fall rate for bone health strategy, regular exercise, vitamin D and calcium consumption prevent these problems. Flaxseed and flaxseed oil contain plant estrogens so consume flaxseed oil 1- 3 tablespoon/day. It is good to ease joint pain, by lubricating the joints. It will lessen the stiffness for arthritis patients, also a good source of fiber. Turmeric (anti inflammatory) and massage therapy is an effective method for joint stiffness<sup>18</sup>.

### **Cardiac problems and remedies**

Common cardiac problems reported are tiredness, palpitations, fatigue and higher cholesterol level/ lipid profile. The use of soy and isoflavones may improve lipoprotein profile and reduce cardiovascular risk. Flaxseed helps to regulate the estrogen and progesterone balance. It is a good way to keep the cholesterol in check. Turmeric is believed to support liver health, help prevent bad cholesterol and it is being studied for its ability to blocking growth of cancer<sup>18</sup>. Brisk walking and vigorous exercise are associated with substantial reductions in coronary events and stroke. Physical activity lowers blood pressure, improves the lipid profile. Encourage a minimum of 30 min of moderate-intensity dynamic exercise, e.g., brisk walking, at least 5 days a week, supplemented by an increase in daily lifestyle activities. Optimum results will be obtained with a 5 days per week regimen, with 30 – 40 minutes of aerobic exercise at 70 % of the maximum heart rate<sup>19</sup>.

### **Neurological problems and remedies**

Many women complain of headache, memory loss, irritation, blurred vision and sleep disturbance during menopausal transition. Several large epidemiologic studies have consistently shown that the menopause transition is associated with more sleep disturbance and neurological problems<sup>20</sup>. The integrated approach of Yoga therapy can improve cognitive functions such as remote memory, mental balance, attention and concentration, delayed and immediate verbal retention and recognition test<sup>21</sup>.

### **Genitourinary problems and remedies**

Common genitourinary problems like prolapse, frequency of micturition, itching, dribbling of urine and descent of genital organs are more seen due to lack of hygiene, multiparity and lack of regular checkups<sup>10</sup>. Kegel exercise is an effective method of encountering incontinence by strengthening the pelvic muscles. Avoid certain foods and beverages that can contribute to overactive bladder by irritating the bladder; like chocolate, tea, coffee, soft drinks, spicy foods, and alcohol. Limit fluid intake to about 8-10 glasses per day. For obese women, weight loss can reduce incontinence by up to 60%. Change the undergarments daily. Avoid exposure to urine for long periods<sup>22</sup>.

### **Sexual problems and remedies**

Vaginal dryness and dyspareunia are common complaints among middle-aged women with an estimated prevalence of vaginal dryness ranging from 4% to 22% in reproductive-aged women, from 7% to 39% in women in the menopause transition, and from 17% to 30% postmenopause<sup>23</sup>. These can be countered by use lubricants and moisturizers during intercourse, regular sexual stimulation, which promotes blood circulation to the genital area, can also maintain the vaginal area healthy. If there are any signs of Sexually transmitted disease like itching at perineal area, vaginal discharge, burning micturition, immediately concern to doctor and have a Pap smear test to identify STI's<sup>10</sup>.

### **Dietary and lifestyle modifications**

Since women's diets are often low in iron, fiber and calcium, So eat iron-rich foods a day like lean red meat, poultry, fish, eggs, leafy green vegetables, nuts and enriched grain products. Take high fiber such as whole-grain breads, cereals, pasta, rice, fresh fruits and vegetables. Calcium is found in dairy products, curds, paneer, broccoli and legumes. Include at least 2 to 4 servings of fruits and 3 to 5 servings of vegetables in daily diet. Drink at least eight 8 to 10 glasses of water a day. Maintain a healthy weight. Reduce foods high in fat and use sugar and salt in moderate amount. Yoga is a free of cost non invasive method, is fairly effective and is strongly recommended to all women of menopausal age<sup>24</sup>.

A study was conducted to assess the knowledge, attitude, problems faced and remedial measures adopted by menopausal women. Using purposive sampling technique, 100 subjects were selected and scheduled for menopausal problems faced and

remedial measures adopted by them. Some women were suffering single problems whereas others had multiple problems. Maximum number of menopausal women suffered from musculoskeletal (114), cardiac (73), vasomotor (72), neurological (61), psychological (41), genitourinary (15) and sexual problems (18). Out of total sample, only 45 menopausal women used remedial measures for musculoskeletal problems i.e. frequent rest (16), ayurvedic/homeopathic (10), massage (12), self medication like pain killers (03), home remedies like aloe vera (02), belt users and heat application (1). For cardiac problems, 19 used rest and 17 women modified their dietary changes. For hot flushes and dryness, women used cream/oil application, more water intake. For neurological problems women adopted rest (4), tea/coffee (3), self medication (2), homeopathic medication and dry fruits (1) as remedial measures whereas only two menopausal women used oil as a lubricant to get relieve of sexual problems. It was also found that women having adequate knowledge and positive attitude faced less problems and used remedial measures than those who were having inadequate knowledge and negative attitude towards menopause<sup>10</sup>.

### **CONCLUSION**

Menopausal women may suffer in silence, not knowing what to do and how to seek appropriate help. Many women use alternative/herbal remedies as a more natural way of managing their menopausal symptoms than conventional medicines. Educating the women towards menopause can help in early adaptation and thus women can adopt non pharmacological approach to get relief of the discomfort of menopausal symptoms and avoid the side effects of HRT.

**Ethical Clearance:** To conduct this study, ethical clearance was taken from concerned authorities.

**Source of Funding:** None

**Area of Conflict:** None

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# An Exploratory Study to assess the Expectations of Mothers During Labour from Professional Nurses in a Selected Hospital, Ludhiana

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## ABSTRACT

**Background:** Child birth is supposed to be a positive experience and should leave a good impression on a women's life and psychological state. Women's psychological wellbeing depends on whether their expectations of child birth care met or not so the support they receive during this time is critical. Consumers are demanding a more humanistic approach to obstetric care and a greater share of responsibility for the events surrounding birth. The investigator came across her previous experiences from the intranatal patient care and some concerned non formal interview of mothers in labour room found their high expectations and some sort of un-satisfaction towards care they were getting. Many expectations from nurses regarding the care given and the need was felt to assess their expectations and then compensate the areas where it lacked.

**Method:** An exploratory approach was used to assess the expectations of mothers during first stage of labour. The hospital selected for the study was Christian Medical College & hospital, Ludhiana, Punjab and the department selected was labour room. The sample of the present study consist of 100 mothers who were in first stage of labour. The sampling technique adopted was purposive sampling. A self structured questionnaire was prepared an was divided in to two parts, socio demographic data and 60 items related to check the expectations of mothers during labour from professional nurses.

**Result:** majority 64% of mothers belonged to the age group of 18-27 years and were graduates(40%). 85% were housewives, Hindus and from urban area, got information from friends and relatives. The highest mean percentage expectation score of mothers were fond under the dimension of interpersonal communication style and provision of information(94.83%) and least in physical comfort(79.35%). The overall mean expectation of mother was 89.72%. moters under the age group of 18-27 got a high mean expectation score (108.15) and found that younger the mother, higher the expectation from professional nurses. Level of education was also found an impact on the expectation of mothers. higher the education of mothers ,lower the expectation score.

**Conclusions:** The study was indicated that majority of mothers had high expectations from the professional nurses under the dimension of interpersonal communication style and provision of information(94.83%) and least in physical comfort(79.35%).

**Keywords:** Expectations, Professional Nurse, Labour

## INTRODUCTION

Birth is a celebration. Labour and birth is a time of excitement and anticipation along with uncertainty and fear. Giving birth represents a major transition in a woman's life. The memories and experiences of labour and birth remain with women throughout their lives<sup>1</sup>.

Child birth is a socio cultural, psychological and physiological process, during which the woman has a special need for professional support. How the woman

perceives and responds to the pivotal life experience of birth has an impact on her development as a woman. Nuses have a unique role in supporting women during this challenging and vulnerable time. Labour support has several components, including physical comfort, emotional support, patient teaching or giving information and advocacy.<sup>2</sup>

Ensuring a safe and satisfying child birth for women requires the efforts of all health care providers,

particularly the intra partum nurse. with the current emphasis on evidence based care, labour support research is probably the most relevant research for intrapartum nurses to apply to their practice.

Women reported they needed great support and guidance during the more intense parts of labour. As one mother stated "I wont forget her, she was brilliant, she came in and she completely took over and a complete control of the situations"

Vande Vusse reported in his study in addition to have personal expectations of labour, each woman approached labour with certain social expectations concerning the type of behaviours considered acceptable for women to exhibit during labour. These expectatios exerted an influence on the women's Self appraisals of her labour experience.

### OBJECTIVES

1. To identify the expectations of mothers from professional nurses in first stage of labour.
2. To determine the relationship between the mother's expectations from professional nurses during labour with selected variables ie, age, gravida, eduction, occupation, income, religion, area of residence, category of admission and source of information about labour.
3. To develop an information booklet for nurses in Labour Room on expectation of mothers during first stage o labour from professional nurses.

### ASSUMPTION

Mothers do have high expectations during labour from the professional nurses.

### METHODOLOGY

The research design for the study was a non experimental design, where exploration implied without any manipulation of the variables or control over the research setting. The population for the present study comprises of 100 mothers during 1<sup>st</sup> stage of labour who are admitted in labour room of Christian Medical College and Hospital, Ludhiana, Punjab. Data was collected using purposive sampling techniques. Prior to the data collection, the researcher had taken formal permission from the institutional ethical committee of Christian Medical College& hospital, and also taken verbal consents from the mothers and were

ensured that their responses would be kept confidential. The data was collected by distributing a self structured questionnaire to the mothers in 1<sup>st</sup> stage of labor to assess the expectations from the professional nurses. Both descriptive and inferential statistics were used for the data analysis.

## FINDINGS

### Section I: Sample Characteristics

Table 1. Percentage distribution of sample characteristics N=100

S. No.	Characterestics	n	Percentage(%)
<b>1. Age (in years)</b>			
1.1	18-27	64	64%
1.2	28-35	34	34%
1.3	36-45	02	2%
<b>2. Education</b>			
2.1	Illiterate	02	2%
2.2	<5 <sup>th</sup> std	01	1%
2.3	5-10	10	10%
2.4	10+2	37	37%
2.5	Graduate	40	40%
2.6	postgraduate	10	10%
<b>3. Occupation</b>			
3.1	Housewife	85	85%
3.2	Private job	09	9%
3.3	Govt job	00	0%
3.4	others	06	6%
<b>4. Income (per month)</b>			
4.1	<Rs.5000	22	22%
4.2	Rs.5,0/-00-10,000	51	51%
4.3	>Rs.10,000	27	27%
<b>5. Gravida</b>			
5.1	First	59	59%
5.2	Second	33	33%
5.3	Third	08	08%
5.4	Above three	00	00%
<b>6. Religion</b>			
6.1	Hindu	64	64%
6.2	Muslim	00	00%
6.3	Sikh	29	29%
6.4	Christian	07	07%
<b>7. Area of residence</b>			
7.1	Urban	87	87%
7.2	Rural	13	13%
<b>8. Category of admission</b>			
8.1	Private	24	24%
8.2	General	76	76%
<b>9. source of information</b>			
9.1	Previous experiences	40	40%
9.2	Television	05	5%
9.3	Friends/relatives	48	48%
9.4	Education materials	07	7%

**Table 1** depicts that subjects studied were distributed in to various categories according to their age, education, occupation, monthly income, gravid, religion, area of residence, category of admission and source of information. Majority (64%) mothers belonged to the age group of 18-27 years and were graduates(40%). Majority were housewives(85%), having monthly income Rs.5,000/- 10,000/- (51%)and

were first gravida(59%). Most of the mothers were Hindus (64%), from urban area(87%), (76%)admitted under general category and got information about labour from friends and relatives(48%).

**Section-II**

**Part 1:** Description of expectations of mothers from professional nurses in first stage of labour.

**Table 2.** Mean, mean percentage and rank order of mother’s expectations score during first stage of labour from professional nurses. N=100

S. No	Dimensions of expectations	Mother’s expectation score			
		MaxScore	Meanscore	Mean%	Rank Order
1.	Physical comfort	28	22.2	79.36	6
2.	caring and emotional support	20	18.33	91.65	4
3.	Interpersonal communication style & Provision of information	36	34.14	94.83	1
4.	advocacy	12	11.27	93.92	2
5.	Competence of profession	18	16.71	92.83	3
6.	Spiritual care	6	5.33	88.83	5
	Over all expectations score	120	107.66	89.72	

Maximum score =120, Minimum score =0

Table 2. Shows that mothers having high expectations from professional nurses on the dimension of inter personal communication style and provision of information(34.14) and least expectations on physical comfort(22.2).

**Part-II**

The relationship between the mother’s expectations from professional nurses during labour with selected variables.

**Table 3.** Mean expectations score of mothers during first stage of labour according to age in years. N=100

Age in years	Mother’s expectation score				
	n	mean	Standard deviation	Degree of freedom	Z score
a) 18-27	64	108.15	16.9	96	.356 <sup>NS</sup>
b) 28-35	34	107.14	10.98	34	2.46 <sup>**</sup>
c) 36-45	2	96.5	5.5	64	2.63 <sup>*</sup>

Maximum score=120  
Minimum score=0

NS=None Significant

\*= significant at p<0.05 level, \*\*= significant at p<0.01

Table 3 inferred that age had an impact on expectations of mothers during labour. Younger the

mother, higher the expectations from the professional nurses.

**Table 4.** Mean expectations score of mothers during first stage of labour according to Education N=100

Age in years	Mother’s expectation score				
	n	mean	Standard deviation	Degree of freedom	Z score
a) illiterate	3	113.3	4.72	11	1.34 <sup>NS</sup>
b) 5 <sup>th</sup> - 10 <sup>th</sup> std	10	107.3	11.20	45	.255 <sup>NS</sup>
c) 10- +2	37	108.24	6.08	75	.584 <sup>NS</sup>
d) Graduate	40	107.37	6.90	48	.692 <sup>NS</sup>
e) Post graduate	10	105.3	8.22	11	2.78 <sup>*</sup>

Maximum score=120  
Minimum score=0

\*-significant at p<.05

Table 4 shows mother who were illiterate got a high mean expectation score (113.3).and found significant at 0.05 level.thus it is concluded that higher the education of mothers, lower the expectations from professional nurses.

Table 5

Variables	Level of significance
Parity	Non significant
Gravida	Non significant
Category of admission	Non significant
Source of information	Non significant
Religion	Non significant

These variables are having no impact on the expectations of mothers from professional nurses during labour.

## DISCUSSION

In the available review of literature many studies are supporting the list of expectations of mothers during labour. Vande Vusse(1996 b) studied the patterns of control and methods of decision making during labour on 15 women. The study revealed that women valued information, explanations, advice and individualized nursing care while in labour. Walker et al(1995) done a study on 32 post partum women and 6 partners which focused on the experiences of personal relevance related to maternity care and showed that personalized information from the nurse was important during all stages of labour, especially prior to the performance of procedures. Some studies supports the relation with expectation of mothers with variables. The finding was in agreement with the study conducted by Baker Angela et al(2000) revealed on the perceptions of labour pain by mothers, majority was aged between 22-32 years had more pain intensities than other age categories. (Green 1990) have found a relationship between lower education level and child birth satisfaction whereas others found no relationship.

Goodman Petra (2003) reported upon 60 low risk post partum women that employed got high mean satisfaction score(147.83)than unemployed mothers. Tumbling and Simkin(2001) reported that multiparae probably based their expectations upon past experiences whereas primi parae could have developed preconceived ideas through viewing videos, television dramatizations or documentaries.these may have set up unrealistic portrayals of the nurses role.

## CONCLUSIONS

Mothers having high expectations from the professional nurses on the dimension of interpersonal communication style and provision of information, followed by the dimension of advocacy, competence of profession, caring and emotional support, spiritual care and physical comfort respectively.younger the age higher the expectations from the professional nurses.

Higher the education, lower the expectation. Family income, gravid, religion and category of admission had no impact on the expectations of mother during labour.

**Conflict of Interests:** Nothing reported.

**Source of Funding:** None.

**Recommendations:** A comparative study can be done on post natal mothers between the expectation and the received care to assess the effectiveness of nursing practice and satisfaction of mothers.

**Ethical Considerations:** Prior to the data collection ,permission had taken from the ethical committee of Christian Medical college & Hospital, Ludhiana,and from the Head of the obstetrical &Gynaecological department, C.M.C, Ludhiana.

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# Awareness of Nurses about the Nature and Practice of Collaborative Care in Sacred Heart Hospital, Abeokuta, Nigeria

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## ABSTRACT

**Objectives:** To evaluate the awareness of nurses about collaborative care, to identify the effects of collaborative care on patient care outcomes, to evaluate the challenges that may be encountered by nurses in collaborative care, to identify/suggest the favourable factors enhancing collaborative care.

**Material and Method:** Descriptive survey involving 98 registered nurses irrespective of their areas of specialization, age and rank, working in Sacred Heart Hospital, Lantoro, Abeokuta, Ogun State, Nigeria. Self-developed questionnaire served as tool for data collection.

**Results:** 69.4% of the nurses define collaborative care as the interaction between healthcare professionals to achieve highest care outcomes followed by 14.3% who stated that it implies coordination of activities between nurses and other healthcare professionals.

Most nurses believe interdisciplinary/collaborative approach to care enhances quality and safety of care (53.0%), followed by those (28.6%) who stated that it enhances coordination and efficiency of care/therapeutic regimen. Most nurses do encounter challenge(s) in the practice of collaborative care (83.7%) while 16.3% do not.

Out of the nurses who encounter challenges during collaboration (N=82 {83.7%}), majority (56.1%) stated that physicians perceive themselves as primary decision makers and will change treatment plans without consultation. This, by implication, constitutes a major challenge followed by lack of communication (24.4%).

Respect for different perspectives and mutual responsibility for problem solving is a favourable factor enhancing purposeful collaborative care (53.1%), followed by direct and open communication (26.5%).

**Conclusion:** The study was conducted aiming to find out the awareness of nurses about the nature and practice of collaborative care. Findings show that 69.4% of the nurses define collaborative care as the interaction between healthcare professionals to achieve highest care outcomes followed by 14.3% who stated that it implies coordination of activities between nurses and other healthcare professionals. By implication, nurses are aware of the nature and practice of collaborative care.

**Keywords:** *Collaboration, Communication, Nursing, Outcome, Perspective, Practice, team*

## INTRODUCTION

Collaboration is an idea of practical relevance repeatedly discussed in health care settings. The benefits are well understood, yet collaboration is seldom practiced. So what is the problem? The lack of a shared definition is one barrier. Additionally, the complexity of collaboration and the skills required to facilitate the process are difficult to deal with. Much of the literature on collaboration describes what it should look like as

an outcome, but little is written concerning the actual participation of nurses and how to approach the developmental process of collaboration.

Collaboration is both a process and an outcome in which shared interest or conflict that cannot be addressed by an individual is addressed by key members/stakeholders. The collaborative process involves a synthesis of different perspectives to better understand complex problems. As nurses, we have the

authority to make nursing decision that we are accountable for, and that the delivery, supervision and direction of nursing care is our responsibility.

Patients have the right to expect safe, competent individualized nursing care, from admission up to, and including discharge. In collaborative care, nurses play a central role in that, the actions of other health professionals based on diagnosis, treatment and rehabilitation determines the nursing action to be performed whether dependent, independent or interdependent.

According to International Council of Nurses<sup>1</sup>, Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. Nursing includes the promotion of health, prevention of illness, and the care of ill, disabled and dying people. Advocacy, promotion of a safe environment, research, participation in shaping health policy and in patient and health systems management, and education are also key nursing roles.

Fatona and Obiojogwu<sup>2</sup>, opined that irrespective of what (professional affiliation), whom (self worth) or where (organization/institution) we are, anything we do depends on our value belief. Nursing can be conceptualized as an open system which responds to the society of which it is a part. As an open system, nursing is engaged in simultaneous interaction with social system. As a profession, nursing addresses the responses of the individual and families to actual or at risk health problems in a humanistic and holistic manner.

Nurses must always remember the person to whom they are ultimately accountable; their patient. This accountability is first and foremost in upholding the principles a nurse represents. We should constantly be asking ourselves whether or not the care we are providing is exceeding the expectations of our patients and bestowing health advancement to preserve the patient's health integrity. Moreover, we must remain vigilant of the duty to ourselves in the same regard by being able to self-evaluate.

According to Fatona and Adebayo<sup>3</sup>, the nature and practice of collaborative care cannot be discussed without taking note of the general nursing roles. They are: Independent, dependent and interdependent roles.

Independent nursing roles are actions initiated and performed by nurses. They include: comprehensive

assessment of client, family and community needs; diagnosing; planning; identifying outcomes; implementing and evaluating care/actions.

Delegation and supervision of client care activities to be performed by junior professionals are also independent roles.

Dependent roles imply health actions initiated by other healthcare professionals but thoughtfully/ reasonably performed by nurses. They are patient care services including, but not limited to, administration of medication and therapeutic agents necessary to implement a treatment, disease prevention or rehabilitative regimen initiated by, and within the scope of licensure of a physician, dentist, paediatrician or clinical psychologist.

Interdependent roles are actions initiated, and performed by healthcare providers when appropriate in a bid to achieve a common patient-centred goal. Here, nurses play a central role. For instance, the nurse must ensure laboratory investigations are carried out by haematologists or laboratory technicians (in addition to health history and physical assessment) which will assist in arriving at a diagnosis. Also, in planning and implementing care, patient requiring dietary modification will additionally require the service(s) of a nutritionist/dietitian. In doing this, there is need for continual assessment and documentation. The term "interdependent role" is similar to, and can be used interchangeably with Multi-disciplinary collaboration, interdisciplinary care, interdependent intervention, collaborative care.

According to Ellingson<sup>4</sup> some level of collaboration between health care providers is necessary in any health care setting. In hospitals, careful coordination of services between nurses, nursing assistants, physicians, and a variety of health care professionals (e.g., physical therapists) must occur around the clock. In outpatient settings health care providers may operate at varying levels of collaboration depending upon the types of services offered. No single discipline or specialty can meet all of a patient's needs.

The Canadian Medical Association {CMA}<sup>5</sup>, believe that Collaborative care is patient-centred and the following perspectives should be noted:

"Care that is truly patient-centred considers patients' cultural traditions, their personal preferences and values, their family situations, and their lifestyles. It makes patients and their loved ones an integral part

of the care team who collaborate with health care professionals in making clinical decisions.

Patient-centred care puts responsibility for important aspects of self-care and monitoring in patients' hands – along with the tools and support they need to carry out that responsibility.

The word collaboration implies working together for the greater good, but it actually encompasses far more. Several preconditions must be in place in order for collaboration to be successful. Collaboration must have shared objectives. The value system among the participants must be similar. Communication must be honest, respectful, and purposeful. Successful collaborative nursing practice and collaborative health care practice need to encompass all of these conditions.

Collaborative health care practices facilitate better patient outcomes. The healthcare team works as a group utilizing individual skills and talents to reach the highest of patient care standards. A multidisciplinary plan of care should be decided by all of the team members.

Individual disciplines must be willing to work together, have the same objectives and goals, and provide a plan of care which is individualized to the patient's needs. A multidisciplinary approach to care sounds simple in theory, but collaboration of different skills and expertise has its share of problems.

**If designed appropriately, collaborative care models have the potential to**

- Improve access to healthcare;
- Enhance the quality and safety of care;
- Enhance the coordination and efficiency of care/ therapeutic regimen; and
- Enhance provider morale and reduce burnout within health professions.

A common, accessible patient record in collaborative care settings is desirable to ensure appropriate communication between Nurses and other health care professionals, to prevent duplication, coordinate care, share information and protect the safety of patients.

The role and scope of practice of each member of the collaborative care team should be clearly understood and delineated in job descriptions and employment contracts.

Collaboration "implies collective action toward a common goal in the spirit of trust and harmony." In the context of healthcare, collaboration is understood as the way in which physicians and nurses interact with each other in relation to clinical decision making.

Collaboration involves direct and open communication, respect for different perspectives, and mutual responsibility for problem solving.

Studies have indicated that physicians both dismiss and devalue nurses' knowledge. In addition, physicians perceive themselves as the primary decision makers in healthcare, and they feel free to change treatment plans without consultation. It is not surprising that compared with physicians, nurses perceive lower levels of collaboration and are less satisfied with the collaboration.

Patients are responding to the conditions of the environment, their own physical states, their own history, their own meaning, and their own psychological well-being and sense of self. Nurses' work involves attending to all of these conditions. Making sense of patients' responses is a significant part of nurses' work. However, nurses' work is often poorly understood and less relevant to physicians, whose primary work concerns the disease itself and its treatment.<sup>6</sup>

Despite the fact that individuals constituting a group share common goal, each of them is unique based on value-belief, socio-cultural background and professional affiliation. This surely affects group interaction. In collaborative practice, several barriers may be encountered which obviously needs to be addressed.

According to Moore<sup>7</sup>, the most common break down in collaborative practice is lack of communication. If the disciplines are not communicating with each other, there will not be consistency and continuity in care.

Another common barrier to collaborative practice is the inability to work together because of the lack of understanding and appreciation for what the other contributes to the team.

Based on the methodology of collaborative care, the following can be helpful; learning to value and manage diversity, developing constructive conflict resolution skills, Balancing autonomy and unity in collaborative relationships. Learn from collaborative successes and failures.<sup>8</sup>

In addition, according to CMA<sup>5</sup> Governments must enhance access to medical care by increasing the number of health care providers, and not by encouraging or empowering provider substitution.

## MATERIAL AND METHOD

The research design adopted for the study was descriptive survey approach. The population consisted of registered nurses irrespective of their areas of specialization, age and rank, working in Sacred Heart Hospital, Lantoro, Abeokuta, Ogun State, Nigeria. Convenience sampling technique was used to select the sample of 98 nurses. Participation was based on their presence, and readiness to participate in the study. The data was collected using self-developed questionnaire with open and Closed-ended questions. Data collected from the respondents were analysed descriptively through the use of tables. This was followed by interpretation derived from the data presented.

## FINDINGS

**Table I: Socio-demographic Characteristics of Respondents N=98**

S. No	Demographic Characteristics	Frequency	Percentage (%)
1	<b>Age (years)</b>		
	20-29	58	59.2
	30-39	22	22.4
	40-49	14	14.3
	50 and above	4	4.1
2	<b>Gender</b>		
	Male	12	12.2
	Female	86	87.8
3	<b>Marital Status</b>		
	Single(never ever married)	64	65.3
	Married	32	32.7
	Separated/divorced	2	2.0
4	<b>Religion</b>		
	Christianity	82	83.7
	Islam	12	12.2
	Traditional	4	4.1
5	<b>Years of working experience</b>		
	0-4 years	62	63.3
	5-9 years	12	12.2
	10-14years	18	18.4
	15 years and above	6	6.1
6	<b>Rank</b>		
	Nursing Officer II (NO II)	66	67.3
	Nursing Officer I (NO I)	2	2.0
	Senior Nursing Officer (SNO)	22	22.4
	Principal Nursing Officer (PNO)	8	8.2

**Table II: Respondents' Definition of Collaborative CARE N=98**

Definition	Frequency	Percentage (%)
Interaction between healthcare professionals to achieve highest client care outcomes	68	69.4
Coordination of activities between nurses and other healthcare professionals	14	14.3
Utilising personal professional approach in making decision	8	8.2
Collective action toward a common goal	8	8.2

**Table III: Effects of Interdisciplinary/Collaborative Approach To Healthcare N= 98**

Effects of Collaborative Care	Frequency	Percentage (%)
Improves access to care	8	8.2
Enhances the quality and safety of care	52	53.0
Enhances the coordination and efficiency of care/ therapeutic regimen	28	28.6
Facilitates better client outcomes	10	10.2

**Table IV: Possibility of Facing Challenges in Executing Collaborative Care N= 98**

Possibility of Facing Challenges	Frequency	Percentage (%)
Yes	82	83.7
No	16	16.3

**Table V: Challenges Encountered by Nurses in The Practice of Collaborative Care N= 82**

Challenges	Frequency	Percentage (%)
Physicians dismiss and devalue nurses' knowledge	10	12.2
Physicians perceive themselves as primary decision makers and will change treatment plans without consultation	46	56.1
Lack of communication	20	24.4

**Table VI: Factors Enhancing Purposeful Collaborative Care N= 98**

Favourable Factors	Frequency (%)	Percentage
Learning to value and manage diversity	6	6.1
Direct and open communication	26	26.5
Respect for different perspectives and mutual responsibility for problem solving	52	53.1
Developing constructive conflict resolution skills	8	8.2
Adequate man-power in healthcare institutions	6	6.1

## DISCUSSION

Respondents of ages 20-29 years constitute the highest percentage (59.2%), Most of them are females (87.8%), Majority (65.3%) of them are single (never ever married). 63.3% of the respondents (registered nurses) have the working experience of 0-4 years, and they are mostly NO IIs (67.3%) followed by the SNOs (22.4%).

69.4% of the nurses define collaborative care as the interaction between healthcare professionals to achieve highest care outcomes followed by 14.3% who stated that it implies coordination of activities between nurses and other healthcare professionals. This supports the work of CMA,<sup>5</sup> stating that healthcare team works as a group utilizing individual skills and talents to reach the highest of patient care standards/outcomes.

Most nurses believe interdisciplinary/collaborative approach to care enhances quality and safety of care (53.0%), followed by those (28.6%) who stated that it enhances coordination and efficiency of care/therapeutic regimen. This corroborates the submission of CMA,<sup>5</sup> in that, if designed appropriately, collaborative care models have the potential to; improve access to healthcare, enhance the quality and safety of care, enhance the coordination and efficiency of care/therapeutic regimen.

Most nurses do encounter challenge(s) in the practice of collaborative care (83.7%) while 16.3% do not.

Out of the nurses who encounter challenges during collaboration (N=82 {83.7%}), majority (56.1%) stated that physicians perceive themselves as primary decision makers and will change treatment plans without consultation. This, by implication, constitutes a major challenge followed by lack of communication (24.4%). This is backed by Stein-Parbury and Liaschenko,<sup>6</sup> who stated physicians perceive themselves as the primary decision makers in healthcare, and they feel free to change treatment plans without consultation. It is not surprising that compared with physicians, nurses perceive lower levels of collaboration and are less satisfied with collaboration. At the same time, disagrees with the work of Moore,<sup>7</sup> who opined that the most common break down in collaborative practice is lack of communication.

Respect for different perspectives and mutual responsibility for problem solving is a favourable factor enhancing purposeful collaborative care (53.1%) followed by direct and open communication (26.5%).

Supports Stein-Parbury and Liaschenko,<sup>6</sup> Collaboration involves respect for different perspectives, and mutual responsibility for problem solving. Disagrees with Moore,<sup>7</sup> learning to value and manage diversity, developing constructive conflict resolution skills, Balancing autonomy and unity in collaborative relationships.

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**Conflict of Interest:** None.

**Source of Funding:** None.

**Ethical Clearance:** Ethical permission was obtained from the Chief Matron (Chief Nursing officer) and the team of nursing leaders of Sacred Heart Hospital, Abeokuta, Ogun State, Nigeria.

## CONCLUSION

As healthcare professionals, we need to look at the whole picture and meet all of the needs of our patients. The study was conducted to find out the awareness of nurses about the nature and practice of collaborative care. Findings show that 69.4% of the nurses define collaborative care as the interaction between healthcare professionals to achieve highest care outcomes followed by 14.3% who stated that it implies coordination of activities between nurses and other healthcare professionals. By implication, nurses are aware of the nature and practice of collaborative care.

To sum up, the place of our independent and dependent roles remain, and is affected by institutional policy. Interdependent role (collaborative care, interdisciplinary/multidisciplinary care) requires a lot of effort/commitment from individual members of the team, and surely enhances wellness in patients.

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# Effectiveness of Structured Teaching Programme on Minor Breast Problems among Primipara Women in Selected Community Area at Coimbatore District

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## ABSTRACT

The study aims to assess the knowledge and attitude regarding minor breast problems during breast feeding among primigravida women to determine the relationship in between the knowledge and attitude regarding minor breast problems. A total of 60 primi postnatal women were selected data was collected using multiple choice questions for knowledge and statement to assess the attitude. It was found that majority of them had inadequate knowledge in pretest. Postnatal women were not aware about the minor breast problems during breast feeding as well as the importance of breast feeding. Based on the study findings, structured teaching programme was provided and mothers were made aware on it.

*Keywords: Attitude, Minor Breast Problems, Primigravida, Structured Teaching Programme*

## INTRODUCTION

Breast feeding is a unique experience and to be cherished. Sometimes certain simple problems faced by mothers result in stoppage of breast feeding or giving of supplements of animal milk/commercial infant formula to the baby. These problems are preventable if due care is taken from the pregnancy period to prepare for breast feeding. Breast feeding is fundamental to health and for the development of child and also important for the health of mother. Breast milk is not only the best but also important for the infants. It is generally considered to be the superior source of nutrition for infant through the first year of life. Breast feeding can prevent 15% of all child diseases and deaths. The most common problems are nipple irritation associated with infection in the breast, breast engorgement, cracked nipples, Retracted and flat nipples and sore nipple. Breast is an essential component of reproductive health of women. Therefore primary health care of a woman should include examination of breasts and attending to breast problems at the earliest during antenatal period in order to prevent the feeding problems in postnatal period (Eglash et.al.2006) <sup>1</sup>

Coovadia HM (2007)<sup>2</sup> has done a study on breast problems among breast feeding mothers. The samples were collected randomly. Mothers those who

underwent a breast feeding counseling were selected for the study. The findings of the mothers those who are suffering with inverted nipple was 6%, mastitis 11%, breast abscess 11% and 17% of mothers are experienced sore nipple. Most problems occurred during the first month after delivery.

Amit. M & Forester.D (2001)<sup>3</sup> performed a study among lactating women. A randomized controlled trial and a survey approach were followed. Totally 1193 mothers were selected. The findings suggested that 17% women experienced mastitis, 5% developed breast abscesses, 2.9% of women who took antibiotics for mastitis. Majority of the studies estimates that 11% of women developed breast abscess with mastitis.

## MATERIAL AND METHOD

**Research Approach:** Survey research approach.

**Research Design:** Quasi experimental one group pre-test and post-test design.

**Settings:** This study was conducted in selected community areas at Coimbatore.

**Study population:** Primipara women of selected community areas at Coimbatore.

**Inclusion criteria:** Primipara women.

### Sample and sampling technique

60 Primipara women selected by convenient sampling technique.

### Development of the tool

The structured self administered questionnaire was used to assess the knowledge. The three point likert scale to assess the attitude on minor breast problems during breast feeding. It was developed by the researcher after intensive review and expert's opinion.

### Description of the tool

**Part I:** Consists of Demographic Variables (Age, Education, Occupation, Family Income, Residential Area, Type of Family, and Previous Source of knowledge).

**Part II:** Consists of 20 multiple choice questions to assess the knowledge on minor breast problems during breast feeding among primigravida women.

**Part III:** Consists of 14 statements to assess attitude on minor breast problems during breast feeding. Equal number of both positive and negative statements under 3 point likert scale was used. Reliability was established through test re-test method. The coefficient correlation score on knowledge and attitude was 0.8 and this was found to be highly reliable. The pilot study was conducted with 10 primipara women after obtaining formal consent. The purpose was to find out the feasibility of the study.

Informed consent was obtained from study samples before starting data collection in order to obtain full cooperation and assurance was given to the study samples. After obtaining their consent, the structure self administered questionnaire was given to the samples to assess the knowledge and attitude. The structured teaching programme was given to the samples and pamphlets including causes of breast problems, signs and symptoms, management and prevention of minor breast problems during breast feeding were also issued. After 7 days of interval post test was conducted.

### ANALYSIS

The data were analyzed by using descriptive and inferential statistics. The data related to demographic variables were analyzed by using descriptive measures (frequency and percentage) and the knowledge and attitude score of primipara were analyzed by using descriptive measures (mean and standard deviation). The effectiveness of teaching programme was analyzed by paired 't' test. The association between the

knowledge and attitude with selected demographic variables of primigravida women were analyzed by using inferential statistics (chi-square test).

### RESULTS

Findings of the study shows that among primigravida women majority of them (52%) belonged to the age group of 20-25 years, 47% had completed their higher secondary education, 52% were house wives and their family income was Rs.3001-5000/month. Most of them were living in rural area, single family and they have not gained knowledge previously.

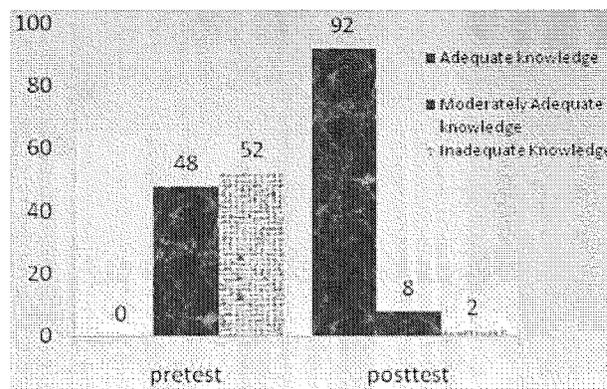


Fig. 1. Percentage distribution of knowledge of mothers on minor breast problems during breast feeding

It is inferred that in pretest none of them had adequate knowledge. In post test majority of them had adequate knowledge. So the structured teaching programme has increased the knowledge.

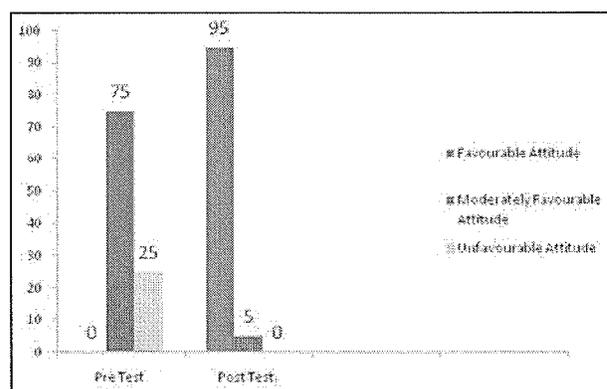


Fig. 2. Percentage distribution of attitude of mothers on minor breast problem

The data shows that in pretest none of them had favorable attitude, 45 (75%) of them had moderately favorable attitude and 15 (25%) of them had unfavorable attitude. In post test 57 (95%) had favorable attitude and 3 (5%) of them had moderately favorable attitude and none of them had unfavorable attitude. It

was inferred that the structured teaching programme was highly effective to impart favorable attitude in preventing minor breast problems during breast feedings.

**Table 1. Mean, Standard deviation and 't' value of knowledge, and attitude on minor breast problems.**

S.No.	Variable	Mean	SD	't' value
12	Knowledge Attitude	710	23	40 *49 *

\*Significant at 0.01 level

The obtained 't' value 40 was significant at 0.01 level. The mean attitude score was 10 and SD score was 3. The obtained 't' value 49 was significant at 0.01 level. It was inferred that the structured teaching programmed was effective.

**Table 2. Mean, Standard deviation and 'r' value of knowledge, and attitude on minor breast problems.**

S.No.	Variable	Knowledge		Attitude		'r' value
		Mean	SD	Mean	SD	
12	Pre TestPost Test	1017	1.71.4	1625	2.11.9	0.11

It confers that the correlation co-efficient value of knowledge and attitude of the primipara women was scored 0.1 which was positively correlated. And in the post test 1 was perfectly positive correlated. It is inferred that there was a positive relationship between the knowledge and attitude regarding minor breast problems during breast feeding among the primipara women.

**Table 3. Association between various demographic variables with knowledge and Attitude Score**

Demographic variables	DF	Knowledge Score		Attitude Score	
		X <sup>2</sup> Value	Level of significant	X <sup>2</sup> Value	Level of significant
Age	2	4.07	Not Significant	11.13	Significant
Education	2	0.46	Not Significant	0.34	Not Significant
Occupation	2	0.24	Not Significant	1.9	Not Significant
Monthly Income	2	1.26	Not Significant	5.63	Not Significant
Type of Family	1	37	Significant	1.46	Not Significant
Previous source of Information	2	11	Significant	3.45	Not Significant

It was inferred that there was no association with their demographic variable like age, educational status, occupation and family income. There is an association between the knowledge of primipara women on minor breast problems with their type of family and previous source of knowledge.

It was inferred that there was no association with their demographic variable like educational status, occupation, family income, type of family and previous source of knowledge. There is an association between the attitude of primipara women on minor breast problems with age group.

### CONCLUSION

It was concluded that in posttest majority of them had adequate knowledge, the structured teaching programme increased their knowledge and education was highly effective in imparting favourable attitude in preventing minor breast problems during breast feedings.

**Conflict of Interest:** Nil

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# Comparative Study to assess the Knowledge on Prevention of Parent to Child Transmission (PPTCT) of HIV among Staff Nurses Attended and Not- Attended in-Service Education Programme

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## ABSTRACT

HIV (human immunodeficiency virus) is the virus that causes AIDS. This virus is passed from one person to another through blood-to-blood and sexual contact. Infected pregnant women can pass HIV to their baby during pregnancy or delivery, as well as through breast-feeding. Vertical transmission to the neonates is about 14-25%, transplacental transmission may occur in early (8-14) weeks of pregnancy, though majority (40-80%) occurs during labor. The risk of transmission of HIV from mother to child during pregnancy is 5-10%, during labor and delivery 10-20%, during breast-feeding 5-20%. Staff nurses play a vital role in preventing HIV transmission from mother to child, so ongoing evaluation of staff nurses knowledge was important. Therefore a comparative study was conducted to assess the knowledge of staff nurses who had attended and not attended in-service education programme regarding PPTCT of HIV in selected hospitals of Ludhiana, Punjab with the objectives to assess the knowledge of staff nurses who had attended and not-attended in-service education programme regarding PPTCT of HIV, to compare the knowledge of staff nurses who had attended and not attended in-service education programme regarding PPTCT of HIV and to find out the relationship of staff nurses knowledge with selected demographic variables. The study sample consisted of total 100 staff a nurse 50 from CMC&H and 50 from DMC&H. Data was analyzed by inferential statistics. The staff nurses who had attended in-service education programme on PPTCT of HIV had significant higher knowledge as compared to those who had not attended in-service education programme on PPTCT of HIV. This study shows that there is a need to conduct In-service education programmes in every Health care facility.

*Keywords: Knowledge, HIV, Staff Nurse, In-Service Education Programme, Attended, Not-Attended, Prevention, Parent to Child Transmission*

## INTRODUCTION

HIV (human immunodeficiency virus) is the virus that causes AIDS. This virus is passed from one person to another through blood-to-blood and sexual contact. In addition, infected pregnant women can pass HIV to their babies during pregnancy, delivery, as well as through breast-feeding. Most of the people will develop AIDS as a result of their HIV infection. The body fluids proven to spread HIV is blood, semen, vaginal fluid, breast milk and other body fluids containing blood.

There are additional body fluids that may transmit the virus that health care workers may come into contact with CSF surrounding the brain and the spinal cord, synovial fluid surrounding bone joints, amniotic fluid surrounding a fetus.<sup>1</sup> Today, the most common ways HIV is passed from one person to another are such as reusing and sharing needles, unprotected sex (no condom or other barrier devices), mother to child.<sup>2</sup>

Vertical transmission to the neonates is about 14-25%. Transplacental transmission may occur in early (8-14) weeks of pregnancy, though majority (40-80%) occurs during labor. The risk of transmission of HIV from mother to child during pregnancy is 5-10%, during labor and delivery 10-20%, during breast-feeding 5-20%, overall without breast-feeding 15-30%, overall, with breast-feeding for 6 months 25-35%, overall, with breast-feeding for 18-24 months 30-45%.<sup>3</sup>

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Health systems need to be strengthened so that interventions to prevent mother to child transmission of HIV infection, including the use of antiretroviral drugs, can be safely and effectively implemented. Moreover, HIV testing in pregnancy has a number of benefits in terms of prevention and care for mother and child, although to avoid or minimize negative consequences testing must be voluntary and confidential and accompanied by quality counseling.<sup>4</sup>

### OBJECTIVES

- To assess the knowledge of staff nurses who had attended in-service education programme regarding prevention of parent to child transmission of HIV.
- To assess knowledge of staff nurses who had not attended in-service education programme regarding prevention of parent to child transmission of HIV .
- To compare the knowledge of staff nurses who had attended and not attended in-service education programme regarding prevention of parent to child transmission of HIV
- To find out the relationship between knowledge of staff nurses who had attended or who had not attended in-service education programme regarding prevention of parent to child transmission of HIV with selected variables such as age, gender, professional qualification, duration of experience, area of work, marital status, salary of staff nurses per month, religion.

### ASSUMPTIONS

The staff nurses who had attended in-service education programme will have more knowledge than the staff nurses who had not attended in-service education programme.

### MATERIALS AND METHOD

A non –experimental design and comparative descriptive approach was considered appropriate for the present study. The present study was conducted in Christian Medical College & Hospital (CMC&H), Ludhiana and Dayanand Medical College & Hospital (DMC&H), Ludhiana. Sample was selected by purposive sampling technique. Sample of the study consisted of fifty staff nurses who had attended in-service education programme regarding PPTCT of HIV from CMC&H and fifty staff nurses who had not attended in-service education programme on PPTCT of HIV were from DMC&H. structured questionnaire was used to collect the data. The data was collected by using personal profile and knowledge questionnaire which consists of questions regarding knowledge on different aspects of prevention of parent to child transmission of HIV. This questionnaire consist of 40 multiple choice items, each item consist of one correct answer among the four choices and each correct answer carries one mark.

### RESULTS

#### Sample Characteristics

Table 1. Percentage Distribution of Sample Characteristics of Staff Nurses. N=100

Sample Characteristics	Attended		Not-attended		df	$\chi^2$
	n=50	%	n=50	%		
<b>Age (in years)</b>						
20-24	17	34	13	26	3	1.27 <sup>NS</sup>
25-29	16	32	15	30		
30-34		10	20	12	24	
> 34	07	14	10	20		
<b>Gender</b>						
Male	15	30	05	10	1	6.25*
Female	35	70	45	90		
<b>Professional Qualification</b>						
GNM	40	80	37	74	1	0.50 <sup>NS</sup>
B.Sc.(N)	10	20	13	26		

Table 1. Percentage Distribution of Sample Characteristics of Staff Nurses. N=100 (Contd.)

Sample Characteristics	Attended		Not-attended		df	$\chi^2$
	n=50	%	n=50	%		
<b>Duration of Experience</b>						
<1year	05	10	02	04	3	1.42 <sup>NS</sup>
1-4year	20	40	22	44		
5-8year	11	22	12	24		
>8year	14	28	14	28		
<b>Area of Work</b>						
Medicine	13	26	04	8	4	12.34*
Surgery	22	44	20	40		
Emergency	11	22	25	50		
Maternity	04	8	01	2		
<b>Marital Status</b>						
Married	29	58	29	58	2	1.01 <sup>NS</sup>
Unmarried	21	42	21	10		
<b>Salary of Staff Nurses (Per Month)</b>						
<5000	02	4	01	2	3	8.94*
5001-15000	24	48	13	26		
15001-20000	12	24	10	20		
>20000	12	24	26	52		
<b>Religion</b>						
Hindu	06	12	12	24	3	49.80*
Sikh	07	14	33	66		
Muslim	00	0	02	4		
Christian	37	74	03	6		

Table 1 shows that majority of staff nurses who had attended in service education programme on PPTCT of HIV were in age group 20-24years (34%), were female (70%), GNM (80%), having 1-4year of experience (40%), from surgery wards (44%), married (58%), with 5001-15,000/- salary per month (48%), and Christians (74%).

Whereas the staff nurses who had not attended in-service education programme on PPTCT of HIV majority were in age group (30%) 26-30 years, females (90%), GNM (74%), having 1-4 years of experience (44%), from emergency ward (50%), married (58%), with salary > 20,000/- (52%) and Sikh (66%).

Table 2. Frequency and Percentage Distribution of Staff Nurses Attended and Not Attended In-Service Education Programme Regarding PPTCT of HIV According to Level of Knowledge. N=100

Level of Knowledge	Score	Knowledge Score			
		Attended		Not-attended	
		F	%	f	%
Excellent	≥32	1	2	0	0
Good	26-31	17	34	5	10
Average	20-25	22	44	26	52
Below average	<20	10	20	19	38

Max. Score=40

Min. Score=0

**Table 2** depicts that maximum (44%) of staff nurses who had attended in-service education programme on PPTCT of HIV obtained average knowledge score followed by (34%) good, (20%) below average and (2%) excellent. Whereas the maximum (52%) staff nurses who had not attended in-service education programme on PPTCT of HIV obtained average score followed by (38%) below average, (10%) good and none (0%) obtained excellent score.

Thus it is inferred that maximum number of staff nurses who had attended in-service education programme had average to good knowledge and those who had not attended in-service education programme had average to below average knowledge regarding PPTCT of HIV.

**Table 3. Mean, Mean Percentage and Rank Order of Knowledge Score of Staff Nurses Who Had Attended and Not-Attended In-Service Education Programme Regarding PPTCT of HIV According to Area of Knowledge. N=100**

Area of Knowledge	Max. Score	Knowledge Score					
		Attended			Not-attended		
		Mean Score	Mean%	Rank	Mean Score	Mean %	Rank
Introduction	7	5.36	76.5	1	3.94	56.2	2
Diagnosis	5	2.60	52	6	2.32	46.4	4
Prevention during							
Perinatal period	14	7.56	54	5	5.44	38.85	6
Breast Feeding	4	2.28	57	3	1.66	41.5	5
Screening	3	2.18	72.66	2	2.12	70.6	1
Drugs	7	3.92	56	4	3.74	53.42	3

Max. Score=40

Min. Score=0

Table 3 depicts that according to area of knowledge regarding PPTCT of HIV the mean percentage score of staff nurses who had attended in-service education programme on PPTCT of HIV was highest (76.5%) in 'introduction' followed by 72.66% in 'screening', 57% in 'prevention in breast feeding', 56% in 'drugs', 54% in 'prevention in perinatal period' and least (52%) in 'diagnosis'. Whereas the staff nurses who had not attended in service education programme on PPTCT of HIV was highest (70.6%) in 'screening' followed by 56.2% in 'introduction', 53.42% in 'drugs' and 46.4% in 'diagnosis', 41.5% in 'prevention in breast feeding' and least (38.85%) in 'prevention in perinatal period'.

Hence it can be concluded that staff nurses who had attended in-service education programme have rank 1 in area of introduction followed by rank 2 in screening, rank 3 in prevention in breast feeding, rank 4 in drugs, rank 5 in prevention in perinatal period, rank 6 in diagnosis. The staff nurses who have not-attended in-service education programme have rank 1 in screening followed by rank 2 in introduction, rank 3 in drugs, rank 4 in diagnosis, rank 5 in prevention in breast feeding, rank 6 in prevention in perinatal period. The deficit areas of knowledge were prevention during perinatal period, diagnosis, drugs and breast feeding.

Objective3. To compare the knowledge of staff nurses who had attended and not attended in-service education programme regarding PPTCT of HIV.

**Table 4. Comparison of Mean Knowledge Score of Staff Nurses Who Had Attended and Not Attended In-Service Education Programme Regarding PPTCT of HIV. N=100**

	n	KNOWLEDGESCORE			
		Mean	SD	df	Z
Attended	50	23.88	4.44	98	4.514*
Not-Attended	50	19.24	5.75		

Max. Score=40  
Min. Score=0

\*at p<0.05 level

**Table 4** depicts that the staff nurses who had attended in service education programme on PPTCT of HIV had mean knowledge score of 23.88 whereas the staff nurses who had not attended in service education programme on PPTCT of HIV had mean knowledge score of 19.24. Based on 'Z' test the difference in both the mean was found statistically significant at p< 0.05 level.

Hence, it is concluded that in service education programme on PPTCT of HIV had impact on knowledge of staff nurses who had attended it.

Table 5. Comparative Mean Knowledge Score of Staff Nurses Who Had Attended and Not Attended In-Service Education Programme Regarding PPTCT of HIV According to Age N=100

AGE	Knowledge Score							df	t
	Attended			Not-attended					
	n	Mean	SD	N	Mean	SD			
20-24	17	23.82	3.86	13	21.54	5.57	28	1.32 <sup>NS</sup>	
25-29	16	23.50	4.76	15	18.40	4.82	29	2.92*	
30-34	10	24.70	5.12	12	18.17	6.63	20	2.54*	
>34	07	23.71	4.88	10	18.80	6.17	15	1.75 <sup>NS</sup>	
		df	F		df	F			
	B/G	3	0.14 <sup>NS</sup>		3	0.95 <sup>NS</sup>			
	W/G	46			46				

Maximum score: 40

Minimum score: 0

\* at p&lt;0.05 level

NS= Non significant

Table 5 depicts that according to age the mean knowledge score of staff nurses who had attended in-service education programme on PPTCT of HIV was highest (24.70) in age group 30-34 years followed by 23.82 in 20-24 years, 23.71 in >34 years and 23.50 in 25-29 years. Staff nurses who had not attended in-service education programme on PPTCT of HIV had highest mean knowledge score (21.54) in 20-24 years followed by 18.80 in >34 years, 18.40 in 25-29 years and 18.17 in 30-34 years. The difference in mean knowledge score of staff nurses who had attended and not attended in service education programme on PPTCT of HIV having age 25-29 years and 30-34 years was found statistically significant at p<0.05 level. Whereas the difference in mean knowledge score of staff nurses who had attended and not attended in service education programme on PPTCT of HIV having age 20-24 years and > 34 years was found statistically non significant. Based on F test the calculated value of the staff nurses who had attended and not-attended in-service education programme regarding PPTCT of HIV is 0.14 and 0.95 at 3/46 degree of freedom respectively and was found statistically non significant at 0.05 level. Hence, it is concluded that age had no impact on knowledge of staff nurses who had attended and not attended in service education programme on PPTCT of HIV.

## DISCUSSION

The finding of the present study revealed that maximum (44%) of staff nurses who had attended in-service education programme on PPTCT obtain average knowledge score followed by (34%) good, (20%) below average and (2%) excellent which were consistent with the findings reported by Chizoma. M (2007)<sup>5</sup> that nurse/

midwives had average level of knowledge after attending in-service education programme regarding vertical transmission of HIV with mean score of 51.4%.

The findings of the present study revealed that the maximum (52%) of staff nurses who have not attended in-service education programme on PPTCT obtained average knowledge score followed by (38%) below average, (10%) good and (0%) excellent which were consistent with findings reported by H.J Viseer (2004)<sup>6</sup> which revealed that 30% of trained staff nurses had average knowledge regarding HIV/AIDS.

Findings of the present study revealed that staff nurses who have attended the in service education programme on PPTCT has mean of 23.88 whereas the staff nurses who have not attended in service education programme have mean of 19.24 and the difference in both the mean is found statistically significant at p < 0.05 level which were consistent with findings of the study reported by Melby et.al (1992)<sup>7</sup> that there is lack of knowledge found in staff nurses who had not attended in-service education programme regarding HIV/AIDS. Another study done by Chizoma. M (2007)<sup>8</sup> revealed that the staff nurses who had attended workshop on HIV prevention had higher knowledge from those who had not attended that workshop. Study done by William BA (2006)<sup>9</sup> revealed that the staff nurses attended in-service education had moderate level of knowledge.

## CONCLUSION

In the present study, the knowledge of staff nurses who had attended in-service education programme regarding PPTCT of HIV was found significantly higher

than the knowledge of staff nurses who had not attended in-service education programme regarding PPTCT of HIV. On the other hand there is no significant impact of age, gender, professional qualification, duration of experience, area of work, marital status, salary of staff nurses per month, religion on the knowledge of staff nurses who had attended and not attended in-service education programme regarding PPTCT of HIV.

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#### Ethical clearance

Permission from Medical Superintendent, Christian Medical College and Hospital, and DMC&H, Ludhiana was taken before starting the study. Written permission was taken from Nursing Superintendent of Christian Medical College and Hospital, and DMC&H. An informed verbal consent from staff nurses was taken.

**Conflict of Interest:** There is no conflict of interest.

**Source of Funding:** Self

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