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Research Protocol Abstract

The University of Pittsburgh School of Medicine proposes to enhance the third-year clinical clerkships' contribution to medical students' preparation to provide palliative care to cancer patients and others with advanced, life-limiting illnesses. The purpose of the third-year medical curriculum is not to produce the level of clinical expertise expected of residents or fellows. Rather, it is to provide students with opportunities to begin to apply—through observation, practice, and feedback—the principles of the physician-patient relationship, medical diagnosis, and treatment to the care of actual patients. The curriculum changes in this proposal aim to ensure that the principles that relate particularly to end-of-life care receive appropriate emphasis and reinforcement. The specific **outcome aims** of the proposal are to improve graduating students' (1) knowledge of core end-of-life tasks, (2) attitudes toward end-of-life care, (3) emotional comfort with dying patients, (4) satisfaction with their end-of-life instruction, and (5) feeling of preparedness to provide end-of-life care at the level of a medical intern. To achieve these outcomes, the proposal has the following **process aims**: (1) to provide faculty and residents with **teaching materials and pedagogical strategies** to help them take increased advantage of “teachable moments” related to end-of-life care in six required third-year clerkships: Medicine, Surgery, Clinical Neurosciences (Neurology and Psychiatry), Pediatrics, Family Medicine, and Ambulatory Care; (2) to develop and implement **web-based instructional technologies (ePortfolios)** that enable students to record systematically their exposure to end-of-life learning opportunities throughout the third year, and to receive just-in-time educational materials and feedback from faculty; (3) to match specific end-of-life learning objectives to the learning opportunities most likely to arise in particular clerkships, while **monitoring students' exposure to the full end-of-life curriculum across the clerkship year as a whole**; and (4) to provide **easily accessible, non-threatening settings** in which third-year medical students may explore their emotional reactions to their patients' terminal illnesses or deaths. Process and outcome measures for these aims include maintenance of a centralized data base of student and faculty web activity, faculty, resident, and student surveys, student focus groups, and administration of a palliative care knowledge and attitude survey to the entire medical school class upon entering medical school, at the end of Year 2, and upon graduation.

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A. SPECIFIC AIMS

Over the past four years the University of Pittsburgh School of Medicine has introduced significant changes in its curriculum for first- and second-year medical students, to improve the students' preparation to provide excellent care to patients near the end of life. While modifying the first- and second-year curriculum is a necessary first step toward a comprehensive approach to improving medical education for care near the end of life, it is *only* a first step. Whereas the first two years of medical school can establish the importance of end-of-life care within an overall vision of the physician's professional role, and can expose students to basic knowledge and principles, it is up to the third and fourth years—the clinical years—to begin to translate basic principles into clinical skills and behaviors. With this proposal we intend to take this next step.

The proposal focuses on **third-year medical students'** preparation to provide technically competent and compassionate end-of-life care, commensurate with their experience and knowledge at this level of training. We recognize that clinical skills for end-of-life care—as in any other aspect of medical care—continually develop throughout medical education, including residency and beyond. The purpose of the third- and fourth-year curriculum is not to produce the level of clinical expertise expected of residents or fellows. Rather, it is to provide students with opportunities to begin to apply—through observation, practice, and feedback—the principles of the physician-patient relationship, medical diagnosis, and treatment to the care of actual patients. With this proposal we want to ensure that the principles that relate particularly to end-of-life care receive appropriate emphasis and reinforcement

We have **outcome aims** and **process aims** in this proposal.

OUTCOME AIMS

- A.1. Improve graduating students' **knowledge** about core clinical tasks in the care of dying patients, relative to their baseline knowledge at the end of their second year, and relative to baseline measures of graduating medical students obtained prior to our intervention. Specifically, students will demonstrate improvement in their knowledge of:
 - i. principles of communication with patients about bad news, and about the patient's goals of care when cure of the patient's disease is no longer a realistic possibility;
 - ii. assessment and basic treatment for common physical symptoms of advanced disease;
 - iii. recognition of emotional, existential, and spiritual distress in patients and families with advanced disease.
- A.2. Improve graduating students' **attitudes** about the importance of the physician's role in the care of dying patients, relative to their baseline attitudes at the end of the second year, and relative to baseline measures of graduating medical students obtained prior to our intervention.
- A.3. Ensure that medical students graduating from the University of Pittsburgh School of Medicine demonstrate a greater level of **emotional comfort** with dying patients, relative to baseline measures of graduating medical students obtained prior to our intervention.
- A.4. Improve graduating students' **satisfaction** with the quality of their end-of-life instruction in their clinical rotations, relative to baseline measures of graduating medical students obtained prior to our intervention.
- A.5. Ensure that all students graduating from the University of Pittsburgh School of Medicine feel **adequately prepared** to care for dying patients at the level of a medical intern.

To achieve these outcome aims, we will pursue more immediate **process aims** of **curriculum change** and **faculty development**. The specific process aims we have chosen to pursue flow from the following assumptions, which we develop more fully in the next section:

- In addition to the explicit, formal curriculum for the clinical years of medical school, there is a highly influential informal, or "hidden," curriculum that students learn when they observe the behaviors, priorities, and reward systems of their faculty and resident role models.
- The third-year clinical clerkships contain many opportunities to introduce medical students to the principles and practices of good end-of-life care, but these opportunities are frequently missed because the general clerkship faculty—who have, for the most part, no special training or expertise in palliative care—lack the time, motivation, and pedagogical resources to take maximum advantage of them.
- Clerkship faculty underestimate the potential educational significance of students' emotional reactions to patients' deaths, and the value of helping students respond to them in ways that enhance the students' capacity and willingness to form close therapeutic relationships.

Accordingly, our process aims are as follows.

PROCESS AIMS

- B.1. Provide clerkship faculty and residents with **teaching materials and pedagogical strategies** to help them take increased advantage of “teachable moments” related to end-of-life care that arise in the day-to-day teaching routines in the third-year clinical clerkships in Medicine, Surgery, Clinical Neurosciences (Neurology and Psychiatry), Pediatrics, Family Medicine, and Ambulatory Care.
- B.2. Develop and implement **web-based instructional technologies (ePortfolios)** that enable students to record systematically their exposure to end-of-life learning opportunities throughout the third year, and to receive just-in-time educational materials and feedback from faculty to reinforce their knowledge of the end-of-life skills to which they are exposed.
- B.3. **Match specific end-of-life learning objectives to the learning opportunities most likely to arise in particular clerkships**, while monitoring **students’ exposure to the full end-of-life curriculum** across the clerkship year as a whole.
- B.4. Provide **easily accessible, non-threatening settings** in which third-year medical students may explore their emotional reactions to their patients’ terminal illnesses or deaths.

B. BACKGROUND AND SIGNIFICANCE

The resources exist for realizing the vision of skilled and compassionate care for patients at the end of life and their families; it is now up to academic health center faculty and leaders to take on the task of translating good intentions into action.¹

From 1997 to 2001 the Institute of Medicine and the National Cancer Policy Board issued a series of reports calling attention to serious deficiencies in the care of individuals with advanced life-threatening illness.²⁻⁴ The reports recommended a number of reforms in research, the organization of clinical care, and professional education “to ensure quality of care at the end of life, in particular, the management of cancer-related pain and timely referral to palliative and hospice care.”³ In its latest report the National Cancer Policy Board succinctly summarized the plight of cancer sufferers, whose problems make the need for reform so urgent:

For at least half of those dying from cancer, death entails a spectrum of symptoms, including pain, labored breathing, distress, nausea, confusion, and other physical and psychological conditions that go untreated or undertreated and vastly diminish the quality of their remaining days. Patients, their families, and caregivers all suffer from the inadequate care available to patients in pain and distress, although the magnitude of these burdens is only now being described.^{4, p. 3}

Among the seven barriers to excellent palliative and end-of-life care identified in the Board’s 2001 report, number 2 is “*inadequate training of health care personnel in symptom management and other end-of-life care skills.*” The Board noted that as recently as 2000 financial support for end-of-life education was very low, and largely provided by private foundations, with little from federal sources. As a result, “most new physicians leave medical school and residency programs with little training or experience in caring for dying patients. ...Contact with dying patients, particularly for undergraduate medical students, if any, is limited.”^{4, pp. 19-20}

In this section we present data to show that current approaches to medical student education in the clinical years are failing to prepare students to care for dying patients. We will proceed in the following way:

1. The evidence that graduating medical students themselves feel unprepared to provide end-of-life care
2. The evidence for the most likely causes of students’ lack of preparation:
 - (a) The low quality of end-of-life instruction
 - (b) Lack of emotional support
 - (c) Negative impact of the informal, hidden curriculum
 - (d) The general clerkship faculty’s lack of resources for end-of-life teaching
3. Current efforts at reform and the distinctiveness of our proposal

1. Medical students report that they are not prepared to provide end-of-life care

Sullivan, Lakoma, and Block¹ have reported the most extensive data on medical students’ perceptions of their end-of-life education. They confidentially surveyed a national probability sample of 1455 fourth-year medical students by telephone in 1997. Only 18% had taken a formal course in end-of-life care, and only 8% had completed a clerkship in that area. Comparing the amount of attention instructors paid to end-of-life issues to the attention they paid to other clinical problems

(e.g., lupus and sepsis), with 0 = “no teaching” and 10 = “a lot of teaching,” the students’ mean rating for coverage of end-of-life care was 3.9, for lupus, 6.2, and sepsis, 6.3. When they were specifically asked how prepared they felt to provide various aspects of end-of-life care, the percentages of fourth-year students who responded **“not very well” or “not well at all”** for the following tasks were:

- Managing pain for a dying patient: 27%
- Addressing patients’ thoughts and fears about dying: 39%
- Addressing cultural issues related to the end of life: 55%
- Addressing spiritual issues: 49%
- Helping families during bereavement: 46%

An earlier survey of 102 senior medical students at Michigan State University⁵ revealed that

- 33% rated as inadequate their understanding of physicians’ role in palliative care
- 46% rated as inadequate instruction on assessing symptoms in the terminally ill
- 60% rated as inadequate instruction on implementation of palliative care plans

Surveying fourth-year students from six medical schools, Fraser, Kutner, and Pfeifer⁶ found, for a set of end-of-life competencies considered appropriate for graduating medical students by a working group of the National Consensus Conference on Medical Education for Care Near the End of Life,⁷ that the percentages of respondents who felt prepared by their education ranged between 22% and 53%. Significantly for our proposal’s emphasis on the third-year curriculum, 45.9% of these students identified *clinical rotations* as the most important component of their training for learning these skills, far more important than basic science courses, problem-based learning sessions, or formal courses in patient interviewing.

There is evidence that four factors contribute to students’ lack of confidence in their preparation for end-of-life care: (a) students perceive teaching about end-of-life care to be of lower quality than teaching on other subjects; (b) students are poorly supported in their emotional reactions to caring for dying patients; (c) the informal, hidden curriculum discourages students from developing the necessary skills and attitudes for end-of-life care; and (d) the general clerkship faculty lack the appropriate time, settings, and resources to address end-of-life topics in a timely or effective manner.

2(a). Students rate end-of-life instruction as of lower quality than other subjects

Sullivan, et al¹ asked their fourth-year student respondents to rate both the quality of teaching on end-of-life care and the quality of teaching in general at their medical school. While 80% rated the overall quality of teaching at their school as “excellent” or “very good,” only 38% gave those ratings to end-of-life care teaching. A survey of graduating medical students at Georgetown University and the Mayo Medical School revealed that fewer than half (48%) believed they had adequate role models for how to discuss end-of-life issues with patients; only 41% felt prepared to discuss advance directives.⁸

A more objective measure of the quality of teaching is the amount of supervision and feedback students receive for particular clinical tasks. Sullivan et al¹ asked the fourth-year students how often they received *no feedback at all* after performing various tasks. Their results showed that of the 71% of the students who performed a lumbar puncture, only 2% reported receiving no feedback. However, of the 49% who had given a patient bad news (i.e., the existence or recurrence of a life-threatening condition), 48% never received feedback; and of the 58% who spoke with a patient about their wishes for end-of-life care, 53% received no feedback on their conduct in that discussion. Sullivan et al conclude, “In the clinical arena students are systematically protected from, or deprived of opportunities to learn from caring for dying patients. When they do participate in this care, they lack role models with expertise to learn from, as well as feedback and support that facilitate clinical growth.”^{1, p. 691}

2(b). Students are poorly supported in their emotional reactions to death and loss

Encounters with dying patients are often emotionally charged, even for seasoned physicians. Mount⁹ and Meier, Back, and Morrison¹⁰ have catalogued a wide range of physiological, psychological, and social manifestations of stress in physicians who work with patients who die. MacLeod,¹¹ interviewing physicians from internal medicine, family medicine, geriatrics, and palliative care with experience ranging from 0 to 40 years noted that “these doctors remembered [incidents when patients died] that may have happened 20 years ago and yet they could describe events in detail as if they occurred yesterday.” Samples from MacLeod’s interviews:

- “I don’t think there was anything so gruesome. I drove home and saw this chap’s face in front of me all the time. ...I was really stunned, absolutely stunned. ...I just burst into tears. It was really shocking and I don’t know how

to handle it.” (Internist with five years in practice)

- “I cried and cried. ...I still find myself absolutely terrified by the thought of my own dying. ...I am afraid of death, of my own death.” (Internist with three years in practice)
- “I was a GP and visited [the patient] daily for weeks. I could still describe the room, the medications, the dog, the care, even his clothes! ...Despite knowing that he was dying, when it came, I was devastated.” (Palliative medicine specialist with sixteen years in practice)

For medical students, early exposures to patients’ deaths can be particularly challenging emotionally. For them, the common feelings of shock, anxiety, or guilt when someone dies are aggravated by uncertainty about the appropriateness of these feelings in their new professional environment.¹² Branch, et al,¹³ reviewing 100 “critical incident reports” written by third-year medical students, found that students were confused about the proper balance between empathy for their dying patients and professional acculturation. After witnessing a failed resuscitation attempt one student described “wander[ing] around looking for someone to explain,” and continued:

I was not really sure what I wanted to ask anyway—not about the medical reasons for what was done. What I wanted to know was how it felt to be invading someone’s body when there was so little chance of it being any use. And how to switch quickly from being intensely involved in something so personal as death, to acting business-as-usual.”

The dominant ethos of medical education is to discourage open acknowledgement of emotional reactions to patient care, and especially to emotional responses to patient deaths.¹⁴⁻¹⁸ Summarizing this literature, Novack, Epstein, and Paulsen wrote:

Like soldiers on a battlefield, students must often deal with their emotions alone, or in chance discussions with colleagues and friends. Many learn to protect themselves and survive, but at the cost of distancing themselves emotionally from patients and peers, and consequently from the greatest satisfactions of clinical care. An unacceptable number of medical students and practicing physicians experience burnout, addictions, and emotional impairment.^{19, pp. 516-517}

There is a growing consensus among medical educators that, for reasons both of personal well-being and professional effectiveness, medical students should have more opportunities and support for recognizing and reflecting upon the emotional consequences of their clinical experiences.^{10-11, 20-24} Meier, Back, and Morrison¹⁰ propose a stepwise process of “self-monitoring and reflection,” and go so far as to argue that such a process is a professional obligation, because “physician feelings are normal and inevitable and...these feelings influence behavior.” The process they suggest—which includes recognizing and symbolizing the feelings in words; accepting them; and reflecting on their potential consequences in a safe and confidential professional setting—is designed to “protect our patients (and ourselves) from the consequences of unexamined impulses.”

The reality for many medical students, however, is that they are left to deal with their emotions without support. Our palliative care faculty collaborated in a study of students’ reactions to their first patient deaths during clinical rotations.²⁵ Of 36 randomly selected third-year students at two US medical schools who were interviewed for 60-90 minutes with open-ended and structured questions, 57% rated the impact of their first death as *highly emotionally powerful*, and 25% of these students rated the amount of support they received from supervisors as *extremely inadequate*. Only 37% of patient deaths were discussed with attending physicians, and 40% of these focused solely on medical details. Students commonly perceived from their supervisors that both death and emotions are negative aspects of medicine.

2(c). The informal, hidden curriculum discourages students from developing the skills and attitudes required for end-of-life care

The processes that influence medical students to avoid or conceal their emotional reactions to dying patients are part of a broader phenomenon: the outside-the-classroom messages and cues that students receive—from faculty, residents, and the everyday routines and structures of their education—that convey to them the “real” values and priorities of their new profession, regardless of what they may be taught in formal courses. Hafferty and others refer to this process of socialization and acculturation as *the informal and hidden curriculum*.^{26, 27}

While there are no studies bearing directly on the deleterious effects of the informal and hidden curriculum on students’ abilities or enthusiasm for end-of-life care, the indirect evidence is strongly suggestive. Section 2(b) presented evidence that medical school discourages students’ active awareness of their emotional reactions to patients’ deaths. This very plausibly contributes to the students’ tendencies to avoid becoming involved in the care of dying patients, with the unsurprising result (reported in section #1) that most graduating students feel unprepared to provide such care.

In addition to attention to one’s own emotions, palliative care places a premium on concern for patients’ and families’

psychosocial needs. It also frequently requires physicians to be involved in ethical decision making, and to take seriously their own and their patients' deepest values. In light of these aspects of palliative care, two other lines of research reinforce the idea that academic medicine's hidden curriculum negatively affects students' preparation for the care of dying patients.

The first line of research concerns what has been called academic medicine's "chilly climate" for primary care.²⁸ Primary care emphasizes a psychosocial rather than technical orientation in clinical practice: e.g, the physician-patient relationship, attention to psychological, social, and cultural factors in illness. These are precisely the characteristics that are critical to good care of dying patients. Yet several studies during the 1980s and 1990s documented a decline in medical students' interest in primary care over the four years of medical school, and many investigators attributed this to the culture of medical education.²⁹⁻³² Block et al^{28, 32} and Zinn et al³³ found that medical students who chose primary care as a career tended to come from medical schools where there was positive regard for the competence and role of the generalist, for primary care-related research, and as much support for a "socioemotional" as for a "technical" practice orientation. By contrast, students tended not to choose primary care when they had more negative attitudes toward the psychosocial and emotional aspects of clinical practice, and when their educational environment tended to denigrate generalists as compared to specialists. As the attitudes and values conducive to a career in primary care are similar to those leading to enthusiasm for palliative care, these findings suggest that the overall culture of medical school—the source of the informal or hidden curriculum—is a valid focus of concern to end-of-life educators.

The second line of research concerns the negative impact of medical education on another core element of good care of dying patients, namely, students' concern for professionalism, values, and ethical decision making. Many early studies that purported to show an increase in medical student "cynicism" have been criticized on methodological grounds.³⁴⁻³⁶ Several more recent reports, however, raise concerns of direct relevance to this proposal. Christakis and Feudtner^{16, 37, 38} reviewed medical students' essays about ethical dilemmas encountered during clinical clerkships. Among the behaviors and attitudes the essays revealed were disregard of the trainees' and patients' values; undue deference to authority; resentment and "turfing" of psychosocial tasks; social isolation; and emotional estrangement. Supporting the findings of Hafferty and Franks^{26, 27} on the influence of the informal and hidden curriculum, Christakis and Feudtner conclude,

For physicians in training to uphold their most noble values, they must have more than just an education in bioethical principles or a clarification of values. They must have the social resources and emotional capabilities to carry out the proper course of action. Current medical training, however, with its abundance of fleeting encounters and poverty of enduring relationships, does little to provide these necessary social resources or to enhance the emotional capabilities of trainees.^{38, p. 743}

There is evidence that inpatient medicine-surgery clerkships can reinforce inaccurate negative stereotypes of certain patient groups. In examples with implications for the subject matter of our proposal, students who completed a 16-week medicine-surgery clerkship over one year at the University of Kentucky significantly overestimated the percentage of elderly over the age of 75 who are demented, underestimated the percentage who can live independently, and overestimated the percentage of chronic pain patients who are drug seekers.³⁹ Finally, in Parsons et al's study of medical students' use of humor during clinical clerkships,⁴⁰ they found that humor—often in the form of derogatory slang and other remarks about patients—is used to blend in with what the students perceive to be the mainstream culture of the hospital, and as a way to cope with stressful experiences. The authors suggest that their findings bolster recommendations by others for the use of small group discussions and "ethical debriefings" after stressful clinical encounters, as a way of fostering more constructive coping mechanisms.^{23, 41, 42}

2(d). General clerkship faculty lack the appropriate time, settings, and resources to address end-of-life topics in a timely or effective manner

As described in the Cancer Education Program Plan, one of our initial steps in this proposal is a detailed survey of our clinical faculty to learn their perceptions of the barriers to teaching palliative care to medical students. It is reasonable to suggest, however, based on the literature reviewed above and preliminary focus group data at our own institution, that even well-motivated clinical faculty need support in the following areas, which are the major emphases of our proposal:

a. Appropriate settings:

End-of-life teaching can and should take place in all of the typical clerkship settings, e.g., bedside rounds, morning report, didactic sessions, case conferences, and individualized mentoring. These settings should permit students to learn about care of dying patients at three levels: the scientific knowledge base of patient assessment and symptom management; communication with patients and families; and recognition and processing of emotional reactions.

b. Useful teaching tools

To take advantage of learning opportunities that arise in the various settings, faculty need a “tool kit,” that is, relevant, easy-to-use, and authoritative teaching materials—such as lecture slides, clinical protocols, role-play scenarios, references, —that they can introduce either in a pre-arranged didactic lecture, or in response to real-time clinical encounters.

c. Mechanisms to monitor and evaluate student progress

Even though there is a broad consensus on the content of the end-of-life curriculum appropriate for graduating medical students,⁴³⁻⁴⁵ what any student actually encounters in his or her clerkships will depend not only on the interests of faculty, but also on the characteristics of the patients who happen to be in the hospital, clinic, or doctor’s office at the time the student rotates there. Mechanisms are needed to keep track of the breadth and depth of students’ exposure to the various elements of end-of-life care over the course of the entire year.

d. End of life teaching “across the curriculum”

The power and pervasiveness of the informal and hidden curriculum argue strongly against segregating end-of-life teaching in a single, specialized unit, even though this is currently the typical approach. While there is certainly a value in a focused immersion in the subject (and we offer such an experience ourselves as a fourth-year elective), the danger in making a single unit the only form of end-of-life teaching is that its effects will be washed out or overwhelmed by the sorts of influences described in sections 2(b) and 2(c). A plausible antidote to that threat would be more consistent reinforcement of knowledge, skills, and attitudes in various settings across the entire clerkship year.

3. Current efforts at reform and the distinctiveness of our proposal

a. Current approaches to teaching end-of-life care to third-year medical students

We believe that the optimal end-of-life teaching program for third-year medical students—

- Is a required part of the curriculum, rather than elective
- Combines cognitive, skill-based, and emotional aspects of care of the dying
- Includes faculty development
- Rests on a foundation of end-of-life teaching in the preclinical years
- Is consistently reinforced throughout the year, rather than a single concentrated exposure

We reviewed the published reports of end-of-life teaching initiatives for third-year medical students from 1991 to the present. The results of our review are presented in **Table 1**.

Table 1. Clinical Education for End-of-Life Care

Institution	Required / Elective	Cognitive	Skills	Emotions	Faculty Development	Preclinical Foundation	All Year
Wayne State ⁴⁶	R	Yes	Yes	Yes	No	No	No
U of Mass ⁴⁷	E	Yes	Yes	No	No	No	No
London Hospital ⁴⁸	E	Yes	Yes	Yes	No	No	No
Weill-Cornell ⁴⁹	R	Yes	Yes	Yes	No	No	No
Washington U. ⁵⁰	E	Yes	Yes	No	No	No	No
Emory U. ⁵¹	R	Yes	No	No	No	No	No
U of Tenn. ^{52, 53}	R	Yes	No	No	No	No	No
University of Colorado ⁵⁴	E	Yes	Yes	No	No	No	No
University of Miami ⁵⁵	R	Yes	Yes	Yes	No	No	No
Medical College of Wisconsin ⁵⁶	E	Yes	Yes	Yes	Yes	Yes	No
Southern Illinois ⁵⁷	E	Yes	Yes	Yes	No	No	No
Thomas Jefferson U ⁵⁸	E	Yes	Yes	No	No	No	No
Yale ⁵⁹	E	Yes	Yes	No	No	No	No
U.of Rochester ⁶⁰		Yes	Yes	No	No	Yes	Yes
U.of Arizona ⁶¹	E	Yes	Yes	No	No	No	No
University of Maryland ⁶²	R	Yes	Yes	Yes	No	Yes	No
U.of North Dakota ⁶³	E	Yes	Yes	Yes	No	No	No
U of California, San Diego ⁶⁴	E	Yes	Yes	Yes	Yes	Yes	No
Oregon Health Sc. ⁶⁵	R	Yes	Yes	No	No	Yes	No

As the table shows, very few programs satisfy all of these criteria. The three programs that come the closest, and which we consider to be the present state-of-the-art, are at the University of Maryland, the University of Rochester, and the University of California at San Diego.

The clinical program at Maryland builds on preclinical foundations, combines affective, cognitive, and behavioral learning, and is a required component of the internal medicine clerkship. The program at Rochester requires third-year medical students to participate in three palliative care-oriented biopsychosocial mortality and morbidity conferences, one following each of the paired clerkships in obstetrics-gynecology/pediatrics, neurology/ psychiatry, and medicine/surgery. These conferences attend to students' emotional reactions as well as to clinical aspects of terminal illness. This program is nested within an integrated curriculum that includes required elements in years 1 and 2, and electives in year 4. The most recent program, at California-San Diego, is, like Maryland's a palliative care segment within the required Internal Medicine rotation. It consists of two classroom days, one day on an inpatient palliative care unit, and one day making home visits to terminally ill patients. In addition to their clinical and didactic experiences, students are encouraged to address their emotional reactions through a "personal reflection project." The program includes faculty development in the form of faculty meetings to review ongoing teaching and provide peer support.

As strong as these programs are, we believe the approaches they exemplify suffer from *three significant limitations*, which we hope to improve upon in our proposal. *First*, we believe that concentrating end-of-life education in a very short course, while leaving the rest of the clerkships to "business as usual," ignores the powerful effects of the hidden and informal curriculum. There is a real danger that the positive effects of a few hours or days of palliative care experience—no matter how intense—will be washed out or overwhelmed by the predominant routines, priorities, and attitudes that students encounter throughout the rest of their clerkship year. *Second*, a short, concentrated palliative care experience aggravates a more general limitation of all clinical teaching: dependence on the patient mix on a ward at the particular time a student happens to be there. There is a real danger that many facets of good care of the dying will be unaddressed, simply because on the day (or two) that the student is present, the available patients do not raise those issues. *Third*, by focusing exclusively on patients who are already "dying," students in a separate, dedicated palliative care rotation miss what is often most challenging about palliative care, namely, the vague and subtle transitions and changes of goals characteristic of chronic degenerative disease. These are more likely to be encountered in the more general rotations, and for this reason we believe it is preferable to equip the clinical preceptors on those rotations to take better advantage of those teachable moments. In the Program Plan below, we describe in detail how we intend to achieve these objectives.

At the same time, we want our proposal to *preserve* what we see as important *strengths* of these three programs. One strength is that these programs rely primarily if not exclusively on palliative medicine specialists to do the teaching, ensuring students' exposure to appropriate role models. In our proposal, our specialist palliative medicine faculty will also play prominent roles. In addition to their availability as preceptors to students during palliative care consultations for the students' patients, our specialist faculty will (1) conduct resident and faculty development seminars for the general clinical faculty to make sure the non-specialist faculty have state-of-the-art educational material (**Process Aim B.1**) and (2) respond directly to students with advice and feedback on specific end-of-life patient encounters via the two-way communication capability of the web-based ePortfolios (**Process Aim B.2**).

A second strength of the Maryland, San Diego, and Rochester programs is quality control, stemming from the fact that the teaching settings are under the complete control of the palliative care programs. In our proposal, our specialist palliative medicine faculty will monitor the actual experiences our students are having with end-of-life care by reviewing and responding to the students' ePortfolios, and will supply the non-specialist clinical faculty and residents who are supervising those students with the same state-of-the-art clinical information that we send to the students (see **Process Aim B.2**, and the Program Plan below). Keeping the non-specialist faculty in the email communication loop between the students and the specialist faculty reinforces our faculty development aim (**Process Aim B.1**) as well.

b. Current strategies to address students' emotions during clinical rotations

Although the literature cited above suggests that the prevailing culture of medical education makes it difficult to help students with their emotional reactions to patient care, it is not impossible. Branch et al¹³ describe their use of written "critical incident reports" as a vehicle for students to reflect on significant patient encounters, especially those that test their ability to balance empathy with appropriate professional distance. In a later report, Branch et al²⁰ describe a five-step approach to what they call "active learning of humanism" that elaborates on the critical incident method, and discuss ways to incorporate attention to emotion in clinical teaching. Novack et al,⁶⁶ writing for the Working Group on Personal Awareness of the American Academy on Physician and Patient, present a full curriculum, delivered in a group discussion format, in which residents or medical students can examine attitudes and feelings connected to various types of clinical encounters, as well as the stresses of medical training itself. And Lewin and Lanken²² describe small-group courses in ethics, humanism, and professionalism for

students in the first clinical year at Case Western Reserve University and the University of Pennsylvania, respectively, developed as part of the UME-21 medical education initiative.

We believe that, with this generation of computer-savvy medical students, there is great potential in using interactive web-based instructional technologies to facilitate students' expression and reflection on their emotional experiences. Since use of the web figures prominently in other aspects of our proposal as well, we next present an overview of current web-based instructional technologies in medical education.

c. Current web-based technologies for just-in-time, interactive learning

We intend to develop on-line forms for tracking students' exposure to end-of-life learning opportunities, with two-way communication to facilitate faculty feedback and exchange of educational materials. This approach not only fits the particular aims of our proposal, but also makes our proposal *transferable* to other institutions, as the necessary technologies are currently in use in many medical education settings.

Chumley-Jones et al⁶⁷ evaluated 39 articles examining web-based learning (WBL) in the medical community. They found that WBL is a valuable addition to the educational armory, and that most students welcome the concept and give it high satisfaction ratings. The concept of an **electronic portfolio** ("**ePortfolio**") is also coming into its own. The idea of maintaining a portfolio or logbook for educational purposes is an older concept.^{68, 69} Banks⁷⁰ has defined an "ePortfolio" as "an electronic format for learners to record their work, their achievements and their goals, to reflect on their learning, and to share and be supported in this..." Benefits include, "providing a learner-centered rather than course-centered view of learning, reflection on activities and planning future direction, linking achievement with skill, providing lifelong learning and continued professional development." Cotteril⁷¹ notes in his survey that 80% of users agree their ePortfolio was a useful learning experience, and that 83% feel their ePortfolio helped them gather good evidence of their learning progression.

A documented advantage of electronic portfolios programs is their method of treating medical students more like adult learners capable of reflective, self-guided study.⁷²⁻⁷³ Extended electronic dialogue and interaction provides a way to focus on "identifying learning problems so that remediation can take place."⁶⁹ This contributes to the learner-centered, personalized benefits of an online recording tool.⁷² Patil⁶⁹ also details how such close supervision of students could benefit instructors by giving them feedback about the educational techniques and opportunities that are most effective for teaching. One of the best features of the technology is its flexibility and capacity to teach non-traditional topics as well as standard ones.

The University of Manchester has implemented the use of ePortfolios, under the title Skills Base, in their medical school curriculum. Curriculum overview and training materials were incorporated into Skills Base directly or as links to existing internet sources. Curriculum competence standards included checklists used in clinical examinations. A panel of skills experts was recruited to answer any questions students posed by email.⁷³ At McGill University, Duque^{72, 74} studied the use of an ePortfolio during clinical clerkships. The ePortfolio contains a list of skills and attitudes which the students are expected to achieve by the conclusion of the rotation. Students post their self-evaluations and action plans in their ePortfolios every time they perform or demonstrate one of the skills or attitudes. Tutors post feedback and comments to their assigned students. Duque found that the use of the ePortfolio "encourages participation of medical students in their own assessment as well as their tutors' involvement in active feedback for their trainees." McGill now includes an ePortfolio in the geriatric clerkship.

C. PRELIMINARY ACTIVITIES

In this section we describe 1) the resources in palliative care that we have at our School of Medicine that are the basis for our proposal, (2) programs we have already implemented to improve end-of-life education in the first two years of the curriculum, (3) evidence that end-of-life education for our third- and fourth-year students is still deficient, (4) our resources in instructional technology, and (5) the support of key faculty and administrators.

1. We have strong clinical and educational programs in palliative care

This proposal originates in the Section of Palliative Care and Medical Ethics at the University of Pittsburgh, a high-volume clinical service and a national leader in palliative care education and research. The Section was included in the Robert Wood Johnson and Milbank Foundation 2000 publication, "Pioneering Programs in Palliative Care."⁷⁵ It is one of three programs awarded an AHRQ grant entitled "Enhancing Regional Access to High Quality End-of-Life and Palliative Care Services" in cooperation with the Hospital Alliance of Pennsylvania, and has received a grant from the Project on Death in America and the Kornfeld Foundation to establish a Palliative Medicine Fellowship Program. The American Board of Hospice and Palliative Medicine has accredited this program in its first round of program evaluations. For details of our **clinical programs** in palliative care, and the opportunities they provide for teaching, see the **Resources Page, part 1.A.**

Since June 2003, the program's **education and research activities** have been conducted through the University of Pittsburgh Institute to Enhance Palliative Care. David Barnard, the Principal Investigator for this proposal, is Director of the Institute. The Institute is a collaboration between the University and Family Hospice and Palliative Care (FHPC), a large community-based hospice and palliative care program with an average daily census of 200 patients—both children and adults—and inpatient hospice contracts with 24 hospitals and 40 skilled nursing facilities. Rafael Sciallo, MSW, President of FHPC and a co-director of the Institute, is also a past President of the Board of the National Hospice and Palliative Care Organization. FHPC is a key training site for the University of Pittsburgh's medical and nursing schools, as well as other area nursing and pharmacy schools and residency programs. Details of our **current educational programs** are in the **Resources Page, part 1.B.**

Additional evidence of the strength and visibility of our educational program is the fact that students and residents who have trained with us have authored or co-authored a significant number of the "Fast Facts and Concepts" in palliative care that are posted on the EPERC website (www.eperc.mcw.edu), which is the leading on-line resource for peer-reviewed palliative care educational materials.

2. We have laid a strong foundation for our proposal with previous work in the preclinical curriculum

As noted in the introduction to our Specific Aims, with prior NCI grant support (R25 CA090595) we have spent the last four years laying the groundwork for our clinical education proposal by developing and implementing a new end-of-life curriculum for first- and second-year medical students. The relevant Specific Aims of that project were:

1. To increase students' exposure to the scientific and humanistic knowledge necessary for excellent end-of-life care.
2. To increase students' scientific and humanistic knowledge related to end-of-life care.
3. To develop and implement learning experiences that provide students with prolonged exposure to dying patients.
4. To instill in medical students understanding and acceptance of the importance in the physician's role of providing effective and compassionate end-of-life care.

To accomplish these goals we have already implemented the following new programs for our pre-clinical students:

Problem-Based-Learning Cases and The First-Year Oncology Course

Table 2 shows how we have modified Problem-Based-Learning (PBL) cases, and added additional lecture material and examination questions in several of the *required* basic science courses. The new PBL materials introduced learning objectives and clinical scenarios that emphasize end-of-life issues, across the curriculum. By including test questions based on this material we reinforce the subject's importance. Examples of the new material are included in **Appendix A.**

Table 3 summarizes the elements of a four-hour palliative care block within the required first-year course in oncology.

Course	Modified PBL	Questions on Final Exam	Lecture Materials
Human Body	X		
Cell Structure		X	
Genetics	X	X	
Cell Signaling	X	X	
Immunology	X		
Host Defenses - Hem	X		
Host Defenses – Onco	X	X	X
Second-Year Basic Science Courses			
Body Fluids	X	X	
Pulmonary			X

Class Session 1:
<ul style="list-style-type: none"> • Palliative care MD interview of patient who is making the transition from therapy with curative intent to palliative care • Psychiatrist interview of a bereaved man whose wife of 52 years has died three months prior
Class Session 2:
<ul style="list-style-type: none"> • Panel of third-and fourth-year students describe their experiences of patient deaths during their clerkships • Small group discussions of the above, with faculty and guest facilitators

Repro Bio	X (next year)		
Neuroscience	X		

The students' reactions to the oncology sessions were very positive. Of 73 written evaluations in which students rated the strengths and weaknesses of the oncology course as a whole, 20 included explicit references to this block, with 18 mentioning it as a strength, and only 2 mentioning it as a weakness. Student feedback, elicited immediately following the student panel and small group discussion, included these comments:

- “The panel of medical students was key—it made us listen.”
- “It makes it OK to bring the subjects [of death and grief] up among ourselves.”
- “It’s important that this was in our [required science course], part of the ‘real curriculum.’ It shows us that we should take this seriously.”
- “*I hope you’ll give us opportunities like this when we will need it more, like when we are on our clerkships.*” (emphasis added)

Longitudinal Elective

We have also created a new, increasingly popular elective course for first-year students, in which the students spend an entire semester making home visits to a critically ill or dying patient, in order to learn first-hand from the patient and family about the personal dimensions of serious illness, loss, and bereavement. In addition to the home visits (which are interrupted in some cases by the patient’s death), students meet regularly in small groups to discuss what they have learned, and to explore their own emotional reactions to critical illness, death, and loss. They also write a 15-20 page narrative based on their patient’s experiences and their personal reactions to the course. From an initial enrollment of 12 in 2002, the course has grown to 19 students in 2003 and 2004. **Tables 4 and 5** show some of our evaluation data.

Table 4: Evaluations, Academic Years 2002 and 2003

Visiting with your patient							
Not at all valuable	1	2	3	4	5	6	Very valuable
7							
	1(4%)				4(16%)	5(20%)	15(60%)
Assigned readings							
Not at all valuable	1	2	3	4	5	6	Very valuable
7							
			1(4%)	3(12%)	8(32%)	12(48%)	1(4%)
Writing assignments							
Not at all valuable	1	2	3	4	5	6	Very valuable
7							
			2(8%)	3(12%)	4(16%)	10(40%)	6(24%)
Would you recommend the elective to other students?							
Absolutely not	1	2	3	4	5	6	Definitely
7							
				2(8%)	3(12%)	7(28%)	13(53%)

Table 5: A Representative Student Comment

“Nothing I have learned this year in the basic sciences will leave an impression on me as this experience. The realization of my ignorance in the realm of palliative care and how much more I need to learn still astounds me. Yet I feel that I have a framework now with which to approach the issues of terminal disease, the dying patient, the surviving family members, palliation, and bereavement.”

The student’s comment in **Table 5** illustrates how this course relates to our present proposal. This student is sensitized to important aspects of caring for dying patients, wants to learn more in the future, and feels prepared to do so.

3. Despite progress in Years 1 and 2, our end-of-life teaching in the clinical years is still deficient

As a preliminary needs assessment, and to determine a baseline for program evaluation, we have collected survey data on knowledge, attitudes, and perceptions of end-of-life education from our graduating medical students for the past four years. We have data from 310 students, for an overall response rate of 52.5% for the four years. (Year-by-year response rates were: 73.1% in 2001; 48.2% in 2002; 44.4% in 2003; and 41.9% in 2004.) Some of our survey questions are the same as those used by Sullivan et al¹ in their national telephone survey, giving us an opportunity to compare our students with the national sample. Our results, in fact, paint a similar picture. Just as in the national sample, our students compare their end-of-life

education unfavorably to their overall education, and feel inadequately prepared to care for dying patients. (See **Appendix B** or complete survey instrument.)

Using a scale of 0 to 10 to evaluate their overall feeling of preparedness to care for patients at the end of life, with 0= “completely unprepared,” and 10= “as prepared as you can be,” our students’ mean score was 4.6. For several particular tasks, where the scale ranged from “not well at all” to “very well” prepared, the following percentages are the students who answered “**Not well at all**” or “**Not very well**”:

- Manage pain: 48%
- Discuss end-of-life decisions with patients: 45%
- Talk with patients about thoughts and fears about dying: 51%
- Address cultural issues in end-of-life care: 60%
- Address spiritual issues in end-of-life care: 69%
- Help family members with bereavement: 79%
- Manage your own feelings about patients’ dying and death: 67%
- Manage delirium at the end of life: 52%

Our students rated the quality of their *overall* medical education as either “very good” or “excellent” 69% of the time; by contrast, only 16% rated their education for *end-of-life care* “very good” or excellent.” This difference is reflected in more specific measures. For example, using a 0 to 10 scale (0= “no teaching” and 10= “a lot of teaching”), the students’ mean score for clerkship teaching on sepsis was 6.77; for teaching on lupus, it was 5.03; and for end-of-life care, 4.52. Whereas 100% of the students performed a lumbar puncture on a patient, and 87.5% received feedback from a resident or attending, only 47% reported talking with a patient with life-threatening disease about their values and wishes for care at the end of life, and only 43% of those students received feedback on their performance. Only 33% of our students reported that residents and faculty conveyed that treating dying patients’ psychosocial needs is a core clinical competency “to a moderate extent” or “a lot”; 33.9% answered “not at all.”

In light of these results it is not surprising that 34% of our graduating students said they “generally” or “completely” agreed with the statement that “I dread having to deal with the emotional distress of family members of a patient at the end of life,” and that 72% “generally” or “completely” agreed that “caring for dying patients is depressing.”

Nevertheless—and this is both a bright spot in our data and cause for optimism about the potential of our present proposal—90% of our students generally or completely agreed that “physicians have a responsibility to provide bereavement care to the patient’s family members after death”; 95% agreed that “physicians have a responsibility to help patients at the end of life prepare for death; and 80% said that it was either “very important” or “somewhat important” to learn how to provide end-of-life care, in light of their personal interests and career goals. Furthermore, in our survey, a significant positive relationship was observed between students’ reported preparedness to provide palliative care and their exposure to dying patients during clinical rotations ($r=.604$, $p=.01$). Students who said they were more prepared were more likely either to have witnessed more patient deaths or to have cared for more dying patients during their clerkships than the unprepared students.

We conclude from these data that (1) there is both room and need for improvement in end-of-life education at our medical school; (2) more systematic and well-supervised clinical exposure to dying patients is the appropriate strategy; and (3) students will be receptive to initiatives to enhance their end-of-life education.

4. We have the resources in instructional technology to implement our proposal

Technology to enhance learning for medical students is part of the educational culture and day-to-day process of students at the University of Pittsburgh, and is centered in the Laboratory for Educational Technology. Curricular materials are accessed via the World Wide Web using our own learning management system (Navigator). This system was accessed by our medical students over 70,000 times last year, with over 2 million web pages viewed. New for the 2004-05 academic year is a student and faculty collaboration portal which combines both academic and administrative functions into one personalized website. This sophisticated custom installation of Microsoft’s SharePoint 2003 portal merges email, the online curriculum, event calendars, and virtually every student web-based resource into one place. The Lab for Educational Technology will use the existing collaboration tools of its SharePoint portal as the communication and document management backbone of the ePortfolios that are described in the Program Plan below. This will connect to online learning modules developed by the project’s faculty, using the Navigator system with the help of the Lab’s Instructional Designer. Students’ clinical experiences can be captured using existing PDA-based software and integrated with their ePortfolios’ learning modules and communication with their mentors. For more information on our **educational technology** resources, see **Resources Page, part 2**.

5. We have the support of key faculty and administrators to implement our proposal

To test our hypothesis that there are numerous end-of-life teaching opportunities that wait to be exploited in the third-year clerkships, and to obtain a preliminary reading of the clerkship directors' receptivity, we have met with each clerkship director in the process of developing this proposal. Our meetings encompassed clerkships in Ambulatory Care, Surgery, Pediatrics, Neurology/Psychiatry, Internal Medicine, and Family Medicine.

The clerkship directors strongly support our proposal, as do the Senior Vice Chancellor and Dean, the Vice Dean (who has responsibility for Medical Education), the relevant Department Chairs, Residency Program Directors, and Chief Residents. (See letters of support in **Appendix C.**) The clerkship directors' recommendations for new initiatives encompass three broad areas, which correspond to the major thrusts of this project: Faculty Development, Didactic Instruction, and Emotional Processing.

Faculty Development

Clerkship directors recommended a variety of resources and teaching formats for enhancing their faculty's ability to teach about end-of-life care. (As described below, we will also survey the faculty themselves to solicit their perspectives.) Suggestions included: presentations by palliative care specialists and educators at faculty journal clubs; presentations to group practices that host medical students at community practice sites; preparing teaching materials (e.g., articles, slides, websites) that can be distributed to students on rounds; including tips on teaching during palliative care lectures and case conferences for residents; and providing portable and easily accessible evidence-based symptom management protocols and prognostic information to attending faculty.

Didactic Instruction

Several clerkships suggested topics that could be incorporated into existing didactic programs, such as a session on "the dying child" in the Pediatrics lecture series, a session on "grief" in Psychiatry, and participation in Mortality & Morbidity rounds in Surgery. Another suggestion was to post relevant articles and case discussions on the clerkships' websites, which students are required to access as part of their rotations. The Medicine faculty recommended a required written case analysis involving care of a dying patient, with feedback provided by the faculty.

Emotional Processing

Except for Psychiatry, where students and residents are routinely debriefed after unexpected patient deaths (especially suicides), few of the clerkship directors had previously given much thought to students' emotional reactions to patient encounters. (This is consistent with the literature cited in section 2(b) of Background and Significance.) When we brought up the subject, however, all of the clerkship directors agreed that it was an area worth exploring. Ambulatory Care and Family Medicine suggested sensitizing their faculty preceptors to the issue, including a recommendation that, when appropriate, preceptors consider taking a student with them when attending a patient's funeral. Several clerkships supported a "drop-in" time during the clerkship when students could discuss troubling patient encounters, and the Medicine faculty suggested that one use for the written case analyses could be to describe students' emotional reactions.

We have reported the clerkship directors' ideas in aggregate here. The actual implementation of the ideas—which we now describe in our Cancer Education Program Plan—will be individually tailored for each clerkship, since each has its own culture and structure.

D. CANCER EDUCATION PROGRAM PLAN

a. Program Direction

David Barnard, Ph.D., is the Principal Investigator and Program Director for this project. Dr. Barnard is Professor in the Department of Medicine, Division of General Internal Medicine, Section of Palliative Care and Medical Ethics, and in the Center for Bioethics and Health Law. He is also Director of the University of Pittsburgh Institute to Enhance Palliative Care. From 1991-1999 he was Chair of the Department of Humanities at Penn State University College of Medicine. A nationally and internationally recognized expert on the integration of ethics and humanities in palliative care education, Dr. Barnard has twenty-five years experience in curriculum development and implementation in academic medical centers. As detailed in the Budget Justification, Dr. Barnard will provide overall leadership for the academic and administrative aspects of the program.

b. Program Faculty/Staff

In addition to Dr. Barnard, the project will draw primarily on two palliative care physician faculty and the palliative care team's psychologist for curriculum development and for just-in-time consultation with general faculty, residents, and students. *Physicians:* (1) Robert Arnold, M.D., is Professor of Medicine and Chief of the Section of Palliative Care and Medical Ethics, Division of General Internal Medicine, Department of Medicine, Director of Clinical Ethics Training in the Center for Bioethics and Health Law, and Director of the University of Pittsburgh Institute on Doctor-Patient

Communication. A recipient of a Faculty Scholar Award from the Project on Death in America, Dr. Arnold is also the founder and Medical Director of the Comprehensive Palliative Care Service at the University of Pittsburgh Medical Center. Dr. Arnold co-directs Onco-Talk, a federally funded program to train Oncology Fellows in communication skills related to the care of patients with advanced disease. (2) Winifred Teuteberg, M.D. is Assistant Professor in the Section of Palliative Care and Medical Ethics, Division of General Internal Medicine, Department of Medicine, and one of the staff physicians for the Comprehensive Palliative Care Service at the University of Pittsburgh Medical Center. Dr. Teuteberg has completed a fellowship in palliative medicine at Massachusetts General Hospital, Harvard Medical School, and a fellowship in clinical medical ethics at the University of Chicago. *Psychologist:* Ellen Redinbaugh, Ph.D. is Research Instructor at the University of Pittsburgh Cancer Institute. She is also the Clinical Psychologist for the Comprehensive Palliative Care Service at the University of Pittsburgh Medical Center, with expertise is the assessment and management of psychosocial distress in cancer patients and their families, and in behavioral medicine approaches to pain management. Technical expertise to create the web-based-learning tools and ePortfolios will be under the leadership of James B. McGee, M.D., Director of the Laboratory for Educational Technology at the School of Medicine. Dr. McGee's specific responsibilities for the project, as well as those of Drs. Arnold, Teuteberg, Redinbaugh, and additional support staff, are detailed in the Budget Justification.

c. Proposed Cancer Education Program

In **Process Aims B.1 – B.4** we outlined the components of our proposed intervention. In this section we describe each of those components in more detail. First, however, we describe the needs assessment surveys we will carry out with faculty, residents, and students.

1. Pre-intervention needs assessment

While our review of the literature and our preliminary discussions with the directors and faculty from the various clerkships helped us formulate the components of our intervention, the needs assessment will provide us with more precise guidance in our faculty development efforts. Carrying out the needs assessment will also raise awareness of end-of-life teaching among our target groups, which should facilitate the introduction of our reforms. We will survey **clinical teaching faculty** (identified with the help of clerkship directors) and randomly selected **residents** (from the pool of residents identified with the help of Residency Program Directors) in Medicine, Surgery, Clinical Neurosciences (Neurology and Psychiatry), Pediatrics, Family Medicine, and Ambulatory Care. We will administer our survey online for respondents' convenience and efficient data analysis. We will also conduct two or three focus groups with randomly selected **third- and fourth-year medical students** (from the pool of students identified with the help of the School of Medicine's Office of Student Affairs) to gain more detailed knowledge of the strengths and weaknesses of their educational experience related to end-of-life care. This will allow us to pursue in greater depth the issues raised by our annual survey of graduating students, data we presented in the Preliminary Activities section above. Our objectives in the focus groups will be to explore our ideas for curriculum reform—along the lines of the interventions described below—to maximize their acceptability and perceived relevance from the students' point of view. **Table 6** summarizes the data we will collect in our needs assessment:

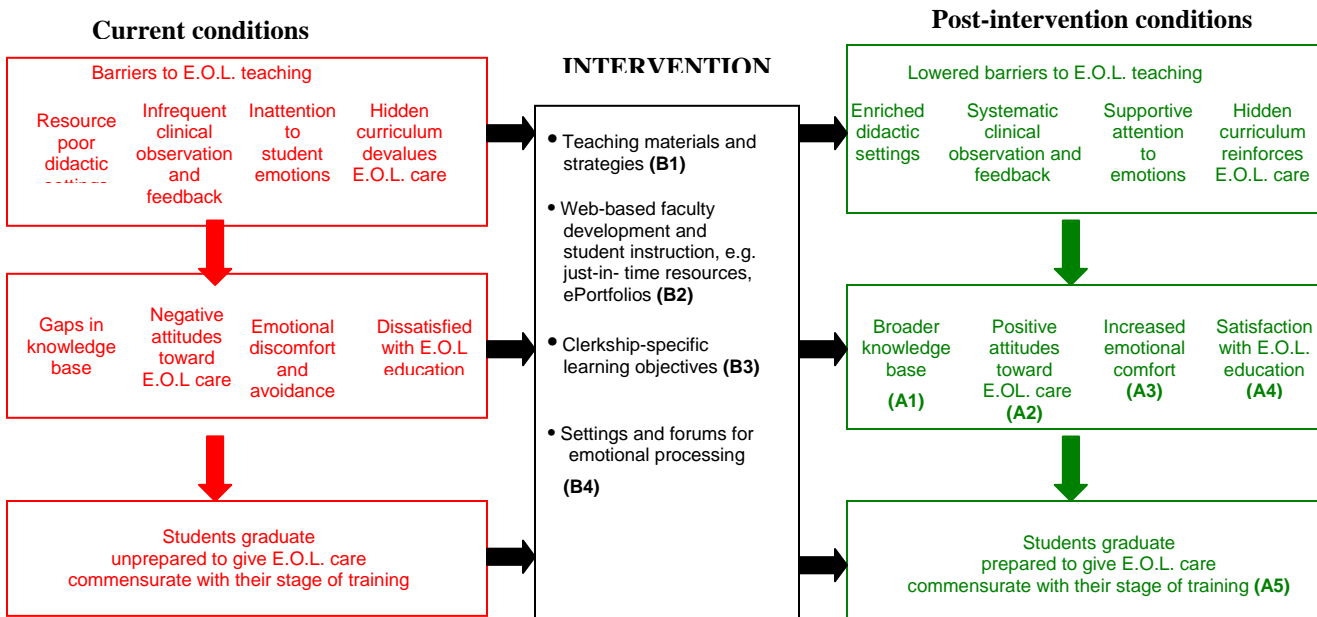
Table 6: Needs assessment

Faculty and residents	Students
<ol style="list-style-type: none"> 1. Number of dying patients cared for in last 12 months 2. Type and extent of prior formal end-of-life education 3. Self-rated ability to provide excellent end-of-life care (Likert scale) 4. Number of students supervised regarding end-of-life care tasks in the last 12 months 5. Type and extent of prior formal training in how to teach medical students about end-of-life care 6. Self-rated ability to teach medical students about end-of-life care (Likert scale) 7. Perceived barriers to effective end-of-life teaching 8. Resources needed to improve end-of-life teaching 	<ol style="list-style-type: none"> 1. Number of dying patients cared for in last 12 months 2. Type and extent of prior formal end-of-life education 3. Self-rated ability to provide excellent end-of-life care (Likert scale) 4. Timely availability of end-of-life teaching materials (Likert scale) 5. Amount and quality of feedback from faculty and residents (Likert scale) 6. Nature of emotional reactions to caring for dying patients 7. Timely availability of opportunities to discuss emotional reactions (Likert scale) 8. Perceived barriers to improved end-of-life instruction 9. Desired resources for improved experience with dying patients

2. Overview of the intervention

Our research plan, which we have depicted schematically in Figure 1 below, flows from our analysis of the correctable causes of medical students' lack of end-of-life preparedness.

Figure 1:



The “current conditions” on the left summarize the empirical data and argument in the previous sections (Background and Significance and Preliminary Activities). There we have shown that most medical students graduate feeling unprepared to provide end-of-life care appropriate to their stage of training. The barriers to effective end-of-life education, we believe, are (1) the faculty’s lack of readily available resources for teaching about end-of-life care in didactic settings, (2) students’ lack of significant clinical exposure to dying patients, and poor supervision and feedback when it does occur, (3) the faculty’s indifference to students’ potentially significant emotional reactions to patient care, and (4) a prevailing educational culture (the hidden and informal curriculum) that devalues end-of-life care. These barriers, in turn, contribute to (1) gaps in students’ knowledge about end-of-life care, (2) negative attitudes toward such care, (3) emotional discomfort with dying patients, and (4) overall dissatisfaction with end-of-life teaching. Students’ overall lack of preparedness is a product of these factors.

As indicated by the “post-intervention conditions” on the right, the multi-part intervention we describe below aims to (1) empower clinical faculty to make more effective use of didactic teaching opportunities, (2) permit systematic, year-long monitoring of students’ end-of-life exposure and faculty feedback, (3) encourage students to acknowledge and reflect on their emotional responses to patients in non-threatening, accessible environments, and (4) contribute to an overall educational culture that supports rather than undermines good end-of-life care. We hope through these means to improve graduating students’ knowledge about end-of-life care (**Outcome Aim A.1**), promote more positive attitudes toward end-of-life care (**Outcome Aim A.2**), increase students’ emotional comfort with dying patients (**Outcome Aim A.3**), and increase students’ satisfaction with the quality of their end-of-life teaching (**Outcome Aim A.4**). We hypothesize that accomplishing these objectives will increase the proportion of our students who graduate with confidence in their ability to care for dying patients to the extent that we can reasonably expect at their level of training (**Outcome Aim A.5**).

3. The specific elements of our intervention (Process Aims B.1 – B.4)

Aim B.1. *Provide clerkship faculty and residents with teaching materials and pedagogical strategies to help them take increased advantage of “teachable moments” related to end-of-life care that arise in the day-to-day teaching routines in the third-year clinical clerkships in Medicine, Surgery, Clinical Neurosciences (Neurology and Psychiatry), Pediatrics, Family Medicine, and Ambulatory Care.*

There are several end-of-life topics most commonly identified as gaps in students’ education. For each of these topics, there is a wealth of curricular material for end-of-life care, which we believe general medical faculty would find very helpful in their teaching, but of which they are typically unaware.

We intend to package materials in “tool kits,” by which we mean sets of educational resources, in various media, from which faculty can select to structure, augment, or reinforce their teaching. Armed with these materials, the clerkship faculty can incorporate them into existing didactic sessions, and also employ them as issues arise in clinical encounters. The purpose here is to empower the general, non-palliative-care-specialist faculty to do more end-of-life teaching on their own, thereby extending the influence of our specialist palliative care faculty, and to allow the clerkship faculty to capture “teachable moments” as they occur in the wards or in the clinic. The menu of topics and the array of curricular resources we have in mind appear in the following table:

Table 7:

For these topics...

We will introduce and demonstrate those materials**

Giving bad news Discussion of treatment preferences Responding to patient/family emotions Estimating prognosis and life expectancy Management of pain and other common symptoms Addressing spiritual and existential issues	Case vignettes	Slides	Fast Facts
	Communication protocols	Prognostic information	Videos
		CD-ROM	

** See Appendix D for examples

We have learned in our preliminary discussions with clerkship directors that there are several possible venues we can use to demonstrate the tool kits to clerkship faculty and residents. These include regularly scheduled faculty meetings; grand rounds, resident lecture series, journal clubs, and continuing education seminars. The latter are especially attractive for community-based preceptors in family medicine and ambulatory care rotations. The goals of these sessions will be: (1) sensitizing the faculty to the need for improved end-of-life teaching in their clerkship; (2) informing the faculty of available resources; (3) describing our proposed web-based teaching method; and (4) obtaining the faculty’s buy-in to our plans. The agenda for these sessions will be:

- a. Present national and local data regarding gaps in student education and faculty preparedness for teaching
- b. Present results of our faculty needs assessment
- c. Illustrate the use of various teaching materials for important end-of-life topics
- d. Describe our web-based teaching methods (see next section)

We will accommodate faculty and resident turnover in two ways. First, we will repeat these sessions annually for each clerkship and residency training program, thereby capturing new faculty and residents. Second, as we describe in the next session, whenever one of the medical students supervised by a particular faculty or resident has indicated via his or her ePortfolio that he or she has had an end-of-life-related patient encounter, that faculty or resident will receive via email the educational resources we have provided to the student.

Aim B.2. *Develop and implement web-based instructional technologies (ePortfolios) that enable students to record systematically their exposure to end-of-life learning opportunities throughout the third year, and to receive just-in-time educational materials and feedback from faculty to reinforce their knowledge of the end-of-life skills to which they are exposed.*

As we have described in our Preliminary Activities section, we have the technological infrastructure and faculty commitment to require our third-year students to use clerkship websites and hand-held PDAs for on-line recording of their clinical experiences. In our proposal we will take advantage of this capability to have students use the web to create a **palliative care “ePortfolio.”** Our objectives are: (1) to facilitate the process of students’ recording, over the entire year, the breadth of their exposure to various end-of-life tasks, and the level of participation and feedback they experienced for

each task; (2) to enable timely two-way communication between students and faculty about the students' clinical experiences, and the exchange of just-in-time educational materials; and (3) to provide an easily accessible, non-threatening vehicle for the students' reflections on their emotional reactions to the care of dying patients.

The core of our approach will be the **Palliative Care Curriculum Checklist** that we have developed for the palliative care elective we offer to fourth-year students. We have derived the checklist from published curricula developed by internationally recognized consensus panels, specifically the Canadian Committee on Palliative Care Education,⁴³ and the Curriculum Project of the American Academy of Hospice and Palliative Medicine.⁴⁴ For illustrative purposes we reproduce a small portion of the checklist in Figure 2 below. The complete checklist is included in **Appendix E**.

Figure 2:

	Reading	Observer	Active Participant	Feedback from Faculty
Nausea and vomiting				
a. Pathophysiology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
b. Assessing severity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
c. Pharmacology and basic action of anti-emetics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				

Our fourth-year students use this form to record their clinical exposure to palliative care tasks as the four-week elective goes along. We use this information to monitor and focus students' experiences and as an overall record of the students' achievement during the elective. We have used the checklist with the last ten students in our elective, and it has met with strong acceptance.

While a paper checklist works well for the one or two students who take the elective in a given month, we need a more efficient technology for the entire third-year class, over the course of the entire year. *Therefore, we will develop on-line versions of the checklist and incorporate them into the clerkship websites: the palliative care ePortfolio.* When students care for a dying patient (or a non-dying patient whose care requires one of the palliative care tasks) they will be expected to check the appropriate boxes on the palliative care checklist, and will have the opportunity to add comments or questions about the encounter, either on the dedicated website or on their PDA.

Maintaining the palliative care ePortfolio will be part of an existing routine for the students. *We are not asking them to do anything new or unfamiliar.* Students in their third and fourth year clinical clerkships are already required to track or "log" their clinical encounters with each patient. A relatively new program which enables students to record these patient encounters on handheld devices (Palm Pilot, Windows CE devices, etc) was piloted in early 2004. Following this successful pilot, the program has rolled out to all clinical clerkships during the 2004-05 year and electronic reporting, by handheld devices or over the web, will be mandatory by the end of the year. Student compliance with these web-based applications has been 100% since their inception. Satisfaction and perceived value has been consistently high with students reporting moderate (23%), considerable (27%) or very high educational value (37%).

All entries in the palliative care ePortfolio will be maintained in a **centralized data base**, giving us (and the clerkship faculty) a composite record of each students' exposure to palliative care tasks over the entire year, the first objective noted above. The two-way communication capability will permit the faculty to respond promptly to students' questions about a particular end-of-life task or situation, and we will be able to email suggestions, references, evidence-based symptom protocols, and similar educational material.

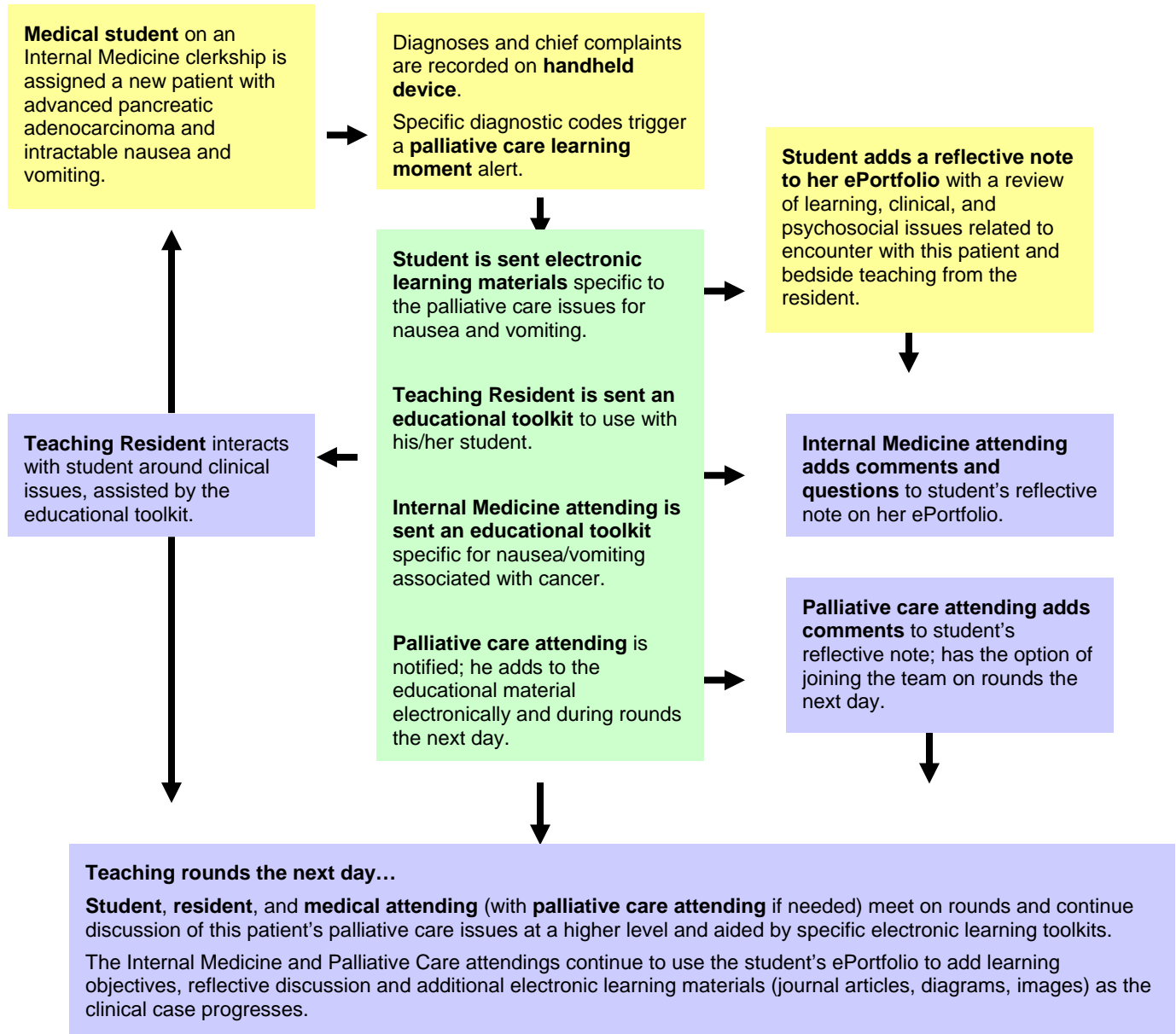
The palliative care faculty will organize learning materials into basic, intermediate, and advanced material. A set of basic materials will be programmed to go *automatically* to the student when a particular topic is first checked by that student on the checklist. Students can then reflect on this material, and can dialogue about it with a palliative care faculty member via email. Our project will have faculty assigned to monitor the ePortfolio activity who have expertise in five areas: (1) pain and symptom management, (2) communication, (3) psychosocial concerns, and (4) spiritual, existential, and emotional issues, and (5) ethics. We can also identify the general faculty and teaching residents who are supervising particular students on the clinical rotations, by referring to the faculty precepting schedules and resident assignments that are prepared in advance for each clerkship and residency program. This will enable us to email the student's attending physician and teaching resident, notifying them of their student's encounter, and providing them with relevant educational

material from the tool kit. This will enable the attending and resident to participate in the student's learning to the extent they desire, while also reinforcing our resident and faculty instructional development objective.

While we will automate the initial communication to students of basic educational materials, we will also rely on the *human factor*. Since the project's palliative care specialist faculty will have a record in our centralized data base of what materials have been sent to which students, the faculty can modify or supplement subsequent communications to a student who has already received the basic material, either with more advanced material that takes the student's knowledge to another level, or that responds to a question about the material that the student has posted on his or her ePortfolio.

We illustrate how our intervention will work with the following example and flow diagram in Figure 3 below:

Figure 3: Sample learning scenario



Aim B.3. Match specific end-of-life learning objectives to the learning opportunities most likely to arise in particular clerkships, while monitoring students' exposure to the full end-of-life curriculum across the clerkship year as a whole

We will tailor the tool-kits to particular clerkships. We will accomplish this through inspection of the learning objectives that each of the clerkships has prepared for its students, and through dialogue with the faculty when we conduct our faculty development training sessions. Based on what we learn about the types of patient populations and clinical encounters that are typical of the various clerkships, we will tailor the on-line versions of the palliative care curriculum checklists to include only the end-of-life tasks that are most relevant to the particular rotation. This will allow each checklist to be shorter than the composite checklist, which will be important for the user-friendliness of the palliative care

ePortfolio. The **centralized data base** will allow us to monitor the overall exposure to end-of-life issues that students receive across the entire year.

Aim B.4. *Provide easily accessible, non-threatening settings in which third-year medical students may explore their emotional reactions to their patients' terminal illnesses or deaths.*

Despite increasing evidence that many students would like help processing their emotional reactions to their encounters with dying patients (see Background and Significance above), little is known about the most feasible and effective ways to do this. We will employ three approaches in our proposal, based on the preliminary discussions with clerkship directors, our fourth-year student survey data, and review of the literature on web-based instruction:

- a. We will use tool-kit demonstration sessions to sensitize clinical faculty and residents to the issue of student emotions, and encourage them to interact sympathetically and constructively with students when patients die (e.g., take student aside for “emotional check-in time,” suggest that the student accompany the faculty preceptor to the patient’s funeral, etc.).
- b. We will provide an informal “drop-in” time during the Medicine and Surgery clerkships where students can speak with a trained faculty member about emotional patient-care experiences.
- c. We will encourage students to use the ePortfolio to record emotional reactions to the care of a patient—an electronic version, in other words, of the “critical incident technique” described by Branch et al.¹³ Faculty will have the opportunity to respond on-line, or, if the circumstances appear to warrant this, they can offer to meet the student in person to discuss the matter further.

All of these methods will be designed to achieve the same goals: (1) to convey to students that acknowledging strong emotions is a normal part of being a compassionate physician; (2) to provide settings that students view as private and non-threatening; (3) to have these settings as readily and conveniently available as possible; and (4) to influence the hidden and informal curriculum so that it is more supportive of end-of-life care.

d. Cancer Education Evaluation Plan

Our intervention is complex, as is the outcome we are trying to achieve. Moreover, the effects produced by social and educational interventions tend to be small to moderate, while program evaluation is usually only able to detect moderate to large effects.⁷⁶⁻⁷⁹ Accordingly, we will evaluate our program using what could be described as a mixed model,⁸⁰ or an integrated multi-method approach,⁸¹ using both quantitative and qualitative methods. This approach is flexible, incorporates a variety of data collection methods, and is designed to compensate for any single method’s limitations by deliberately combining several within the investigation.⁸²

Process evaluation (Aims B.1 to B.4)

The basic question we want to answer with our process evaluation is: *Did we implement our intervention as planned?* We will therefore (1) track the number of end-of-life tool kits we created for the faculty and residents, and the extent to which we introduce them to faculty and residents at instructional development sessions (**Aim B.1**); (2) document the implementation of the web-based instructional technologies and ePortfolios for each clerkship, and track the extent to which they are utilized by the students (**Aim B.2**); (3) document the development of clerkship-specific end-of-life learning objectives, ensure that the objectives, taken as a whole, meet our curricular goals, and track students’ exposure to the complete end-of-life curriculum over their third year (**Aim B.3**); and (4) assess the extent to which we provided students with opportunities to acknowledge and reflect upon their emotional reactions to end-of-life care (**Aim B.4**).

We will utilize four forms of data collection to conduct the process evaluation. The first will be a **curriculum review**, by which we will record (1) the number of tool-kits we created for the end-of-life learning objectives on the Palliative Care Curriculum Checklist (see **Appendix E** for full list of these objectives), and (2) the clerkship-specific learning objectives that were developed and added to the websites of the clerkships for use by the students.

The second evaluative method is the **centralized data base** that, as described in the previous section, will record every instance of a student’s logging an entry in his or her palliative care ePortfolio, and the palliative care faculty’s responses to that entry. This evaluative method has two major benefits. First, we will have real-time, *contemporaneous* monitoring of the student’s exposure to our curriculum throughout the year—allowing for mid-year corrections if and when patterns emerge that indicate program weaknesses. For example, we may find that students never log a non-pain symptom during their internal medicine rotation. The problem, given patients’ co-morbidity, is that students do not see these symptoms within the purview of palliative care. Recognizing this, we can send emails to the teaching faculty and residents (using the communications technologies described above) informing them of this problem and sending them articles emphasizing the relationship between non-pain symptoms and quality of life. Second, we will have a *cumulative* record of every student’s overall exposure to the curriculum at the end of the full academic year. We can thus compare clerkships and

instructional methods with each other, and transfer particularly successful, evidence-based methods from one clerkship to another, wherever individual clerkship cultures and logistics will allow. And, *we will be able to assess the extent to which the web-based approach led to the penetration of the end-of-life curriculum into each student's educational experience during the clerkships.* This will allow us to develop a dose-response relationship between the educational intervention and our outcome analysis.

The third form of data collection will be **surveys**. We will survey faculty, residents, and students at a number of points in the intervention. *At the instructional development sessions*, attendance will be taken and faculty and residents will be surveyed regarding the usefulness of these sessions and the toolkit material. *One week following each clerkship*, randomly selected faculty, residents, and students will be surveyed. These surveys will allow us to assess learners' use and satisfaction with the intervention, as well as the degree to which they changed their practice. Students will also be asked to rate the degree to which the ePortfolios allowed them to discuss their emotional reaction to patients, the degree of support they received, and their comfort in dealing with these emotional encounters.

The fourth method will be **focus groups** with three randomly selected groups of students at the end of the clerkship year. Each focus group will include roughly 8 students for a total of 24 students or roughly 20% of the class. We will conduct the focus groups in Year 4 of the grant, because that is the point by which we will have implemented our interventions in all of the clerkships. **Table 8**, immediately below, lists the evaluation questions for each specific Process Aim, and the methods and indicators that will be used to answer the questions.

Specific Aim	Evaluation Questions	Methods and Indicators
B.1. Provide clerkship faculty and residents with teaching materials and pedagogical strategies for end-of-life teaching in Medicine, Surgery, Clinical Neurosciences, Pediatrics, Family Medicine, and Ambulatory Care.	To what extent were end-of-life teaching materials developed?	% end-of-life learning objectives on palliative care curriculum checklist for which tool kits created, as determined by the curriculum review
	To what extent were the materials introduced to faculty and residents?	% clerkship teaching faculty, and % residents in each department who teach clerkship students, who attended at least one instructional development session, as determined from attendance taken at the sessions % faculty and residents who rated satisfaction with instructional development seminars at 4 or 5 on 5-point Likert scale on survey administered at conclusion of seminar
B.2. Develop and implement web-based instructional technologies and ePortfolios that enable students to record their exposure to end-of-life learning opportunities, and to receive just-in-time educational materials and feedback from faculty	To what extent were on-line rotation-specific curriculum checklists developed?	Inspection of clerkship websites in curriculum review
	To what extent were the checklists used by students to record their end-of-life patient encounters?	% students who entered on ePortfolio at least 2 end-of-life patient encounters <i>per clerkship</i> over the entire year, as determined from centralized data base
	To what extent did students and faculty engage in two-way communication via ePortfolios and email?	% students who received appropriate teaching materials and faculty email responses after entering a end-of-life encounter, as determined from centralized data base and post-clerkship surveys % faculty and residents who were notified and sent appropriate learning materials when students under their supervision entered an end-of-life encounter, as determined from centralized data base % faculty, residents, and students who rated satisfaction with ease of use, timeliness, and usefulness of palliative care ePortfolios at 4 or 5 on 5-point Likert scale, in post-clerkship surveys

<p>B.3. Match specific learning objectives to particular clerkships, while monitoring students' exposure to full end-of-life curriculum across the clerkship year as a whole</p>	<p>To what extent were end-of-life learning objectives entered on the websites of specific clerkships?</p>	<p>Matching of learning objectives to clerkship websites, as determined by curriculum review</p>
	<p>To what extent were the clerkship-specific objectives actually encountered by students on those clerkships?</p>	<p>% learning objectives in each clerkship for which at least 75% of students in that clerkship entered a patient encounter in ePortfolio, as determined from centralized data base</p>
	<p>What proportion of the complete list of end-of-life learning objectives did students encounter—and at what depth—over the entire year?</p>	<p>% learning objectives from the complete palliative care curriculum checklist for which each student entered encounters in ePortfolio and received educational materials and faculty emails by the end of the clerkship year, as determined from centralized data base</p> <p>For each learning objective encountered, % students who indicated on the curriculum checklist that they:</p> <ul style="list-style-type: none"> • Read about the topic • Observed faculty or resident's behavior on the topic • Actively participated with a patient or family on the topic • Received faculty or resident feedback (when appropriate) on the topic
<p>B.4 Provide easily accessible, non-threatening settings in which third-year students may explore emotional reactions to patients' terminal illnesses or deaths</p>	<p>Did students take advantage of opportunities to reflect on their emotions during their clerkships?</p>	<p>Absolute number of entries of emotional reactions (e.g., sadness, anger, confusion, guilt, anxiety) on ePortfolios per clerkship and over the entire clerkship year, as determined from centralized data base</p> <p>Number of students who indicated in post-clerkship surveys that they had an emotional reaction to the care of at least one dying patient during the year, and the % of those students who recorded their reactions on the ePortfolio, as determined from centralized data base</p> <p>% students using ePortfolios to record emotional reactions who received email responses from faculty and/or met with faculty or resident face-to-face, as determined in post-clerkship surveys and focus groups, and from centralized data base</p> <p>% students who utilized the ePortfolio or face-to-face meetings who rated their satisfaction with timeliness, ease of access, and usefulness of the opportunity at 4 or 5 on 5-point Likert scale in post-clerkship surveys</p> <p>Student comments about opportunities for emotional reflection in focus groups at the end of the clerkship year</p>
	<p>What settings did students find most accessible and useful?</p>	

Outcome evaluation (Aims A.1 to A.5):

Our outcome evaluation is designed to answer the question: *Did our intervention improve the end-of-life education that our medical students receive in the third-year clerkships, relative to the end-of-life education students received in the clerkships prior to our intervention?* Improvement in end-of-life education will be measured by assessing (1) graduating students' knowledge about core end-of-life tasks (**Aim A.1**), (2) graduating students' attitudes toward the physician's role in the care of dying patients (**Aim A.2**), (3) graduating students' emotional comfort with dying patients (**Aim A.3**), (4) graduating students' satisfaction with their end-of-life teaching (**Aim A.4**), and (5) graduating students' reported level of preparation to care for dying patients at the level of a medical intern (**Aim A.5**).

We will utilize three forms of data collection for our outcome evaluation. The first is the **on-line knowledge and attitude survey** that we have been administering for the past four years. This instrument was drawn from two previously constructed instruments: one focusing on fourth-year student attitudes toward end-of-life care, the nature of their end-of-life educational experiences, their assessment of the quality of their end-of-life education, and their perception of their preparedness for various end-of-life tasks;^{1, p. 687} the other was designed as an objective measure of medical residents' cognitive knowledge about core palliative care tasks.⁸³ Both instruments underwent extensive cognitive testing and psychometric evaluation. The survey instrument is included in **Appendix B**.

Since 2001, we have administered our survey to our medical students at three time points: during the summer immediately prior to the beginning of their first year (T_1); at the end of the second year (T_2); and at the end of the fourth year (T_3). We are able to track students' answers to the survey questions as individuals and in subgroups across all three time points, according to their differential exposure to required and elective components of the end-of-life curriculum, their demographic characteristics, practice orientations, and likely specialty choices. We thus have extensive baseline data for the past four years on graduating students, which can be compared to students who have undergone the intervention.

We administer the questionnaire on-line, which facilitates student access and participation, as well as data collection and analysis. At the end of the second and fourth years, students are invited to take the survey via flyers inserted in their student mailboxes and two follow-up emails. As inducements to participate, we offer two restaurant gift certificates, randomly awarded to students who have completed the survey. (Institutional Review Board approval for the present proposal is pending.) Our response rates to date are as follows:

Table 9: Palliative Care Education Survey Response Rates

	Class of 2001	Class of 2002	Class of 2003	Class of 2004	Class of 2005	Class of 2006	Class of 2007
Pre-MS1	-	-	-	-	130/167	101/147	114/149
%	-	-	-	-	77.8%	68.7%	76.5%
Post-MS2	-	-	135/169	-	-	89/147	May 2005
%	-	-	79.9%	-	-	60.5%	
Post-MS4	117/160	67/139	64/144	62/148	May 2005	May 2006	May 2007
%	73.1%	48.2%	44.4%	41.9%			

We intend to continue administering our survey at the same time points throughout this project. In the Data Management section below we describe the resources and methods we will use to collect and store our survey data. In the Data Analysis section we describe the analytical methods we will use.

The second evaluative method we will use is the **AAMC Graduation Questionnaire**, administered annually to all students at the time of their graduation from U.S. medical schools by the Association of American Medical Colleges (AAMC). Since 2001, two questions on the AAMC survey have addressed students' views of the adequacy of their school's education on end-of-life care. This information not only provides our outcome evaluation for Aim A.4 with an additional data point, it also permits us to compare our students' responses to the national data.

The third evaluative method will be the **focus groups** with randomly selected students at the end of the clerkship year, to be conducted in Year 4 of the grant as described above under Process Evaluation. As indicated in the preceding table under Aim B.4, we will use the focus groups to evaluate students' utilization and satisfaction with their opportunities to explore their emotional reactions to dying patients. In those focus groups we will invite students to (1) describe their emotional reactions to their patients, (2) describe the support they received for their emotional reactions from their peers, their faculty and residents, and from their use of the ePortfolios, (3) describe the impact the emotional experiences had on their subsequent attitudes toward working with dying patients during the clerkships, and (4) their overall comfort with

dying patients. The students' answers to these focus group questions will be part of the data we will use in our evaluation of Aim A.3.

Table 10, immediately below, lists the evaluation questions for each specific Outcome Aim, and the methods and indicators that will be used to answer the questions.

Specific Aim	Evaluation Questions	Methods and Indicators
A.1. Improve graduating students' knowledge of core end-of-life tasks	Did graduating students demonstrate improvement in their knowledge of: communication of end-of-life information? assessment and treatment of physical symptoms? recognition of emotional, spiritual, and existential distress?	Student responses at T ₃ to items 67, 69, 73, 83-84 and 86 on knowledge and attitude survey, compared both to their responses at T ₂ , and to the T ₃ and T ₂ responses of students who graduated prior to our intervention Same comparisons for student responses to items 63-66, 70-71, 74-75, 78-82 on knowledge and attitude survey Same comparisons for student responses to items 68, 72, 76-77, 83, and 85 on knowledge and attitude survey
A.2 Improve graduating students' attitudes toward end-of-life care	Did graduating students demonstrate more positive attitudes toward the physician's role in the care of dying patients?	Same comparisons for students' responses to items 38-39, 41-43, and 45 on knowledge and attitude survey
A.3 Improve graduating students' emotional comfort with dying patients	Did graduating students demonstrate increased emotional comfort with dying patients?	Same comparisons for students' responses to items 40, 44, 47, and 90-91 on the questionnaire Students' comments about their emotional reactions in focus groups at the end of the clerkship year
A.4. Improve graduating students' satisfaction with the quality of their end-of-life instruction	Did graduating students report greater satisfaction with the quality of their end-of-life instruction?	Student responses at T ₃ to items 1-19 and 30-37 on knowledge and attitude survey, compared to T ₃ responses of students who graduated prior to our intervention Students' responses to end-of-life satisfaction questions on AAMC questionnaire, compared to our students' responses in previous years, and to national sample
A.5 Ensure all graduating students feel adequately prepared to care for dying patients at level of medical intern	Did graduating students report feeling more prepared to care for dying patients at level of medical intern?	Students' responses at T ₃ to items 20-29 on knowledge and attitude survey, compared to T ₃ responses of students who graduated prior to our intervention Student responses to end-of-life preparedness questions on AAMC questionnaire, compared to students' responses in previous years and to national sample.

Data management

For data management, we will use the Data Center (DC) at the University of Pittsburgh's Center for Research on Health Care (<http://www.crhc.pitt.edu/DataCenter>). All DC team members have been certified in their particular area of specialization. (For further background information on the Data Center and its capabilities, see the **Resources Page** and **Appendix F**.) The instruments for student surveys and the faculty/resident needs assessment will be paperless in that the data will be directly entered by the respondent at the time of the survey. A relational database will be stored on a local network where only select research team members will have access to the database. The database will include routine

data edit checks for consistency both within and between forms. Once edited, temporary files will be merged to generate files for data analysis. All files will be backed-up daily and archived weekly. Database development and maintenance will occur with Microsoft Access and SQL Server available through the CRHC network. Analysis will be performed using SAS, SPSS, or Stata.

All respondents in the student survey will be assigned unique identifiers that will appear on all data collection instruments, tapes, documents, and files used in the statistical analysis and manuscript preparation. Personal information needed for tracking and informed consent will be stored separately from other data with only limited team members having access to that data. No personal information concerning study participants will be released without their written consent.

Several steps will be taken to ensure data quality and data integrity: 1) use of standard methods of data collection and recording specified in a manual of operations, 2) a formal staff workshop on research integrity at the beginning of the study and when new personnel are hired, and 3) telephone audits on a random sample of participants to verify completion of interviews and data accuracy. Other data quality assurance measures will include detailed documentation of computer operations and data editing procedures and regular meetings with project staff to review any changes in procedure. The DC also has specific data quality measures that will be implemented. These include verifying the data, out of range data checks, and repeated evaluation of the data process.

Data analysis

This section describes statistical methods that will be used to analyze data collected from medical students involved with the new educational programs. There are two main sources of data to be analyzed: (1) on-line knowledge and attitude survey at three time points: during the summer immediately prior to the beginning of their first year (T₁); at the end of the second year (T₂); and at the end of the fourth year (T₃); and (2) the AAMC Graduation Questionnaire, administered by the Association of American Medical Colleges (AAMC).

1. Data from surveys of medical students at three time points during their education will be used to examine the effect of the new curriculum on knowledge and attitudes toward end-of-life issues, as well as their emotional comfort with dying patients. Surveys conducted with students who do not experience the new curriculum will be used as comparison (cohort 1). Surveys conducted with students who experience the end-of-life education during their third-year clerkships will be used to estimate the intervention effect (cohort 2). We will compare the survey results of the difference between the end of fourth year (T₃) and the end of second year (T₂) for the two groups. This will enable us to examine the impact of the end-of-life education that our medical students receive in the third-year clerkships. First, the difference between the T₂ and T₃ scores on each measure will be used to assess the change over time in medical student's attitudes, knowledge and emotional comfort. The average of the change scores for cohort 2 will be compared to the average of the change scores for cohort 1. The statistical significance will be tested using a one tailed t-test of the hypothesis that students who experience the new program in their third year will be more knowledgeable of and have more favorable attitudes toward end-of-life care as well as emotionally more comfortable with dying patients at the end of fourth year. To estimate the dose-response differences of the intervention, we will include students with 0, 2 and 3 years of experience with our end-of-life instruction. The mixed effects model for linear growth curve will be applied to determine the overall effect of our end-of-life instruction at all three time points. Thus, we can adjust for the individual baseline differences while comparing the improvement of groups which had different exposure to our educational program during the 4 year duration of the study. The mixed effects model will also be used to evaluate the effect of student sociodemographics (e.g., age, gender, race) on the outcomes at all three time points.
2. To assess the effect of the new curriculum on students' satisfaction with the quality of their end-of-life instruction and their feelings of preparedness to care for dying patients as medical interns, we will compare survey data at T₃ between cohorts 1 and 2. In addition, we will compare the average scores of cohort 1 both with cohort 2 and with a national sample using related items in the AAMC Questionnaire. The statistical significance will be tested using a one tailed t-test of the hypothesis that students who experience the new curriculum will be more satisfied with their end-of-life instruction and feel more prepared to care for dying patients.

Project Timeline

Year One (7/1/05 – 6/30/06)	Year Two (7/1/06 -6/30/07)	Year Three (7/1/07 – 6/30/08)	Year Four (7/1/08 – 6/30/09)
Faculty/resident needs assessment	Pilot web-based activities for one clerkship; evaluate and refine based on feedback (B2)	Tailor learning objectives to specific clerkships (B3)	Continue full implementation of all program activities (B1-B4)

Student focus groups	Create toolkits for clinical clerkships (B1)	Implement toolkits for all clerkships (B1)	Process evaluation of all curriculum elements; Re-survey clinical faculty;
Web-site development: ePortfolios, on-line versions of curriculum checklist (B2)	Pilot didactic teaching activities in one or two clerkships; refine based on feedback	Implement web-based activities for all clerkships (B2)	Knowledge and attitude surveys for years 1, 2, and 4
Knowledge and attitude surveys for years 1, 2, and 4	Knowledge and attitude surveys for years 1, 2, and 4	Pilot “drop-in” sessions for emotional processing (B4)	Dissemination via presentations and publications
		Knowledge and attitude surveys for years 1, 2, and 4	

e. Dissemination Plan

During the project we will create a number of products: faculty development tool-kits, curriculum checklists, survey instruments, case vignettes. Creation of these products will be an iterative process, with refinements to be made after initial testing, feedback from students and faculty, and peer review following presentation at professional meetings and publication in peer-reviewed journals. Dr. Barnard regularly attends and presents at the American Academy of Hospice and Palliative Medicine (AAHPM)—the leading professional society for palliative care in the country—and at the bi-annual International Congress on the Care of the Terminally Ill in Montreal. Dr. Arnold regularly attends and presents at the American Academy of Hospice and Palliative Medicine (of which he is President in 2005), and the annual meetings of the American Society of Bioethics and Humanities and Society for General Internal Medicine. Additional meetings at which we will present our curriculum and evaluation results include the American Association for Cancer Education (AACE), which has a Palliative Cancer Education Section, and the American Society of Clinical Oncology (ASCO). We have budgeted the yearly AAHPM meeting, but as a further indicator of **institutional commitment**, attendance at the other meetings by Drs. Barnard and Arnold will not require budgeted funds in this proposal.

We will post our curriculum materials on the web-site of the End-of-Life/Palliative Education Resource Center (EPERC), www.eperc.mcw.edu, the leading online source for peer-reviewed educational materials in palliative care. Both Drs. Barnard and Arnold are regular EPERC peer reviewers. And we will submit our curriculum and results for publication in leading journals such as *Journal of Palliative Medicine* (Drs. Barnard and Arnold are both on the editorial board), and the *Journal of Cancer Education*.

Finally, we are well positioned to target an additional, key constituency. Dr. Michael Elnicki, director of our Ambulatory Care Clerkship (see letter of support in **Appendix C**) is President of the national organization, Clerkship Directors in Internal Medicine (CDIM). CDIM is collaborating with the Society for General Internal Medicine (SGIM) in a national curriculum revision effort that has targeted end-of-life care as one area for improvement. With Dr. Elnicki’s help, we intend to offer our project to CDIM/SGIM as a model program.

f. Statement of Institutional Commitment

The University of Pittsburgh’s commitment to this program can be measured by: (1) the letters of support from senior administrators, department chairs, and faculty in **Appendix C**; (2) the School of Medicine’s support of our previous NCI-funded end-of-life curriculum project (described in section C.2 above), *and its incorporation of the new curriculum elements from that project into the ongoing educational program of the school*; (3) the University’s establishment of the Institute to Enhance Palliative Care in June, 2003 (see section C.1), and the appointment of Dr. Barnard as its Director; and (4) the availability of University funds for professional travel to disseminate our results, beyond the requested funds for travel to the AAHPM meetings.

HUMAN SUBJECTS

The human subjects aspect of our proposal is related to the knowledge and attitude surveys we will be administering to the medical students for purposes of program evaluation. The survey instrument is included in **Appendix B**. As described in the proposal, we intend to administer the survey to all University of Pittsburgh medical students at three time points during their medical education for the duration of the grant, as we have done for the past four years under a previous grant. Under ordinary circumstances, we would expect the use of the survey to qualify for “Exempt” status, under Exemption 1(b): “Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as...research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.” When we proposed using the survey in the previous grant, however, the University of Pittsburgh Institutional Review Board took the position that one element of our survey methodology requires that it receive “Expedited” review rather than receive an exemption. As described in the proposal, we retain individual identifiers for the medical students, so that we can track their responses to survey items over the three time

points, and also analyze subgroups of students according to their differential exposure to various aspects of our curriculum. Even though we keep the identifying information secure and separate from the students' names, and report data anonymously, the IRB required that students give their informed consent.

The survey is administered online. To comply with the consent requirement, we will, as we have done in the past, obtain the students' consent to the survey (including our retention of identifiers) by requiring students to indicate their agreement to these conditions before they gain access to the survey itself.

Because the population we are surveying is the medical school class, the demographic characteristics of the study population—including the percentages of women and minorities—will be those of the class. The data on the “Targeted Planned Enrollment Table” reflects the current and expected make-up of the medical school classes, as projected by the School of Medicine. No children will be included in the survey.

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