

Measuring Thinking Worldwide

This document is a best practices essay from the international, multidisciplinary collection of teaching and training techniques, "[Critical thinking and Clinical Reasoning in the Health Sciences](#)." Each essay in this set provides an example of training reasoning skills and thinking mindset described by international experts in training clinical reasoning.

An Analytical and Evaluative Approach to Community-Based Cancer Screening and Prevention projects

Noreen C. Facione

I will always celebrate the renewed focus on training clinical reasoning skills in our increasingly demanding programs of health science education. Assessing competence in reasoning should be as fundamental as assessing knowledge development. The availability of increasingly powerful medical and surgical treatment is dangerous in the hands of a clinician who has wrongly identified the clinical problem and lacks the ability to analyze and explain a patient's response to treatment. As a result, individuals with very poor reasoning skills should be counseled from our programs early in their training. The others should be continually practiced in case analysis and be asked to voice the reasoned explanation of their planned clinical interventions according to their advancing competence.

This lesson prepared clinicians and graduate level students to design a targeted community based cancer screening project and then to evaluate it in terms of its productivity for advancing cancer early detection. Set in the context of practice, it focuses on evidenced based program planning and evaluation. This exercise of critical thinking skills and habits of mind generalizes well to other aspects of the clinical role and to other community based projects.



Introduction

In the mid 1990's health science education programs adjusted their curricula to include an emphasis on health promotion and illness prevention and medical centers began to focus on delivering prevention and early detection programs to the community outside the Medical Center walls. As a member of the oncology nursing faculty at UC San Francisco, I had the opportunity to prepare a new course for graduate level students on cancer epidemiology, screening and prevention. I seized this opportunity to bring my research findings to the classroom, realizing that in preparing health science clinicians for clinical practice I was educating those who would one day be responsible for recommending participation in cancer screening or even designing and implementing community outreach programs. My goal was for students to learn how to design community based early detection projects with clear and obtainable objectives, well-estimated benefit to the community, fiscal responsibility, and an

evaluation plan for assessing actual benefit to the community. The goal fit well with another always present goal in my teaching: helping students to develop stronger clinical reasoning skills.

Session overview

The lesson is designed in three sections, each targeting different critical thinking skills or dispositional foci. During the first hour of the session, participants analyze cancer incidence and mortality statistics by population group and review cancer screening guidelines and prevention recommendations (Section 1). In the second, they design a targeted community-based project supported by inferences and explanations developed out of their analyses of most at risk populations in their community (Section 2). The last hour is a fair-minded evaluation of a completed cancer screening or prevention project (Section 3), either one that they carried out themselves or one that has been published in the literature. Whether this offering is conducted as a staff development workshop or as a component of a graduate seminar, it is best held either as a three hour immersion experience or as three, sequential, one hour sessions.

Section 1 could be shortened or omitted, in the interest of time, if the participants have a working knowledge of cancer incidence and prevalence, recommended cancer screening guidelines and prevention recommendations, and known cultural barriers to cancer prevention and detection. However, Section 1 offers the opportunity to set the stage for a systematic analysis of cancer prevalence, at-risk populations, and the necessity for an evidence-based and culturally competent matched response in the planned project.

Session participants

This session outlines a segment of a multidisciplinary elective course designed for clinical programs in the health sciences, public health, health care economics, and health care ethics. It has also been offered as a three hour continuing education workshop for practicing clinicians to refresh their awareness of the current cancer burden and current community based efforts at early detection. The model for this session would generalize to training sessions for those who have the responsibility for developing and evaluating community outreach programs.

Learning objectives

There are multiple critical thinking focused learning objectives for the three hour session. The final summative objective calls for an evidence based clinical judgment about the value of the evaluated cancer screening or prevention project:

Section 1:

- a) Accurately analyze and interpret cancer incidence and mortality data to identify an appropriate target population (analysis) and to identify either prevention or early detection objectives for their community-based project (inference and explanation).

Section 2:

- b) Design a community based cancer screening project (inference and explanation) to address these objectives.

Section 3:

- c) Evaluate an actual cancer screening or prevention project against some standard or criterion for cancer control (analysis and evaluation; systematicity and cognitive maturity).
- d) Make a fair-minded, evidence-based judgment about the value of a completed cancer screening or prevention project (interpretation, analysis and evaluation; truth-seeking, open-mindedness).

Material used for the session

Section 1 of this lesson calls for the interpretation and analysis of a large array of documents and data reports. These will have to be made available to participants. Projection of Internet-based graphics to big screen or desktop/laptop display is an environmentally conscious approach to this requirement. The list includes:

- United States data from the Center for Disease Control on cancer incidence and mortality. These data are annually summarized for clinicians on the Centers for Disease Control website www.cdc.gov and presented as *Cancer Facts and Figures* on the American Cancer Society (ACS) website www.cancer.org. These statistics are provided by the Center for Disease Control U.S. Cancer Statistics Working Group (2007) and updated annually.
- Cancer screening guidelines and cancer prevention recommendations. My preferred source is the National Cancer Institute (NIH) website which posts current guidelines for each cancer site: <http://www.cancer.gov/cancerinfo/screening>. They also provide a research based discussion of the likely effectiveness of cancer prevention and early detection efforts. See for example their comments on two lung cancer screening approaches, noting both strengths and weaknesses. Other guidelines are available on the web, for example the Canadian Task Force on Preventive Health Care Recommendations and the American Academy of Family Physicians Task Force Report.

Sections 2 and 3 call for the design and evaluation of a community based cancer screening project. I make these available by electronic projection and suggest that participants conduct additional electronic literature searches as well.

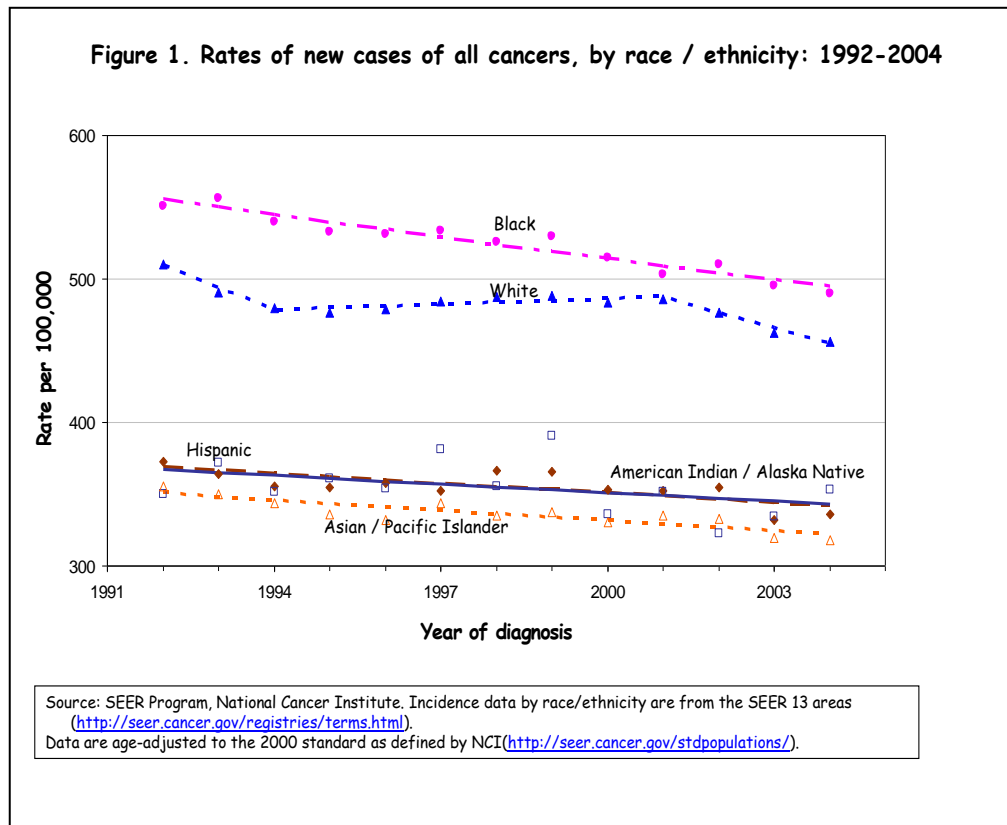
- Published reports of community based cancer early detection programs. These are retrievable with a literature search of digital library resources.

Section One: analyze cancer incidence and mortality statistics by population group

Perhaps the best effect of the new emphasis on evidence based practice is the call for a clear explanation and evaluation of clinical action based on observable data. Implicit is the need to analyze the clinical situation, develop a clear and consensus description of the problem, and identify which data would provide a relevant explanation or evaluation in each practice circumstance. Incidence and mortality data are always four or five years old, due to the time needed for compilation, but they can be examined for differences by age, sex, geographical area, and racial and ethnic background. When these data are well interpreted and analyzed, they provide evidence of at risk and potentially underserved populations, as well as a basis for setting community outreach program priorities in relationship to United States cancer incidence and mortality. I begin by examining some of the available graphic presentations aloud to model a systematic review, analyzing trends in relationship to past

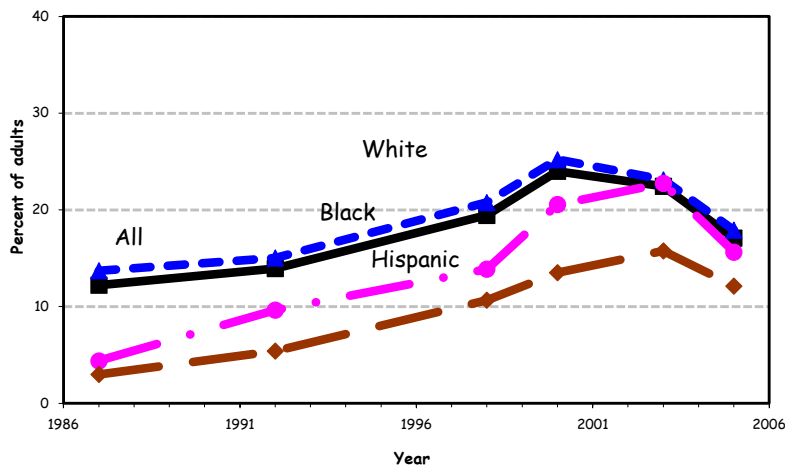
screening practices and connecting the graphic with an explanation of what is known about cancer predisposition, age at presentation and available screening modalities. I have found that I can reliably assume that many students and fellow

clinicians will not have the habit of mind of being thorough in their analyses. Figures 1 and 2 provide examples of the type of graphics that could be used in the Section 1 analysis discussion to determine which cancer sites might be addressed in a community based screening project and which populations should be targeted. Talking aloud while conducting a thoughtful and fair-minded analysis of this type of data nurtures the critical thinking dispositions of truth-seeking, inquisitiveness and systematicity and the skills of analysis and inference. These cognitive behaviors are also easily generalizable to other clinical reasoning



situations.

Figure 2. Percentage of adults aged 50 years and older who had a home Fecal Occult Blood Test (FOBT) within the past 2 years, by race / ethnicity: 1987-2005



Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey.

Section Two: Design of a Cancer Screening Project

The particular cancer focus of the cancer screening or prevention project is not in itself important, but I usually encourage session participants to begin by considering the design of a screening for prostate, breast, colorectal cancer or melanoma because of their prevalence. Some will also want to attempt to impact lung cancer deaths and will need to evaluate approaches to screening versus prevention (smoking cessation) projects. An appropriate choice of smoking cessation should result from the analyses in Section 1 which should have uncovered information like that included in Figure 3.

Figure 3: Lung Cancer Screening Modalities

- 1) Screening for Lung Cancer with Chest X-Ray and/or Sputum Cytology
 - Benefits Screening does not reduce mortality from lung cancer (fair evidence).
 - Harms Screening would lead to false-positive tests and unnecessary invasive diagnostic procedures and treatments (solid evidence).
 - Description of the Evidence: Randomized controlled trials with fair internal validity due to lack of unscreened groups and contamination. No evidence of effect. External validity of the findings is fair, due to lack of women and minority groups. False-positive results range from 4% to 15%; there is a possibility of over-diagnosis and overtreatment (magnitude uncertain).

- 2) Screening for Lung Cancer with Low-Dose Helical Computed Tomography (LDCT)
 - Benefits The evidence is inadequate to determine whether screening reduces mortality from lung cancer.
 - Harms Screening would lead to false-positive tests and unnecessary invasive diagnostic procedures and treatments (solid evidence).
 - Description of the Evidence: Cohort or case-control studies with poor internal validity for answering the question of mortality reduction. The magnitude of the effect cannot determine from the available studies. False-positive results range from 20% to 50%; over-diagnosis and overtreatment are possible (magnitude uncertain).

Small group work (4 to 5 clinicians or students) optimizes both the information available to plan the project and the communication of the thinking process behind the project design. The consideration of culturally relevant outreach, the particular experience of each screening test, potential false positive and false negative screening test rates, the necessity of following up on positive screening tests, and related strategic issues and financial costs is expected to be a part of this project design. Group members are guided to explain their analyses and inferences by a short session guideline I provide (Figure 5). The recommendation of a one hour timeline for Section 2 implies that the session participants have well established group discussion skills. I don't favor assigning a group leader in this type of exercise as they tend to stifle the thinking process. I make rounds on the groups, limiting my comments to asking questions that ask the group to clarify the assumptions being made and the logical connections that should be implicit in the project. At times I need to challenge a groups' assumptions with published findings (capitalizing on teaching from my area of expertise) or point out potential bias or stereotyping of population groups.

Figure 4. Prevention or early detection project

- cancer site (data supported)
- at risk population (data supported)
- optimal screening modalities
- benefits (study supported)
- potential harms (study supported)
- prevention recommendations (National guidelines)
- prevention or detection goals for this project
- cultural/demographic considerations
- potential strategic barriers (drawn from the literature)
- project personnel
- action plan and timeline
- screening plan and follow-up
- prevention plan and follow-up
- project evaluation plan (with brief rationale)
- project budget (with brief rationale)

Written work product for Section 2: In the context of a workshop for clinicians where we will quickly move on to Section 3, I ask each group to prepare a two page summary that covers the points in Figure 4. If this part of the exercise will be used to design an actual cancer prevention or screening project, the length of the report might best take the format of an intramural small grant application. In all cases the length of the discussion of the proposed project should be short and require the writer to be concise and clear, and to supply the evidence base for all key considerations and judgments. This type of requirement forces the write to reanalyze the thinking behind each portion of the project planning in order to present it well in the short summary or finding proposal.

Section Three: evaluation of a completed cancer screening project

Even good thinkers sometimes hold on to poorly made (or even life-threatening) decisions, refusing to reconsider. Past practices are continued in the absence of evaluation. So it's never too soon to subject a practice, a judgment or a favorite project to a fair-minded critical analysis. So I remind participants that it is always appropriate to ask whether goals have been met, or for the reasons behind a continuing effort. In this case we are asking "Should we fund other cancer screening or prevention projects like this one?" Ideally the participants should be evaluating a project that they have conducted, as a way of assessing the benefits and harms of the project and the evidence for continuing it into the future. However, often the time available does not support this ideal and instead Section 3 involves the evaluation of a published report of a community-based cancer screening or prevention program conducted elsewhere.

Possessing ability in critical thinking (skills) is no guarantee of possessing the mental discipline use these skills (disposition) to address critical clinical situations using a critical thinking approach. Knowing this I try never to pass up an opportunity to model both. In this case I talk aloud through the evaluation of a cancer screening or prevention project, covering all of the areas I will expect the participants to cover in their own project evaluation. These are outlines in Figure 5.

You may want to locate and provide written reports for use in this portion of the lesson, particularly when time is of the essence. This literature is uneven in quality, many reports being full of unsupported claims of success in reaching cancer control goals. When time permits, more learning occurs when participants are asked to locate the report individually. The most common error in locating a project to evaluate occurs when participants locate a report of an on-going national project that has yet to be completed or evaluated. In this case they have no way to evaluate the claims of the authors as to the project's benefit. I've found that I frequently need to assist weaker thinkers to identify an appropriate published report that fits the criteria of the exercise and provides them adequate information to respond to the assignment. I keep a list of recent papers reporting on neighborhood screening programs, some of which are included in the references. These are easier to approach and analyze than reports of National screening programs, yet they offer an adequate challenge, and they are more informative to future local efforts at cancer control.

Written or presented work product for Section 3: Once again, while the expected breadth of this written evaluation is considerable, the length of the written response should necessarily be short. This is because executives in the workplace rarely

read long reports. It's best to train efforts to present the results of a strong critical thinking process in a concise report. Bullet lists might even be included to summarize key points and supportive evidence where appropriate, much as has been done in this chapter. Figure 5 provides a structure for the evaluation.

Figure 5. Evaluation Guidelines for Cancer Screening or Prevention Project

Evaluate each of the following:

- overall project goals in relationship to established National cancer control goals (e.g. Goals 2010)
- the selection of cancer site and chosen target population
- the selection of and actual provision of cancer prevention or screening control activities
- the expected benefits and harms
- the use and adequacy of project personnel
- the justification of cost
- the cultural competence of project activities
- the efforts to overcome known strategic barriers
- the actual (benefits and harms) contribution made by this project to cancer control for this community
- Provide a brief comment as to the basis for each area of evaluation.

Comments on the cultural relevance

Perhaps you have been thinking, "This type of evaluation exercise would not be culturally appropriate in my country because this type of evaluation is carried out by only a few." It is true that the expectation of a voiced evaluation of existing programs will differ by country and even by cultural group within a country. In the United States we both value a well thought out critique of common practice or a particular project, and we have the freedom to express it in most circumstances. Even with this freedom, the evaluation is rarely appreciated or headed unless it is presented in a logically well-framed and evidenced-based manner. But even in situations where one may not have either

the freedom or the privilege of expressing the results of an informed evaluation, the ability to carry out an internal critical thinking process resulting in a sound evaluation that can inform one's practice is usually prized. *Those who have practiced skills in fair-minded evaluation are the source of future leadership.*

Thus, regardless of the cultural practices regarding the expected source of a voiced evaluation, I would suggest that all staff development programs and health science educational programs offer lessons like this one that practice the critical thinking skills and dispositions necessary to evaluate practice guidelines, on-going programs and the results of new initiatives.

Assessment data

An examination of performance on this assignment, using some qualitative criteria or a rubric, like the Holistic Critical Thinking Scoring Rubric (HCTSR),¹ will provide a measure of the groups' ability to think critically about an authentic workplace issue. The written reports produced in Sections 2 and 3 also provide excellent portfolio data to assess the groups' overall capability to think critically.

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¹ In the last chapter in this volume Peter Facione – with whom I co-authored the HCTSR in 1994, shares one of his favorite rubric exercises. There he provides a copy of the HCTSR and instructions for its use.

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