Original Publication

OPEN ACCESS

Individualizing Cancer Screening Recommendations: A Team-Based Learning Activity for Fourth-Year Medical Students

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Citation: Bergl PA, Feagles J. Individualizing cancer screening recommendations: a team-based learning activity for fourth-year medical students. *MedEdPORTAL*. 2017;13:10574. https://doi.org/10.15766/mep_2374-8265.10574

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Abstract

Introduction: Cancer screenings are key preventive services that patients receive in primary care. Health care professional students are generally taught about major society guidelines and U.S. Preventive Services Task Force recommendations for cancer screenings. Unfortunately, students and novice providers may view these influential recommendations as a rule book by which to provide care. Experienced providers recognize that not every patient fits neatly into clinical guidelines. Appropriate use of cancer screening entails an understanding of patient preferences, patient-specific health factors, and screening risks and associated pitfalls. **Methods:** This 2-hour team-based learning (TBL) session immerses learners in three challenging patient scenarios that are designed to stimulate nuanced discussion of cancer screening using controversial cases. The scenarios encompass the following cases: (1) a 68-year-old man actively seeking prostate cancer screening, (2) a heavy smoker with psychiatric illness and alcoholism being considered for lung cancer screening, and (3) a 42-year-old woman seeking to become pregnant who inquires about breast cancer screening. **Results:** The materials were originally designed for fourth-year students on an ambulatory medicine rotation. Our students universally viewed this activity as a high-quality presentation applicable to their careers. They strongly agreed that the cases facilitated a deeper understanding of the nuances of cancer screening. **Discussion:** This TBL encourages learners to critically appraise cancer screening guidelines and apply them to real-life examples. It is applicable for learners who understand the complexities of patient care but still suffer from a guidelines-are-rules mentality.

Keywords

Primary Health Care, Early Detection of Cancer, Team-Based Learning, Breast Cancer, Prostate Cancer, Patient-Centered Care, Diagnostic Testing, Primary Care, High-Value Care, Cancer Screening, Lung Cancer

Appendices

- A. Cancer Screening Patient Vignettes.docx
- B. Vignettes - Facilitator Notes .docx
- C. Cancer Screening TBL Slides.pptx
- D. USPSTF Recommendations Grade A and B.docx
- E. GRAT.docx
- F. IRAT - Lung Cancer Screening.docx
- G. IRAT - Breast Cancer Screening.docx
- H. IRAT - Prostate Cancer Screening.docx
- I. Additional Facilitator Reading List.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

At the end of this 2-hour team-based learning session, learners will be able to:

1. Explain common biases and limitations of cancer screening tests.
2. List at least two major benefits and two potential harms of screening for each of the following cancer types: breast, prostate, and lung.
3. Provide a nuanced recommendation for screening real-life patients encountered in challenging case vignettes.
4. Explain the rationale for their screening recommendations, citing contemporary evidence and patient-specific factors in their decisions.

Introduction

Individualized cancer screening is a timely topic. Most influential guidelines now emphasize taking a patient-centered approach in screening decisions. For example, the U.S. Preventive Services Task Force (USPSTF) breast cancer screening guidelines explicitly recommend individualizing decisions for

mammography in women ages 40-49 years.¹ For some cancer types, such as prostate cancer, opting to screen at all is a difficult choice.^{2,3}

To individualize preventive care, shared decision making (SDM) has been advocated as the preferred practice,⁴ particularly when screening decisions are a close call.⁵ SDM involves many layers for successful implementation,⁶ and today's health professions students will be expected to routinely integrate SDM into their future practices. Even though this team-based learning (TBL) activity is not explicitly focused on teaching students SDM, the activity addresses one of the core requirements of successful use of SDM: the clinician's expertise.⁷ To adequately counsel patients in SDM, clinicians need to know what choices patients face, evaluate the available scientific evidence, and adapt that evidence to a single patient.⁷

As they near graduation, most health professions students have adequate clinical experience to understand the role of screening in preventive health care. While these students have likely witnessed preceptors providing preventive health services, they may not have considered the potential risks of cancer screening or critically appraised the guidelines. Furthermore, based on our experiences, we have found they are not prepared to counsel real-life patients in the face of uncertainty about cancer screening. Hence, we introduced the topic of individualized cancer screening to a fourth-year medical student audience to teach broader lessons about individualizing decisions in patient care. This TBL activity uses three close-call cases for cancer screening to provide students with an authentic opportunity to critically appraise evidence and make difficult decisions.

The topic of individualizing cancer screening appears particularly suited for discussion in a TBL format. TBL relies on a constructivist-oriented framework for adult learning.⁸ In essence, constructivist learning requires that the instructor provide students with opportunities to approach familiar problems in a new light, to examine inconsistencies between existing knowledge and new schemas, and to reflect on these disconnects.⁸ This cancer screening TBL capitalizes on the students' familiarity with existing guidelines, but it pushes them to apply those guidelines in complex scenarios, thereby expanding and reexamining the students' views on screening. Students who have already had a diversity of clinical experiences further enrich the dialogues as they debate whom to screen.

In preparation for this session, we were unable to locate any TBL activities focused specifically on individualizing cancer screenings. There are various tools within MedEdPortal that promote patient communication and SDM, but none of these applied to the key preventive service of cancer screening. We were able to locate two resources specific to breast cancer, including modules dealing with disparities in breast cancer care⁹ and advanced treatment options,¹⁰ as well as a module on small-group sessions on cancer genetics.¹¹ However, none of these resources delved deeply into the currently available evidence on cancer screenings, nor did they require students to interpret and apply that evidence to actual patient scenarios in the TBL format.

Methods

For the 2015-16 academic year, this TBL was a required session on the 4-week ambulatory medicine rotation at the Medical College of Wisconsin. On the ambulatory medicine rotation, students predominantly rotate through outpatient internal medicine and medicine-pediatrics primary care, as well as specialty clinics. Each rotation consists of 12 to 18 students. Four half-days are dedicated to didactic activities such as TBLs. Throughout the rotation, students also have 4 to 8 half-days of reading time to prepare for TBL sessions.

Resources Required

To successfully implement this session, the following resources are required:

- Classroom with tables arranged to allow for groups of three to six students.
- One large flipboard with markers at each group table.
- Paper copies of the case vignettes (Appendix A), one copy per student.
- Annotated facilitator guide to case vignettes (Appendix B), one copy per facilitator.
- Audiovisual support to display the PowerPoint presentation (Appendix C).

- Personal tablet devices or laptops for each student. We conducted our readiness assurance tests (RATs) using our institution's online learning platform's quiz function (Desire2Learn, www.d2l.com). We also allowed students to access their readings and other electronic resources during the application exercises. Thus, we required students to bring their own devices.

Team Formation

For this TBL, teams should consist of at least three to six students. Within each group, there should be one or two students who are designated as experts in the specific cancer screenings the TBL is tailored to (i.e., breast, prostate, or lung).

The instructor forms teams at least 1 week in advance to allow students to complete the required readings. Where possible, students are matched into the specific cancer type that best aligns with their future specialty choice. For example, students entering obstetrics and gynecology should be assigned the breast cancer readings. The purpose of this approach is twofold: to provide students with the topic most relevant to their careers and to tap into any additional clinical experiences that these students have (e.g., rotating through women's health clinics). Additionally, groups are intentionally designed to provide a maximum variety of specialty career choices within each group.

Advanced Preparation Resources

Every learner is given three core reading assignments and two additional readings specific to the type of cancer individually assigned to him or her. For the sake of efficiency, our students are provided with highlighted PDF files that emphasize what elements of the readings will be tested on the individual RAT (IRAT) and the group RAT (GRAT). We highly recommend a similar approach based on student feedback.

Core readings: The foundational material focuses on refreshing students' knowledge of biases in screening, with a specific focus given to the consideration of cancer screening in the light of high-value care. These core readings require 1 to 2 hours of reading time and consist of the following:

- Table with USPSTF grade A and B recommendations (Appendix D).
- Wilt, Harris, and Qaseem, "Screening for Cancer: Advice for High-Value Care From the American College of Physicians."¹²
- Moriates, Arora, and Shah, "Screening and Prevention: Balancing Benefits With Harms and Costs."¹³

Cancer-specific readings: These readings also require 1 to 2 hours of reading time.

- Breast cancer screening readings and instructions:
 - Siu, "Screening for Breast Cancer: U.S. Preventive Services Task Force Recommendation Statement."¹ Students are expected to read the entire article.
 - Welch and Passow, "Quantifying the Benefits and Harms of Screening Mammography."¹⁴ Students are expected to become familiar with the estimated benefits and harms shown in the figure on page 452 of this article. Reading the remainder is optional.
- Prostate cancer screening readings and instructions:
 - Moyer, "Screening for Prostate Cancer: U.S. Preventive Services Task Force Recommendation Statement."² Students are expected to read the entire article.
 - Carter, Albertsen, Barry, et al., "Early Detection of Prostate Cancer: AUA Guideline."³ Students are expected to read pages 419-420, 424-426, and Guideline Statements 3-5 on pages 422-424.
- Lung cancer screening readings and instructions:
 - Moyer, "Screening for Lung Cancer: U.S. Preventive Services Task Force Recommendation Statement."¹⁵ Students are expected to read the entire article.
 - Zeliadt, Heffner, Sayre, et al., "Attitudes and Perceptions About Smoking Cessation in the Context of Lung Cancer Screening."¹⁶ Students are expected to skim this article, which outlines smokers' perspectives on lung cancer screening. Boxes 1-2 on pages 1533-1534 of the article contain representative quotations that provide insight into the mind of the smoker.

facing decisions about screening. None of this material is tested on the RAT, but it is helpful for group discussions.

Facilitator Preparation

To prepare for this session, the lead facilitator distributes the required reading assignments to the students. The facilitator also reviews a series of additional articles pertaining to cancer screening, both broadly and for the specific cancer types. This list of articles is included in Appendix I. Facilitators are encouraged to familiarize themselves with this literature.

Readiness Assurance Process

Students are given an IRAT consisting of seven questions, two of which are specific to their assigned area of expertise. Appendices F, G, and H contain the lung, breast, and prostate screening IRATs, respectively. Following completion of the IRAT, teams work on the GRAT (Appendix E), which contains the same questions as the IRAT with the exception of the two cancer-specific questions. Overall, RATs are designed to test knowledge about cancer screening guidelines and concepts like lead-time and length-time bias. The RATs do not assess students' ability to individualize decisions about cancer screening. We do not test students on memorized minutiae or statistics presented in the readings.

All RATs are conducted as closed book and are admitted as a quiz on our online learning platform. We review all of the answers to the GRAT immediately after all groups submit their responses. During this review, teams are allowed to appeal grading of the GRATs, and grades are adjusted if a convincing argument is made.

At our institution, the RATs constitute 40% of the students' overall grade for our ambulatory medicine course. Because we have four TBL sessions during the course, this session's TBLs are worth 10% of a student's final grade.

Team Application Activities

Students work in teams of three to six on cases that simulate the close calls clinicians face in recommending for or against cancer screening. Each team designates a scribe and a separate spokesperson. For each case, the students read the case scenarios relevant to prostate, lung, and breast cancers (Appendix A) and then discuss the questions in their small groups. The cases, specific questions for discussion, and an annotated instructor's guide are included in Appendix B.

By the end of each small-group discussion, a team is expected to commit to a firm decision whether or not to screen the patient by writing its decision on a large flipboard or whiteboard. The teams use the following key to indicate their response to each question:

- A = actively encourage screening for this patient.
- B = recommend screening.
- C = recommend against screening.
- D = actively discourage screening.

As the reader will note, there is no *indeterminate* or *not sure* option. Based on our initial experiences with this TBL, students tend to equivocate. Thus, we force teams to actually make a decision.

After each team has completed its small-group work, we have the teams simultaneously reveal their decisions for screening. Usually, there is some discordance amongst the groups about whether to screen. We allow the spokesperson from each team to defend his/her team's decisions. As a large group, we then review how each team has prioritized the risks and benefits of screening in the case scenario.

When the large-group discussions and interteam debates start to wane, the facilitator may want to include some of his/her own experiences. The large-group discussions may also be buttressed by the included

PowerPoint presentation (Appendix C). These slides are not necessary to conduct the TBL. However, we have found them useful for remembering key points and presenting key data on cancer screening.

Facilitation Schema

We use the following agenda for this approximately 2-hour TBL:

- IRAT (15 minutes).
- GRAT (10 minutes).
- Explanation of RAT answers (5 minutes).
- Students read and discuss prostate cancer case (20 minutes).
- Prostate cancer case large-group discussion (10 minutes).
- Students read and discuss lung cancer case (15 minutes).
- Lung cancer case large-group discussion (15 minutes).
- Students read and discuss breast cancer case (10 minutes).
- Breast cancer case large-group discussion (10 minutes).

As noted above, there are three cases that students review and discuss. Although cancer types differ, similar themes emerge in each discussion. Thus, with each ensuing case, less time can be allotted for small-group discussions.

Results

This TBL was a required session during a 4-week ambulatory internal medicine rotation for fourth-year students. Six sessions of this TBL were completed, and each session was facilitated by the lead author. Attendance ranged from 12 to 18 students per session, with a total of 93 students completing the TBL during the 2015-16 academic year. Based on feedback from the first two groups, readings were substantially shortened, and RAT questions were significantly revised. Thus, results are reported both as aggregate totals for the entire academic year and separately for the later groups after the revisions occurred.

Quantitative Data

A total of 87 students completed an evaluation at the end of the session. They expressed agreement on a 5-point Likert scale for items related to the quality of the presenter, the applicability of the presentation and the cases, and the preparatory materials. Overall, students gave very high marks to the TBL, as shown in Table 1.

Table 1. Student Evaluation Results^a

Item	All Six TBL Groups (N = 87)	Final Four TBL Groups (n = 45)
The presentation was applicable to me.	4.8	4.8
Content of preparatory materials was appropriate.	4.6	4.7
Amount of preparatory materials was appropriate.	4	4.3
The RAT questions assessed topics from preparatory materials.	4.6	4.8
The application cases facilitated my learning.	4.9	4.9

Abbreviations: RAT, readiness assurance test; TBL, team-based learning.

^aFive-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

Qualitative Data

The following themes emerged from the students' comments:

- The cases were stimulating and thought provoking. Students felt the cases were representative of real patients and enjoyed critically appraising approaches to screening.
- Students had a very positive view of having different experts for different cancer types within the group. There were no complaints about the nonuniformity of reading requirements for different cancer types.
- Even though readings were progressively shortened and specific sections were highlighted, students generally felt the readings were too lengthy and esoteric for a fourth-year student.

However, there were at least two positive comments on being able to read about the topic in more depth than simply memorizing guidelines.

Although we have not had the opportunity to implement these suggestions as of publication, student feedback and recommendations centered on the addition of topic areas:

- Discussing Medicare and private insurance reimbursements for screening tests.
- Including elements of primary prevention of cancer through risk factor modification.
- Delving deeper into biases such as lead-time and length-time bias.

Performance on RATs

RAT questions were iteratively refined throughout the academic year, particularly after the first two groups. Additionally, as discussed above, readings were shortened. Thus, scores are reported in [Table 2](#) both for the entire class and separately for the later groups.

Table 2. Student Scores as Percentages Correct on RATs

RAT	All Six TBL Groups (N = 93)		Final Four TBL Groups (N = 45)	
	M (n)	SD	M (n)	SD
Breast cancer IRAT	83.7% (30)	9.60%	84.0% (20)	10.40%
Prostate cancer IRAT	89.0% (30)	10.90%	88.5% (20)	11.80%
Lung cancer IRAT	86.3% (33)	10.30%	85.8% (24)	11.40%
GRAT	94.7% (93)	4.20%	97.0% (64)	6.10%

Abbreviations: IRAT, individual RAT; GRAT, group RAT; RAT, readiness assurance test; TBL, team-based learning.

Unlike the RATs, the group application cases were intentionally designed to have no single right answer, and so these questions were not scored in any way.

Discussion

As any successful TBL should do,⁸ this session exploits students' working knowledge of screening while advancing their ability to apply screening principles to realistic patients. Based on our experiences with this session, using close-call cases incites learners to more carefully consider cancer screening recommendations. The cases are complex enough to stimulate discussion but not too cumbersome to complete in the allotted time. Individualizing cancer screening ultimately requires teaching trainees other skills, such as SDM, but cultivating such skills in medical students would require a substantial time investment¹⁷ and would not be well taught in TBL format.

Unfortunately, we do not have many specific educational outcomes to report from this TBL. Obviously, students' evaluations reflect a high degree of satisfaction, especially with respect to the applicability of the cases. The RAT scores demonstrate that students acquired the requisite basic knowledge for providing individualized, high-value cancer screening recommendations. We did not measure each student's performance during application exercises. However, our experience in facilitating the session is that groups universally met the primary objectives, namely, by weighing the risks and benefits and committing to screening decisions.

Because this session relies on close calls in preventive health, it is imperative that the facilitator have some experience facing these decisions in clinic. Facilitating this session also requires familiarizing oneself with the available evidence, at least at the level of meta-analyses. We found that the USPSTF guidelines summarize the available data quite well. However, we have included a list of additional readings (Appendix I) that may be helpful to read prior to leading this session.

We believe this session is usable by other clinician-educators. The cases in this TBL are very loosely based on actual patients from the lead author's clinical practice. Thus, as a facilitator, our lead author was also privy to additional details about the patient (e.g., health status, social history, personality, etc.) that cannot be completely captured in the vignette. Students were allowed to ask about these modifying factors to make more nuanced decisions on whether or not to screen. Thus, we advise facilitators of this TBL to

consider modifying the vignettes to reflect patients seen in their own clinical practices. These modifications will allow the facilitator to make the discussions more authentic.

The biggest challenge in facilitating this TBL is engaging fourth-year students who are not bound for primary care specialties. We hope that this session imparts broader lessons about individualizing care and understanding screening tests. The high degree of satisfaction amongst students, many of whom were pursuing subspecialty residencies, may reflect achievement of this broader goal of the TBL session.

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Disclosures

None to report.

Funding/Support

None to report.

Ethical Approval

Reported as not applicable.

References

1. Siu AL; for U.S. Preventive Services Task Force. Screening for breast cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2016;164(4):279-296. <https://doi.org/10.7326/M15-2886>
2. Moyer VA; for U.S. Preventive Services Task Force. Screening for prostate cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2012;157(2):120-134. <https://doi.org/10.7326/0003-4819-157-2-201207170-00459>
3. Carter HB, Albertsen PC, Barry MJ, et al. Early detection of prostate cancer: AUA guideline. *J Urol.* 2013;190(2):419-426. <https://doi.org/10.1016/j.juro.2013.04.119>
4. Sheridan SL, Harris RP, Woolf SH; for Shared Decisionmaking Workgroup, U.S. Preventive Services Task Force. Shared decisionmaking about screening and chemoprevention: a suggested approach from the U.S. Preventive Services Task Force. *Am J Prev Med.* 2004;26(1):56-66. <http://doi.org/10.1016/j.amepre.2003.09.011>
5. Chan E. Close-call screening and shared decision making. *AMA J Ethics.* 2015;17(7):601-607. <https://doi.org/10.1001/journalofethics.2015.17.7.ecas1-1507>
6. Elwyn G, Laitner S, Coulter A, Walker E, Watson P, Thomson R. Implementing shared decision making in the NHS. *BMJ.* 2010;341:c5146. <https://doi.org/10.1136/bmj.c5146>
7. Towle A, Godolphin W. Framework for teaching and learning informed shared decision making. *BMJ.* 1999;319:766-769. <https://doi.org/10.1136/bmj.319.7212.766>
8. Hrynchak P, Batty H. The educational theory basis of team-based learning. *Med Teach.* 2012;34(10):796-801. <https://doi.org/10.3109/0142159X.2012.687120>
9. Martinez IL, Ilangovan K, Whisenant EB, Pedoussaut M, Lage OG. Breast health disparities: a primer for medical students. *MedEdPORTAL Publications.* 2016;12:10471. http://doi.org/10.15766/mep_2374-8265.10471
10. Duff J, Daily K, Close J. Breast cancer instructional module. *MedEdPORTAL Publications.* 2015;11:10023. http://doi.org/10.15766/mep_2374-8265.10023
11. Trotter D, Colmer-Hamood J, Jones B, Trotter C. Small group discussion activity: perspectives in cancer genetics. *MedEdPORTAL Publications.* 2014;10:9897. http://doi.org/10.15766/mep_2374-8265.9897
12. Wilt TJ, Harris RP, Qaseem A; for High Value Care Task Force of the American College of Physicians. Screening for cancer: advice for high-value care from the American College of Physicians. *Ann Intern Med.* 2015;162(10):718-725. <https://doi.org/10.7326/M14-2326>
13. Screening and prevention: balancing benefits with harms and costs. In: Moriates C, Arora V, Shah N, eds. *Understanding Value-Based Healthcare.* New York, NY: McGraw-Hill Education; 2015:279-306.
14. Welch HG, Passow HJ. Quantifying the benefits and harms of screening mammography. *JAMA Intern Med.* 2014;174(3):448-454. <https://doi.org/10.1001/jamainternmed.2013.13635>

15. Moyer VA; for U.S. Preventive Services Task Force. Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2014;160(5):330-338. <https://doi.org/10.7326/M13-2771>
16. Zeliadt SB, Heffner JL, Sayre G, et al. Attitudes and perceptions about smoking cessation in the context of lung cancer screening. *JAMA Intern Med.* 2015;175(9):1530-1537. <https://doi.org/10.1001/jamainternmed.2015.3558>
17. Morrow CE, Reed VA, Eliassen MS, Imset I. Shared decision making: skill acquisition for year III medical students. *Fam Med.* 2011;43(10):721-725.

Received: September 19, 2016 | **Accepted:** April 11, 2017 | **Published:** May 4, 2017