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A Rigorous Evaluation of an Institutionally-Based Communication Skills Program for Post-Graduate Oncology Trainees

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Abstract

Objective: Integrating education about physician-patient communication into oncology specialists' education is important to improve quality of care. Our aim was to rigorously evaluate a 4-year institutionally-based **patient** communication skills program for oncology post-graduate trainees.

Methods: Trainees from 10 specialties in the U.S. participated in **patient** communication skills modules tailored to sub-specialties. The program was evaluated by comparing pre-post scores on hierarchical outcomes: course evaluation, self-**confidence**, skills uptake in standardized and real patient encounters, and patient evaluations of satisfaction with communication. We examined breadth of skill usage as key outcome. Generalized estimating equations were used in data analysis.

Results: Two hundred and sixty-two trainees' data were analyzed, resulting in 984 standardized and 753 real patient encounters. Participants reported high satisfaction and demonstrated significant skill growth with standardized patients, but transfer of these skills into real patient

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encounters was incomplete. Participants with lower baseline scores had larger improvements with both standardized and real patients.

Conclusion: The program was well received and increased participant skills in the simulated setting without effective transfer to real patient encounters.

Practice Implications: Future work should allocate proportionally greater resources to trainees with lower baseline scores and measure breadth of participant skill usage as an outcome.

Keywords

Physician-patient relationship; graduate medical education; patient simulation; experiential learning; cancer communication; communication skills training

1. Introduction

Physician-patient communication is an essential component of medical education because of its impact on patient and physician outcomes [1–3]. Particular emphasis has been given to improving cancer communication due to the complex, challenging nature of cancer care [4]. Such programs have been developed, implemented, and evaluated internationally (e.g.,[5–8]).

Post-graduate oncology trainees may have a particular need for communication courses due to stresses associated with being an inexperienced physician [8]. The first U.S. federally funded program to target this group was *Oncotalk*, which focused on communicating with patients who have incurable or progressive cancer [9]. Oncology trainees from 62 institutions participated in a 4-day retreat and demonstrated improved communication skills with standardized patients (SPs)[10].

We hypothesized there would be advantages to a physician-patient communication skills program implemented for all post-graduate oncology trainee physicians (i.e., residents and fellows) *within* an institution rather than a group gathered from multiple locations. First, an institutionally-based program is better able to attend to the *hidden curriculum*, the implicit learning that happens through role modeling and transmission of cultural norms [11]. Second, it allows for measurement of trainee behavior change during regular clinical practice. Third, it allows for tailoring for subspecialties based on input from medical education leadership.

The aim of this study was to rigorously evaluate an institutionally-based physician-patient communication skills program for oncology post-graduate trainees. Our research questions were:

> RQ 1: Is there a main effect of the program on self-confidence, skills uptake with SPs and real patients, and patient evaluations?
>
> RQ 2: What characteristics predict the magnitude of change (pre-training to post-training) in communication skills and patient evaluations?

2. Methods

2.1. Study Design

The study design was a pre-post single arm intervention. Our evaluation model (Figure 1) was a version of Kirkpatrick's assessment model modified for communication skills education [4, 12, 13]. The model describes four levels of assessment, with progressively complex behavior change. Level 1 assesses participants' *reaction* to the program, which we measured through course evaluations. Levels 2A and 2B assess *learning* measured through self-reports and Standardized Patient Assessments (SPAs). Level 3 assesses change in *behavior*, which we measured through recording and coding real patient interactions. Level 4 assesses the *results* of the program, measured through patient surveys in our study.

To attain the most complete evaluation, assessment should be multi-methodological, utilizing all levels. However, as the main purpose of our study was to examine the impact on trainee behavior and on patient evaluations (Levels 2B, 3 and 4), we primarily focused on these.

2.2. Participants

2.2.1. Trainees—Trainees from 10 specialties at Memorial Sloan Kettering Cancer Center (New York City, U.S.) participated in a physician-patient communication skills program across four academic years (2010–14), as part of their training. All trainees at our institution whose program directors had chosen to be part of the program were included. There were no trainee exclusion criteria. Trainees gave permission to use their data for research purposes. The study was approved by the institution's IRB.

2.2.2. Patients—A research study assistant screened patients for eligibility and approached them for consent. Patient inclusion criteria included the ability to provide informed consent and to speak and read English. For Pediatric and Critical Care trainees, legally authorized representatives (LARs) could participate instead of the patient as appropriate.

2.3. Intervention

The Comskil Model, a skills-based approach to teaching communication skills in a cancer setting, guided the program [4, 14–16]. This approach promotes a patient-centered approach and tailoring communication to patients' individual needs. We followed internationally accepted best practices for the method of teaching communication [17]. Each module was approximately 2 hours, included a short lecture, and demonstration videos, with the majority of the time spent in facilitator-led small group role play.

Trainees participated in either four or six modules according to specialty (Table 1). To help address the hidden curriculum, multi-disciplinary faculty members co-led the small group role play sessions. In order to participate as a facilitator, they completed the six-module course as a participant and subsequently completed a facilitator course [4, 18]. By completing the course as a participant, the faculty members became familiar with the curriculum and were able to critically evaluate their own communication skills and improve their own practice of communication skills in the hospital. We assessed fidelity by coding for adherence to our facilitation model [19].

2.4. Assessment Procedures

Our assessment procedures are described in Figure 2 as they occurred chronologically. Here we describe the procedures for each outcome.

2.4.1. Course Evaluations (Level 1) and Self-Confidence (Level 2A).—At the end of each module, trainees completed an anonymous questionnaire evaluating the module and assessing their own confidence about the content.

2.4.2. Skills Application with SPAs (Level 2B).—Immediately before the course, trainees completed two (early/advanced disease) 12-minute video recorded SPAs with trained SPs. We audited 25% of SPAs and gave feedback to SPs who were not performing up to standard. Over the four years, the average SP adherence ranged from 82.8% to 89.7%. Immediately following the course, trainees completed the same two 12-minute SPAs, in the opposite order.

2.4.3. Skills Application with Paitent Interactions and Patient Evaluations (Levels 3 and 4).—Approximately one month before the program, we video-recorded trainees with two different patients. Patients completed a questionnaire following the interaction. We repeated the clinic video recordings and patient questionnaires after participants had completed the program. Our intent was to complete post-training video recordings within one month following the program, but this was not always possible due to schedules and rotations.

2.5. Coding Procedures

All SPA and clinic interaction data were coded using the Comskil Coding System (CCS) [20]. The CCS includes 20 individual skills (listed in Table 5), grouped under five communication skill categories (agenda setting, checking, questioning, information organization, and empathic communication). A randomly selected 25% of small group role play sessions were assessed based on our previously developed checklist [19]. SP adherence during SPAs was coded using a checklist based upon the script and instructions given to SPs.

For SPA and clinic interaction data, coders were trained and tested to a gold standard of approximately 10% of the data before coding independently. Coding occurred at the end of each academic year, and coders were blinded to pre-post status. We assessed inter-rater agreement at midpoint and at end point by double coding 10% of data. Due to the large number of possible codes in any interaction and the variable units of analyses, we used a time-chunk method [20] to determine inter-rater agreement, which was high for both SPA and clinic coding (84–92%). For facilitator and SP adherence data, inter-rater reliability of 20% of the data was established.

2.6. Data collection Instruments

2.6.1. Course evaluations.—Course evaluation questionnaires contained 13–14 standardized questions regarding satisfaction with and evaluation of the module, rated on a 5-point scale (Strongly Disagree=1 to Strongly Agree=5).

The questionnaire also included a pair of retrospective pre-post course questions [21] about the trainees' confidence levels with the communication topic for each module. The first question asked: *Before this module, I felt confident [e.g., giving bad news]*. The second question asked: *Now that I have completed this module, I feel confident [e.g., giving bad news]*. For these two questions the same five-point scale was used.

2.6.2. Trainees Sociodemographics—A brief form detailed the trainee's age, gender, training program, and years since graduation from medical school.

2.6.3. Patient Sociodemographic, Disease, and Treatment Sheet—Patients' demographics included age, gender, race or ethnicity. We also recorded the patient's cancer diagnosis, stage of disease, and treatment type from the electronic medical record for the visit date when the patient was consented and talked with the participating trainee.

2.6.4. Patient Evaluation—The Comskil Patient Communication Questionnaire (CPCQ) is a 22-item questionnaire that asks patients to rate their agreement (on a 5-point scale from Strongly Agree to Strongly Disagree) to a variety of statements about their reaction to the physician's communication. The CPCQ is based primarily on a scale of patient satisfaction with physician communication that has been used in several previous studies of cancer patients and has proven sensitive to changes in doctor behavior [22, 23]. However, some items were removed a priori based on the investigators' knowledge of the roles of the residents and fellows (e.g, not making treatment decisions). Six items were added that focused specifically on the patient's perceptions of communication skills that were being taught in the program.

2.7. Analyses

For participant evaluations and the main effect of the program on outcomes (RQ1), we used descriptive statistics, paired t-tests, and generalized estimating equation (GEE) models. Course evaluations (Kirkpatrick's level 1) were described using frequencies. Self-confidence (level 2a) data were compared pre- to post-training using paired t-tests. For SPA (Level 2b), clinic (level 3), and patient evaluation (level 4) data, we used GEE to model the dependent variables (e.g., skill counts) on training status. GEE methods can account for correlation introduced by repeated measurement [24] for fellows, allowing for unbalanced numbers of observations per fellow. Models were stratified both by skill outcome and (for level 2B) by SPA version (early or advanced), so that effects could be assessed independently in the two versions. Up to four skill counts or patient evaluations per fellow were included in each stratified model. Skill count variables were: (1) frequencies of the 20 individual skills; (2) the sums for each of the five skill categories; (3) *tally of skills* – measured as the total count of skills used, and thus has no maximum value: (4) *breadth of skills* – measured as the count of how many unique skills were used, regardless of how many times each was used, and could range from 0–20. Patient evaluative variables included 22 individual items as well as an overall mean score. For each level of analysis in RQ1, we also conducted a stratified analysis for the highest-level summary scores (i.e., *tally of skills*, *breadth of skills*, and mean of patient evaluative items), where for each of these models we took a median split of participants based on their baseline value of the summary score and modeled post-course effects within these two strata in order to rule out a simple regression to the mean effect.

For RQ2, we used GEE to model the effects of covariates on change in outcomes (e.g., skill counts and patient evaluative items). The covariates included age, gender, years since completing medical school, number modules (4 or 6), training program (Pediatrics, Psychiatry, Radiology, Surgical, or Medicine), and days of participation (1–3). Change scores for post-training skills use were modeled on pre-training skill use and covariates. For patient evaluations (level 4), pre-training skill use was calculated as the mean of two patient interactions for the fellow. Unadjusted effects of single covariates with baseline adjustment were first assessed, followed by models fully adjusted for all potential covariates. Estimated effect sizes are based on t-tests for each scenario and outcome. All statistical analyses were conducted in SAS version 9.4 and all GEE models assumed a compound symmetric correlation structure.

3. Results

3.1. Description of Participants, Program, and Course Evaluations

3.1.1. Trainees—Of 273 participating trainees, 262 gave permission to have their data used. As shown in Table 2, trainees were almost equally male and female. Most had finished medical school in the last 3–9 years, and nearly half were from training programs in the Department of Medicine.

3.1.2. Patients—As shown in Figure 3, we had 753 completed patient video recordings available for analysis. Patients were 52% female and 77% white (Table 3). Fifty-three percent had later stage cancer (stage 3 or 4), with the highest percentage being breast cancer patients (19%).

3.1.3. Communication Skills Program—We conducted 536 small group role play sessions, with a total of 85 trained faculty facilitators participating in the course during the four years. Seventy percent of the small groups were co-facilitated by two faculty – one specific to the discipline of trainee and one with psychosocial expertise (e.g., psychologist). The facilitation process in the coded 25% sample of small groups exceeded our 80% adherence criteria, with an average of 86.3% adherence. In order to improve adherence, we gave feedback to facilitators.

3.1.4. Course Evaluations (Level 1)—More than 90% of participants indicated that they agreed or strongly agreed with 5 of the 6 evaluation items (Figure 4) and the majority of participants (>80%) rated each individual module component as aiding in learning.

3.2. Main effect of the program on Self-Confidence, Skills Application, and Patient Evaluative Items

We answered Research Question 1 by examining the main effect of the program on the variables making up levels 2–4 of the Kirkpatrick model: self-confidence, skills application in SPAs and clinics, and patient evaluations.

3.2.1. Self-confidence (Level 2A)—Mean scores increased significantly from pre- to post-test for each individual module and overall (p<.01, average mean difference = .79) (Table 4).

3.2.2. Skills Application with SPAs (Level 2B)—The communication skills program was significantly associated with moderate increases in *breadth of skills* (mean 1.19 skill increase, corresponding to an effect size of d=0.60) (Table 5). Significant increases were also seen among skill categories of Agenda Setting (0.55 increase; d=0.73), Checking (0.52 increase, d=0.41), Information Organization (0.32 increase, d=0.35), as well as most of the skills associated with those categories, regardless of early (version A) or advanced (version B). Questioning Skills significantly decreased by an average of 0.64 after training only in the early scenario. Empathic Communication skills and *tally of skills* both significantly increased only in the advanced scenario (0.52 and 1.64 respectively). Stratified analyses revealed that the gains in both *breadth of skills* and *tally of skills* were driven by participants with lower baseline in the respective measure; participants with low baseline breadth of skills had a mean increase of 1.62 (p<.001) in that measure, while participants with higher baseline did not have a significant change in breadth of skills. Participants with low baseline tally of skills had a mean increase of 2.91 skills (p<.001) whereas participants with higher baseline had a significant decrease of 1.75 (p<.001).

3.2.3. Skills Application with Patient Interactions (Level 3)—Overall, the results when examining real patient interactions were much more subdued than for those examining skills uptake with SPs (Table 5). Neither *tally* nor *breadth* showed improvement post-course. Most individual skills were not significantly different. However, there were significant changes in the Information Organization Skill category (mean increase 0.27 skills used, p<.01) and one specific skill under that category (Review Next Steps; mean 0.14, p<.001). Stratified analyses again showed significant post-course improvements for the participants with low baseline *breadth of skills* used (mean increase = 0.68, p<.001) and *tally of skills* (mean increase = 1.67, p<.001). Participants with high baseline *breadth of skills* showed a post-course significant decrease in that measure (mean decrease = 1.05, p<.001) and those with high baseline *tally of skills* showed no significant difference post-course.

3.2.4. Patient Evaluative Items (Level 4)—Of the 792 patients in the study, 740 had at least one CPCQ response to be included in analysis (366 pre, 374 post). Just one item “the doctor listened to what I said” showed statistically significant, though not clinically meaningful, improvement (mean difference = .08, p<.05). (Table 6). Once again, differential trends were observed by baseline measures; participants with low baseline mean of patient evaluative items showed a significant increase (mean increase = 0.28, p<.001) post-course, while those with high baseline mean showed a significant decrease (mean decrease = 0.22, p<.001).

3.3. Modifiers to the Effect of the Program on Skills Application and Patient Evaluative Items

3.3.1. Skills Application with SPAs (Level 2B)—Several factors were associated with change depending on the dependent variable (i.e., skill count) of interest. We considered variables associated with change on more than one dependent variable to be most robust: Lower baseline scores were significantly associated with change across all four dependent variables (ranging from .69-.84 increase in skill use per additional one pre-training skill use, all p<.05) and the advanced scenario produced greater change in Empathic Communication, *breadth*, and *tally* (ranging from 0.20 to 0.45 increase, all p<.05). Whether a learner participated in 4 or 6 modules was not associated with change on any of the dependent variables. To explore the consistent finding that baseline skill use was associated with change, we fitted another set of models stratified by median split of the pre-training value; generally, the association was maintained in both high-baseline and low-baseline models, with findings still highly significant at the p<.001 level for summary scores (skill category, *tally*, and *breadth*).

3.3.2. Skills Applications with Patient Interactions (Level 3)—As with the SPAs, lower baseline scores translated to more change, again significant for all dependent variables (range from 0.53 to 0.77 increase per one additional baseline skill, p<.05). As with the SPAs, participating in 4 or 6 modules did not impact change on any dependent variable. A sub-analysis using models stratified by pre-training skill use was again conducted, and results showed consistent baseline effects in higher and lower strata for Agenda Setting, Checking, and Information Organization categories at the p<.001 level.

3.3.3. Patient Evaluative Items (Level 4)—As with the previous analyses, those that had lower baselines saw more significant improvement; on average, a one point lower baseline score in any item was associated with a 0.95 point larger increase (all p < .0001) in that item post-training.

4. Discussion and Conclusion

4.1. Discussion

Guiding oncology trainees in their development of patient-centered communication is a well-accepted goal. Our approach was to do this institutionally at a large cancer center, involving faculty as role models and teachers, in order to try to impact and sustain uptake of communication skills within the context of the hidden curriculum. Certainly, our intervention was not enough to fully address the hidden curriculum, however, we did design our program with the intent to address it to the extent possible.

We examined the effects of our program at hierarchical levels to answer our first research question – if participation in a communication skills program impacts skill uptake and patient evaluations. Though participants had positive reactions to the course and demonstrated significant increases in self-confidence, such findings do not necessarily indicate sustained behavior change, so we evaluated effects of the program at higher levels, such as using SPAs to measure learning. Though we found significant overall behavior change at the SPA level, we found little overall change at higher levels of the assessment model – communication with real patients –and, consequently, no meaningful change at the patient report level.

The disconnect between learning and behavior is not unique to our study or to a medical education context [25, 26]. Our assessments may not have been able to accurately measure what the learners were capable of with real patients. Trainees often saw patients in a supplementary role to the attending physician, without opportunities to demonstrate some skills. Another explanation may be that the dose of the course was not strong enough to consolidate learning or that a post-training coaching session is necessary to help to consolidate learning [27]. A European consensus paper and systematic review published after we developed our program indicated that three days of participation in a communication skills course at minimum are necessary in order to see transfer of skills. [28]. A further possibility is that the work pressure in an overburdened healthcare system leaves little room for sustained communication improvement.

Despite the lack of demonstrated transfer to clinical practice for all trainees, we did have some notable findings. First, we saw an increase in skills usage when measured through the SPAs for the *breadth of skill* variable, as well as three of the five skill categories. The total skill *tally* variable and the Empathic Communication Skills category improved only for the SPA that was focused on an advanced cancer scenario, perhaps because there were more opportunities to communicate empathically during this scenario. Although learners may improve with repeated simulated scenarios, it seems unlikely to be the case here as our learners were almost always repeating the assessments after several months had passed.

Second, although the research literature shows that a larger dose may be important [29], the number of modules our trainees completed did not affect the strength of skill change for either SPAs or clinics. This may be because even our longer programs were not long enough to affect an overall outcome change.

Finally, we believe our most notable finding was that at both the levels of learning (SPAs) and behavior (clinic) and across all four dependent variables, strength of change was dependent on the baseline score: The lower the score, the greater the change. Analyses implementing a median split to exclude an effect of regression to the mean enhanced the utility of this result. This robust finding suggests that the implementation and dissemination of communication skills interventions may benefit from focusing more on participants with lower baseline skills, with particular potential for remedial efforts. Those who have mastered the skills may benefit from more advanced programs. However, as this was not a randomized trial, we can not say definitively that the cause of the differences in outcomes was the baseline score.

An innovative contribution of our study to the communication skills research literature is a conceptualization of measuring outcome of communication skills courses – the breadth of skill usage. Given that participants had limited time in the SPAs, and in reality are often pressed for time in clinics, measuring the breadth of skills is a realistic assessment of their ability to select appropriate skills from a large set in a finite period of time.

Limitations include the lack of a control group and that participants were assigned to different modules depending on specialty. In that way, the design may not be as clean as desired for research, however, it was necessary for studying an educational intervention in a dynamic academic medical setting. Second, as we collected the self-confidence data anonymously, we were unable to link that data to other evaluation levels. Third, we may not have been able to capture an optimal setting to accurately measure participants' true capabilities in their interactions with real patients, given the presence of attending physicians becoming involved in many of these consultations. Fourth, our decision to use *retrospective* pre-post measures may have resulted in bias. In addition, we were unable to always obtain the planned two video recordings per participant both pre-and post-course. Finally, although we have made the assumption with our GEE models of a compound symmetric correlation structure, it is possible that an autoregressive correlation structure may better fit the data, however missing data on the order of SPAs and patient interactions made such a model impossible.

We believe that communication skills are necessary but not sufficient for effective physician-patient communication. We acknowledge that there are other perspectives to consider about how to improve physician-patient communication in the cancer context [30].

In addition to our program continuing locally, the Comskil model has also been used to support the development of a program for oncology nurses [31], is used internationally in Australia and Qatar [32, 33], and has been incorporated in a major textbook about communication in cancer care [34]. Future research should continue to explore how to improve transfer from learning to clinical practice and how to use communication skills interventions to help address patient care challenges.

4.2. Conclusion

An institutionally-based cancer communication program for oncology trainees was evaluated positively and resulted in improvements in self-confidence and demonstrated learning in SP encounters. However, change in communication skill use improved little with real patients, and there was little effect on patient-reported satisfaction. Several factors may have contributed to this lack of transfer. Participants who demonstrated fewer skills at baseline demonstrated larger change in the post-training assessments.

4.3. Practice Implications

Researchers should think carefully about how they are conceptualizing and measuring outcomes of communication skills programs. Using a breadth of skill measure (rather than tallying skills) may be more sensitive to the realities and pressures of healthcare systems. Furthermore, traditional approaches of enrolling all participants in the same communication skills programs may not be an efficient use of resources. Formative assessment can identify participants that would potentially gain the most.

I confirm all patient/personal identifiers have been removed or disguised so that patient/ person(s) described are not identifiable and cannot be identified through the details of the story.

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Highlights

- Medical trainees improved in confidence in communication skills after a course.
- Trainees used more communication skills with actor-patients after a course.
- Trainees with low baseline scores improved communication skills with real patients.

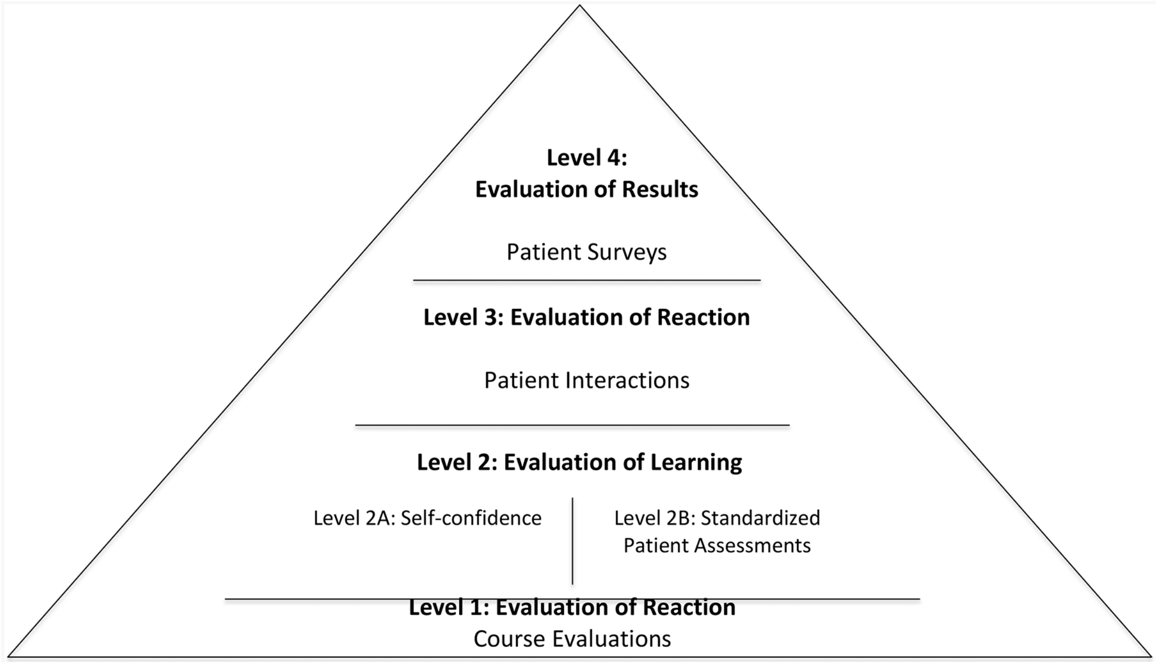

Figure 1.
Application of Kirkpatrick's Evaluation Model to the Communication Skills Program

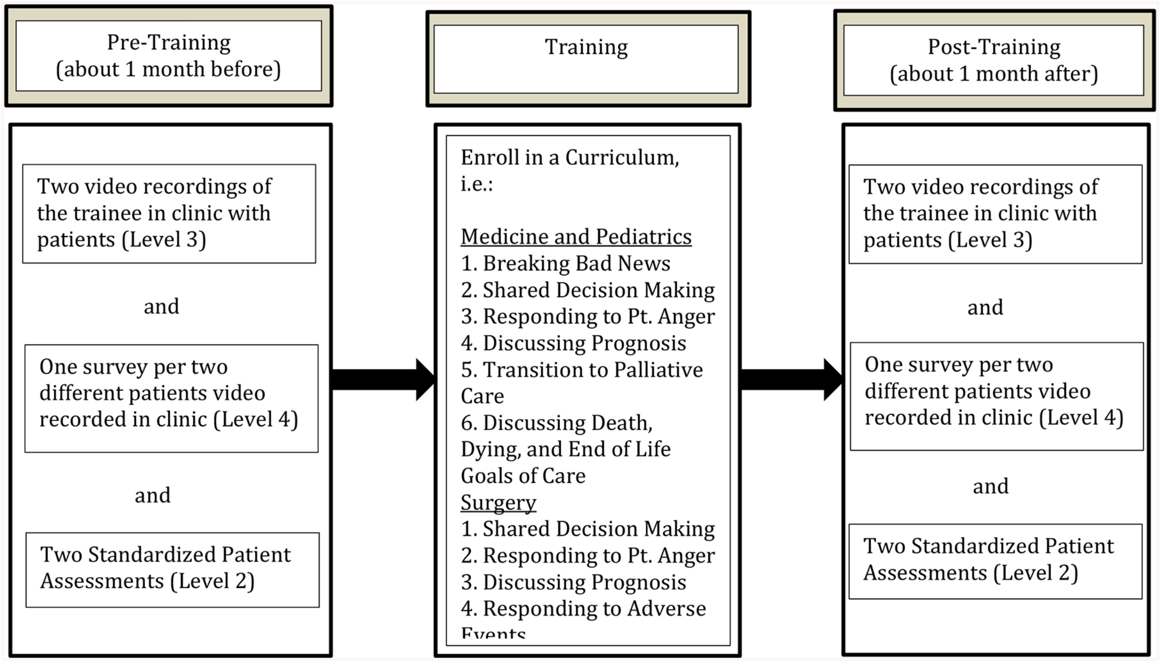

Figure 2.

Procedure: Pre/Post Assessments

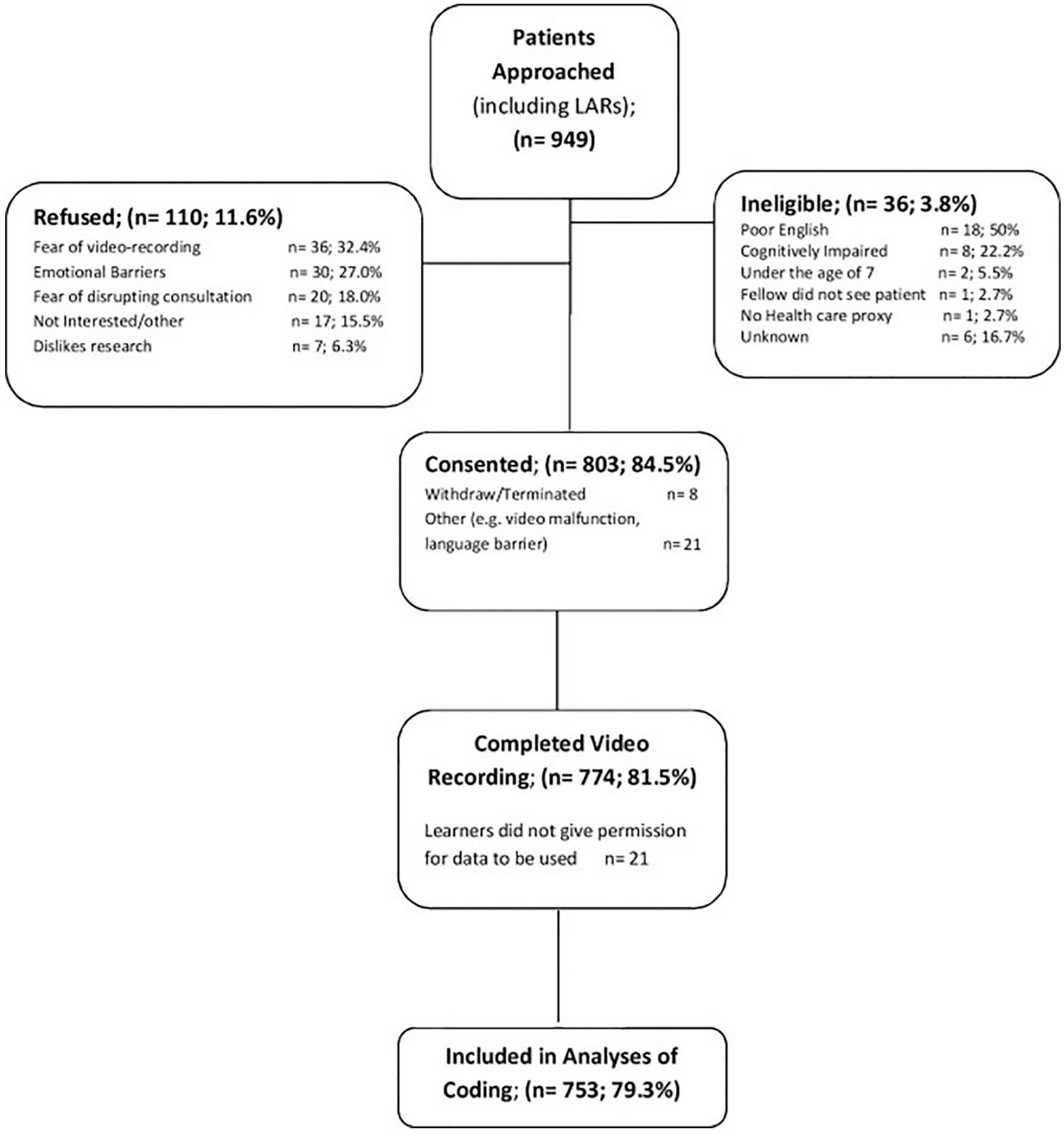

Figure 3.
Patient Enrollment Chart

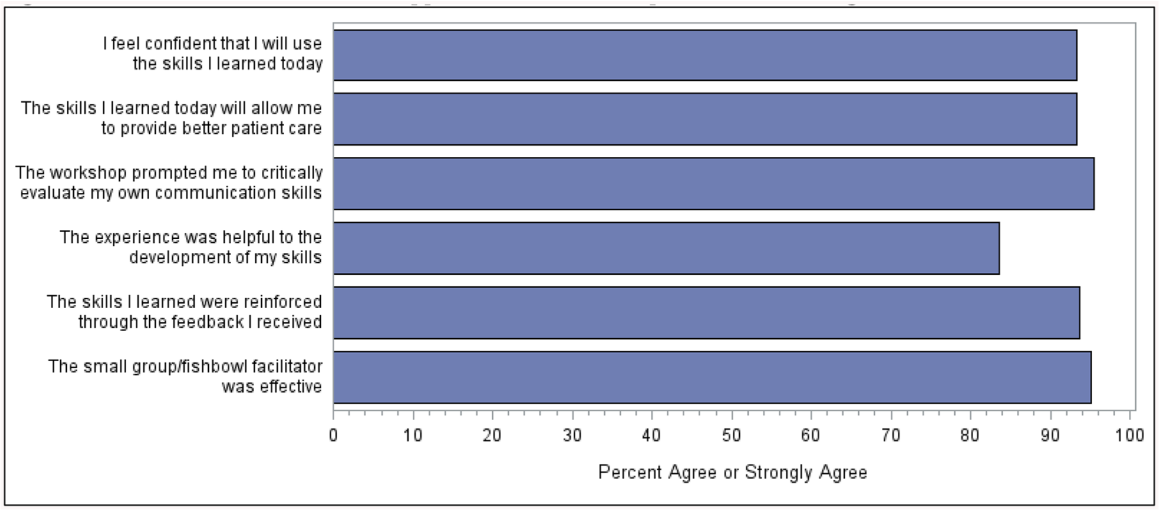

Figure 4.

Trainee confidence and self-appraisal of skill development and teaching method

Table 1.

Curriculum of nine communication skills training modules employed by ten oncology disciplines for their training programs

Training Program	Number of Trainees	Breaking Bad News	Shared Decision Making	Responding to Patient Anger	Discussing Prognosis	Discussing the Transition to Palliative Care	End of Life Goals of Care Discussions	Working with Interpreters	Conducting a Family Meeting	Responding to Adverse Events
Six Modules										
Critical Care	28	✓	✓	✓	✓	✓	✓			
Endocrinology	2	✓	✓	✓	✓	✓	✓			
Medical Oncology	60	✓	✓	✓	✓	✓	✓			
Neurology	18	✓	✓	✓	✓	✓	✓			
Palliative Medicine	21	✓	✓	✓	✓	✓	✓			
Pediatrics	30	✓	✓	✓	✓	✓	✓			
Psychiatry	23	✓		✓		✓	✓	✓	✓	
Four Modules										
Interventional Radiology	12		✓	✓	✓					✓
Radiation Oncology	19	✓	✓	✓	✓					
Surgery	49		✓	✓	✓					✓

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Table 2

Sociodemographic characteristics of 262 trainees

Characteristic		**Female n (%)**	**Male n (%)**	**Total n (%)**
All		127 (48%)	135 (52%)	262 (100%)
Age	27 to 29	22 (17%)	8 (6%)	30 (11%)
	30 to 34	76 (60%)	83 (61%)	159 (61%)
	35 to 39	14 (11%)	25 (19%)	39 (15%)
	40+	5 (4%)	8 (6%)	13 (5%)
	Missing	10 (8%)	11 (8%)	21 (8%)
Yrs Since Med School	<3	3 (2%)	6 (4%)	9 (3%)
	3 to 4	59 (46%)	43 (32%)	102 (39%)
	5 to 9	47 (37%)	54 (40%)	101 (39%)
	10+	9 (7%)	23 (17%)	32 (12%)
	Missing	9 (7%)	9 (7%)	18 (7%)
Number of Modules	4	23 (18%)	38 (28%)	61 (23%)
	6	104 (82%)	97 (72%)	201 (77%)
Days of Training	1	25 (20%)	36 (27%)	61 (23%)
	2	92 (72%)	88 (65%)	180 (69%)
	3	10 (8%)	11 (8%)	21 (8%)

Table 3.

Sociodemographic characteristics of patients providing feedback on trainee communication

Characteristic		Pre n (%)	Post n (%)	Total n (%)	P-value
All		366	374	740	
Age	Under 18	30 (8%)	25 (7%)	55 (7%)	0.381
	18 – 34	40 (11%)	38 (10%)	78 (11%)	
	35 – 54	107 (29%)	108 (29%)	215 (29%)	
	55 – 64	88 (24%)	92 (25%)	180 (24%)	
	65 or higher	100 (27%)	108 (29%)	208 (28%)	
	Missing	1 (0%)	3 (1%)	4 (1%)	
Gender	Female	196 (54%)	190 (51%)	386 (52%)	0.500
	Male	169 (46%)	181 (48%)	350 (47%)	
	Missing	1 (0%)	3 (1%)	4 (1%)	
Ethnicity	Hispanic	37 (10%)	36 (10%)	73 (10%)	0.825
	Non-hispanic	325 (89%)	334 (89%)	659 (89%)	
	Missing	4 (1%)	4 (1%)	8 (1%)	
Race	White	281 (77%)	287 (77%)	568 (77%)	0.580
	Black	40 (11%)	37 (10%)	77 (10%)	
	Asian	17 (5%)	22 (6%)	39 (5%)	
	Other	25 (6%)	24 (6%)	50 (7%)	
	Missing	2 (1%)	4 (1%)	6 (1%)	
Marital Status	Single	89 (24%)	105 (28%)	194 (26%)	0.544
	Living together	11 (3%)	7 (2%)	18 (2%)	
	Married	215 (59%)	204 (55%)	419 (57%)	
	Divorced/Sep	30 (8%)	32 (9%)	62 (8%)	
	Other	18 (5%)	23 (6%)	41 (6%)	
	Missing	3 (1%)	3 (1%)	6 (1%)	
Staging	Early	111 (30%)	112 (30%)	223 (30%)	0.845
	Late	190 (52%)	199 (53%)	389 (53%)	
	In remission	10 (3%)	13 (3%)	23 (3%)	
	Missing	55 (15%)	50 (13%)	105 (14%)	
Diagnosis	Breast	68 (19%)	72 (19%)	140 (19%)	0.536
	Gynecologic	16 (4%)	20 (5%)	36 (5%)	
	Gastrointestinal	56 (15%)	60 (16%)	116 (16%)	
	Hematologic	70 (19%)	57 (15%)	127 (17%)	
	Genitourinary	32 (9%)	36 (10%)	68 (9%)	
	Musculoskeletal	27 (7%)	25 (7%)	52 (7%)	
	Neurologic	24 (7%)	37 (10%)	61 (8%)	
	Thoracic	25 (7%)	28 (7%)	53 (7%)	
	Other	47 (13%)	35 (9%)	82 (11%)	

Characteristic	Pre n (%)	Post n (%)	Total n (%)	P-value
Missing	1 (0%)	4 (1%)	5 (1%)	

Note: P-value is test of differential demographic distribution between pre and post based on Chi-square with missing excluded. Mantel-Haenszel Chi-Square used for Age group. “Other” diagnosis includes Thyroid, Skin, Head and Neck, and those indicated as Other.

Table 4.

Self-confidence in ability to task performance (Years 1–4 combined).

Self-Confidence Items	M	SD	Paired Sample t test
Overall N= 1,486			
Before this module I felt confident about task (Pre)	3.31	.85	$t(1485) = -37.99^{**}$
Now that I have attended this module I feel confident in my ability to perform task (Post)	4.10	.67	
Breaking Bad News (n= 203)			
Pre	3.30	.85	$t(202) = -14.57^{**}$
Post	4.06	.67	
Shared Decision Making (n= 265)			
Pre	3.40	.72	$t(264) = -15.73^{**}$
Post	4.09	.67	
Responding to Patient Anger (n= 274)			
Pre	3.27	.87	$t(273) = -16.98^{**}$
Post	4.13	.62	
Discussing Prognosis (n= 251)			
Pre	3.31	.80	$t(250) = -15.61^{**}$
Post	4.01	.60	
Transition to Palliative Care n= 202			
Pre	3.23	.88	$t(201) = -13.65^{**}$
Post	4.03	.74	
End of Life Goals of Care Discussions n= 185			
Pre	3.29	.98	$t(184) = -12.52^{**}$
Post	4.18	.76	
Working with Interpreters n= 20			
Pre	3.75	.85	$t(19) = -3.58^{*}$
Post	4.40	.50	
Conducting a Family Meeting n= 18			
Pre	3.00	1.09	$t(17) = -7.01^{**}$
Post	4.06	.73	
Responding to Adverse Events n= 59			
Pre	3.47	.70	$t(58) = -9.28^{**}$
Post	4.25	.60	

* $p < .01$;

** $p < .001$.

Table 5.

Generalized estimating equation main effects of training on skill uptake with standardized patient assessments and real patients

Dependent Variable	Level 2B-SPA (N = 984)			Level 3 - Patient Interaction	
	Baseline, Mean (SD)	Post-training Effect		Baseline, Mean (SD)	Post-training Effect
		Version A	*Version B*		
Tally	10.46 (3.90)	0.38	1.64***	10.46 (3.90)	0.21
Breadth	5.67 (1.69)	0.90***	1.43***	5.67 (1.69)	−0.03
Cat1: Agenda Setting	0.41 (0.63)	0.52***	0.59***	0.41 (0.63)	−0.09
Declare agenda items	0.30 (0.47)	0.26***	0.29***	0.30 (0.47)	−0.04
Invite agenda items	0.09 (0.29)	0.19***	0.17***	0.09 (0.29)	−0.04
Negotiate agenda	0.02 (0.13)	0.03	0.07**	0.02 (0.13)	−0.01
Take stock	0.00 (0.07)	0.05**	0.06**	0.00 (0.07)	0.00
Cat2: Checking	0.99 (1.12)	0.49***	0.53***	0.99 (1.12)	−0.14
Check understanding	0.91 (1.07)	0.30**	0.22*	0.91 (1.07)	−0.11
Check pref for info	0.08 (0.29)	0.19***	0.31***	0.08 (0.29)	−0.03*
Cat3: Questioning	5.77 (2.68)	−0.63**	−0.32	5.77 (2.68)	0.08
Ask open questions	2.86 (2.05)	−0.59**	−0.36*	2.86 (2.05)	0.02
Clarify	0.28 (0.59)	−0.02	−0.08	0.28 (0.59)	−0.18
Restate	0.33 (0.88)	−0.01	0.00	0.33 (0.88)	0.09
Endorse question ask	0.46 (0.70)	0.06	0.11	0.46 (0.70)	0.04
Invite questions	1.85 (1.43)	−0.07	0.00	1.85 (1.43)	0.09*
Cat4: Information Organization	0.55 (0.82)	0.32***	0.35***	0.55 (0.82)	0.27**
Preview	0.20 (0.51)	0.06	0.08	0.20 (0.51)	−0.03
Summarize	0.05 (0.30)	0.10**	0.08*	0.05 (0.30)	0.02
Transition	0.13 (0.38)	0.12**	0.11*	0.13 (0.38)	0.13
Review next steps	0.16 (0.39)	0.05	0.09**	0.16 (0.39)	0.14***
Cat5: Empathic Comm.	2.73 (2.40)	−0.30	0.52**	2.73 (2.40)	0.06
Encourage expression	0.52 (0.92)	−0.21**	0.00	0.52 (0.92)	0.11
Acknowledge	0.41 (0.74)	−0.14*	0.09	0.41 (0.74)	−0.05
Validate	1.46 (1.44)	−0.07	0.27*	1.46 (1.44)	0.02
Normalize	0.23 (0.57)	0.02	0.16**	0.23 (0.57)	−0.02
Praise patient effort	0.10 (0.36)	0.10*	0.02	0.10 (0.36)	−0.01

Note: Baseline values for SPAs are aggregated across versions A and B. Modeled post-training effects can be interpreted as the mean increase from baseline. Statistical significance of differences are tested using Generalized Estimating Equation (GEE) models, where * denotes p<.05, ** denotes p<.01, and *** denotes p<.001.

Table 6.

Description of Patient Evaluative Items by and Training Effects

	Baseline		Post-training Effect
	Mean	*Range*	
The doctor understood how I was feeling	4.65	1 – 5	0.08
I was able to talk in the consultation when I wanted to	4.85	3 – 5	0.00
The doctor sometimes interrupted me	1.37	1 – 5	−0.01
The doctor seemed hurried	1.32	1 – 5	−0.10
The doctor was willing to discuss my worries and fears	4.65	1 – 5	−0.02
I asked all the questions I wanted to	4.66	1 – 5	0.06
The doctor listened to what I said	4.73	1 – 5	0.08*
The doctor made me feel I could ask or say anything	4.73	1 – 5	0.06
The doctor used medical terms without explaining their meaning	1.36	1 – 5	−0.08
The doctor made me feel important	4.44	1 – 5	0.04
The doctor kept me at a distance	1.39	1 – 5	−0.01
The doctor gave me hope	4.31	1 – 5	0.11
The doctor respected my need for privacy and dignity	4.66	1 – 5	0.09
I had to wait too long to see the doctor	1.67	1 – 5	0.05
The doctor made me feel like a statistic, rather than a person	1.30	1 – 5	−0.07
The doctor found out how much I understood about my cancer	4.20	1 – 5	0.09
The doctor explained what he or she was going to talk to me about	4.56	1 – 5	0.01
The doctor asked me if I had anything that I wanted to be sure was discussed today	4.47	1 – 5	0.02
The doctor asked if I had any questions	4.67	1 – 5	0.00
The doctor explained what would happen after they left the room	4.71	1 – 5	−0.08
Overall I was completely satisfied with the communication between myself and the doctor	4.75	1 – 5	0.03
Overall I was completely satisfied with the consultation	4.75	1 – 5	0.02
The doctor understood how I was feeling	4.65	1 – 5	0.08
I was able to talk in the consultation when I wanted to	4.85	3 – 5	0.00
The doctor sometimes interrupted me	1.37	1 – 5	0.01
The doctor seemed hurried	1.32	1 – 5	0.10
The doctor was willing to discuss my worries and fears	4.65	1 – 5	−0.02

Note: Statistical significance of differences are tested using Generalized Estimating Equation (GEE) models, where * denotes p<.05.

Modeled post-training effects can be interpreted as the mean increase from baseline.