

Impact of a Non-Small Cell Lung Cancer Educational Program for Interdisciplinary Teams

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BACKGROUND: Successful implementation of non-small cell lung cancer (NSCLC) evidence-based guideline recommendations requires effective educational programs that target all clinicians from interdisciplinary teams. This study describes and evaluates the Engaging an Interdisciplinary Team for NSCLC (GAIN 3.0) experiential learning-based educational curriculum.

METHODS: GAIN 3.0 was designed to enhance interdisciplinary collaboration for effective NSCLC diagnosis, assessment, and treatment. The program used a flipped classroom model that included an e-learning component prior to a live 6-hour interactive program. The interactive program included hands-on simulations, small group workshops, gamification, and case discussions. Participants included academic and community members of multidisciplinary lung cancer teams. Assessments included an online baseline survey, a pretest and posttest, a program evaluation, a long-term survey (LTS), and on-site faculty evaluation of participants.

RESULTS: Of 416 attendees to 13 live GAIN 3.0 programs (nine in the United States and three in Europe), 304 (73%) completed the pretest and 187 (45%) completed the posttest. Out of a perfect score of 12 points, program participants had a mean test score of 6.3 ± 2.1 on the pretest (52%) and 7.8 ± 2.1 on the posttest (65%) ($P = .03$). There was an overall knowledge increase of 13% from pretest to posttest. Most LTS respondents (65%) rated the GAIN 3.0 live programs as “high impact.” On the LTS, the areas with the greatest gains in participants who had very high confidence were communication across disciplines, use of a team-based approach, and personalized treatment.

CONCLUSIONS: GAIN 3.0 was a highly successful interdisciplinary activity that improved participants’ knowledge, competence, and likely the clinical care provided to patients with NSCLC.

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KEY WORDS: education; flipped classroom; lung cancer; problem based learning; simulation

ABBREVIATIONS: EBUS-TBNA = endobronchial ultrasound trans-bronchial needle aspiration; GAIN = Engaging an Interdisciplinary Team for NSCLC; IASLC = International Association for the Study of Lung Cancer; LTS = long-term survey; NSCLC = non-small cell lung cancer; PBL = problem-based learning

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Genetic testing to inform treatment decisions has become part of the standard of care for patients with advanced non-small cell lung cancer (NSCLC).¹⁻⁸ Biomarker-driven therapy has improved progression-free survival outcomes for patients with certain tumor-specific molecular abnormalities that make them sensitive or resistant to a particular drug.⁹⁻¹¹ Adequate tissue samples must be carefully obtained and handled to provide sufficient material for histologic and molecular testing.² Guidelines recommend multidisciplinary approaches to the evaluation, management, and treatment of patients with advanced NSCLC.^{1,2}

Challenges to implementing recommendations include quickly evolving practice standards, gaps in communication between the people involved (various medical specialties, nurses, patients), and the need to optimize tissue acquisition and processing.¹² For example, in an interim analysis of the National Cancer Institute-Molecular Analysis for Therapy Choice (MATCH) trial, sample quality was a major reason for specimens not being analyzed for genetic abnormalities.¹³ A National Cancer Database study found that 21% of patients with lung cancer do not receive cancer-specific treatment.¹⁴ There are gaps in clinician knowledge even regarding common procedures such as endobronchial ultrasonographic transbronchial needle aspiration (EBUS-TBNA). In a survey study, only one-half of respondents from all disciplines used the International Association for the Study of Lung Cancer (IASLC) lymph node map in their daily practice, despite this tool being universally accepted and recommended for lung cancer staging, and participants' insufficient familiarity with the IASLC lymph node map could partially explain the observed high rates of lymph node misclassification.¹⁵ These data suggest that health-care

providers need more NSCLC education pertinent to staging, tissue acquisition, and treatment.

Successful implementation of evidence-based guideline recommendations requires effective educational programs that target all clinicians who care for patients with advanced NSCLC. Conventional lectures are inefficient for modifying physician behavior and result in temporary knowledge gain.¹⁶ Interactive lectures facilitate deeper learning than traditional didactic lectures.^{17,18} The sequential application of different learning styles in an educational encounter maximizes learning potential that leads to changed behaviors.¹⁶ Problem-based learning (PBL) improves knowledge gain and retention when compared with traditional lectures.^{19,20}

Thus, we applied Kolb's learning styles,²¹ PBL,^{19,20,22} a flipped classroom teaching model,²³⁻²⁶ and game-based learning^{27,28} to design the Engaging an Interdisciplinary Team for NSCLC (GAIN) educational curriculum to help clinicians improve their knowledge, skills, and competencies in the assessment and management of patients with NSCLC. GAIN began in 2012 (GAIN 1.0) in the United States and was expanded to Europe in 2014 (GAIN 2.0). GAIN 3.0 is a further expanded collaboration of the American College of Chest Physicians (CHEST), the American Society for Clinical Pathology, IASLC, the National Comprehensive Cancer Network, and The France Foundation. We report results from 13 GAIN 3.0 educational programs held in the United States and Europe. The GAIN 3.0 program's predefined outcome variables included learner satisfaction and confidence, knowledge gain, team assessments, semiquantitative data on participant competence, and self-reported data on changes to clinical practice.

Methods

Course Design

The GAIN 3.0 curriculum's experiential learning theory-based instructional design incorporates flipped classroom precourse e-learning activities and live interactive participatory group game-based learning and team-based workshop sessions (Fig 1). e-Table 1 summarizes the learning objectives, tools, and components of major aspects of the GAIN 3.0 curriculum. We used a *flipped classroom model* to provide e-learning education to prepare for participation at a live program. Participants were asked to independently view e-lectures, PowerPoint presentations, and selected lung cancer guidelines²⁹ provided in portable document format (PDFs). The e-learning material provided to the learners included PowerPoint presentations and articles designed to improve knowledge pertinent to the following topics: obtaining an adequate biopsy sample, identifying current biomarkers used to categorize molecular and

histologic features, explaining the mechanisms of immunotherapies, and diagnosing and monitoring NSCLC. The primary educational intervention of GAIN 3.0 was a 6-hour live interactive meeting. The meeting focused on applying concepts learned prior to the course and on enhancing interdisciplinary collaboration for effective NSCLC diagnosis, assessment, and treatment. The use of hands-on simulations, small group workshops, gamification, and case discussions allowed faculty to personalize the educational interactions (Fig 2 shows the program agenda).

Two weeks before each scheduled program, registered participants were asked to complete the following preclass work through the CHEST learning management system: a baseline survey and knowledge pretest. These were required to access five precourse e-learning modules (Tumor Biomarkers and Targeted Therapy for NSCLC, Specimen Collection and Assays for Molecular Targets, Mediastinal Staging for NSCLC, Barriers to Pathology, Oncology

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