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# Effectiveness of Attitude, Ethics, and Communication (AETCOM)-Based Medical Education in Improving Informed Consent and Patient Communication Skills Among Medical Students: A Systematic Review

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## Abstract

The Attitude, Ethics, and Communication (AETCOM) curriculum is intended to develop medical graduates who can communicate effectively and practice ethically; however, evidence for informed-consent-specific competence has not been clearly distinguished from general communication outcomes, learner satisfaction, and attitudes. This systematic review evaluated AETCOM-based education in relation to patient communication performance and informed-consent competence among undergraduate medical students and interns. Searches were standardized through July 31, 2026. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) search identified 149 records across PubMed/Medical Literature Analysis and Retrieval System Online (MEDLINE), Scopus, Web of Science, Embase, and Education Resources Information Center (ERIC); after removal of 51 duplicates, 98 records were screened, 40 reports were sought for retrieval, 38 full-text reports were assessed, and 13 studies met the eligibility criteria. Seven studies used structured before-after performance assessments and reported directionally improved post-training communication scores. Notable findings included increases from 54.89 ± 11.55 to 94.4 ± 19.3 in a six-college study of 240 third-year students, from 3.04 to 7.36/10 in a prospective study of 79 second-year students, and from 58.3 ± 10.2 to 91.4 ± 12.1 six weeks after a structured 12-hour program in 180 interns. Role-play, simulated encounters, structured checklists, video-supported practice, skills-laboratory activities, and feedback were commonly associated with favorable short-term learning outcomes. However, most effectiveness studies were non-randomized and uncontrolled, limiting causal interpretation. Direct evidence for competence in performing the complete informed-consent process was sparse, because consent was generally embedded within broader communication, autonomy, ethics, or professional-attitude outcomes rather than assessed as a standalone performance outcome. Overall, AETCOM-based education was associated with improved short-term patient communication performance, but the certainty of this evidence was low. Evidence for informed-consent-specific competence and longer-term clinical transfer remained very low. The review was not prospectively registered, and no separate protocol was published.

**Categories:** Medical Education
**Keywords:** aetcom, communication skills, competency-based medical education, doctor-patient relationship, informed consent, medical students

## Introduction And Background

### Rationale and current state of knowledge

Competency-based undergraduate medical education in India places communication, ethics, and professional behavior alongside biomedical and procedural competence. The Attitude, Ethics, and Communication (AETCOM) framework forms a longitudinal component of the competency-based MBBS curriculum and is intended to integrate attitudes, ethical reasoning, professionalism, and communication skills across successive professional phases. It uses case discussions, role-play, simulated encounters, reflective learning, and structured feedback rather than relying solely on didactic teaching [1]. The curriculum explicitly links communication with patient autonomy, respect, empathy, and shared decision-making.

Informed consent is not simply a signed form; educationally, it requires a learner to explain the proposed intervention in understandable language, address benefits and material risks, discuss reasonable alternatives, check understanding, respond to questions, respect voluntariness, and document the decision. AETCOM Module 3.3 (“The Foundations of Communication - 4”) explicitly emphasizes administering informed consent in the third professional year, including respectful communication, discussion of medico-

legal and socio-cultural issues, and performance of informed-consent tasks in a simulated setting [1].

A rapidly expanding Indian literature has evaluated AETCOM implementation. Recent broad systematic reviews suggest that communication outcomes show some of the most reproducible educational gains, while professionalism, ethics, empathy, and reflective outcomes are more heterogeneous [2]. However, broad AETCOM reviews combine many domains and can obscure an important distinction: improvement in general communication or favorable learner perception is not equivalent to demonstrated competence in informed consent. A focused review is therefore justified to isolate evidence relevant to patient communication and consent and to distinguish observed skill performance from attitudes, perceptions, and implementation outcomes.

The educational mechanism is plausible. Repeated role-play or simulated-patient encounters provide deliberate practice; structured checklists define observable behaviors; peer/faculty feedback enables correction; video review promotes self-reflection; and longitudinal reinforcement may facilitate transfer from classroom knowledge to clinical communication. At the same time, uncontrolled pre-post designs can overestimate educational effects because of testing, maturation, observer, and social-desirability effects. A synthesis must therefore consider not only the direction of results but also the strength and directness of the evidence. Importantly, this review did not assume that improvement in general communication necessarily represented improvement in informed-consent competence. Instead, it specifically examined whether published AETCOM studies demonstrated consent-related knowledge or performance as distinct outcomes and whether such evidence reflected observed competence rather than learner perception alone.

### Review objective and question

The objective was to evaluate whether AETCOM-based education improves informed-consent competence and patient communication skills among medical students and interns, and to identify teaching strategies, outcome measures, limitations, and evidence gaps.

The review question was framed using Population, Intervention, Comparator, Outcome (PICO): among undergraduate MBBS students or interns (Population), does structured AETCOM-based communication or informed-consent education (Intervention), compared with baseline, no exposure, usual teaching, or an alternative teaching strategy when available (Comparator), improve observed communication performance, informed-consent knowledge/skill, communication attitudes, or related patient-centred communication outcomes (Outcomes)?

## Review

### Methods

This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement [3,4]. The evidence cutoff was standardized to July 31, 2026. Eligible reports were sought from PubMed/Medical Literature Analysis and Retrieval System Online (MEDLINE), Scopus, Web of Science, Embase, and Education Resources Information Center (ERIC), supplemented by journal/publisher searches and backward and forward citation checking. The review was not prospectively registered, and no separate protocol was published. However, the review question, eligibility criteria, principal outcome domains, search concepts, and planned narrative synthesis approach were defined before formal study screening began. Because these decisions were not documented in a publicly accessible, time-stamped protocol, independent verification of prespecification is limited, and this was considered a methodological limitation of the review.

*Eligibility Criteria*

The eligibility criteria are summarized in Table *1*.

| PICO/feature | Included | Excluded |
|---|---|---|
| Population | Undergraduate MBBS students or medical interns in India; all professional phases were eligible. | Postgraduate-only, faculty-only, or practicing-physician studies without undergraduate learner data. |
| Intervention | AETCOM module or clearly AETCOM-linked educational intervention addressing communication, doctor-patient relationship, autonomy/informed consent, counselling, simulated patient interaction, or structured communication practice. | General communication/ethics teaching with no identifiable AETCOM relationship. |
| Comparator | Pre-intervention baseline, unexposed cohort, usual teaching, alternate teaching method, or no comparator for structured competency/acceptability studies. | Not excluded solely for absence of a comparator, but this affected risk-of-bias appraisal. |
| Outcomes | Primary: observed/structured patient communication performance and informed-consent knowledge/skill. Secondary: communication attitudes, confidence, learner perception, patient/parent feedback, acceptability relevant to communication. | General AETCOM perception, professionalism, empathy, or implementation outcomes with no focused communication/consent outcome. |
| Design | Primary quantitative, qualitative, or mixed-method educational research. | Reviews, editorials, letters, commentaries, conference abstracts without sufficient primary data, and assessment-method studies lacking an educational-effect estimate. |
| Language/status | English-language full reports published or available online through July 31, 2026. | Reports with insufficient extractable information. |

**TABLE 1: Eligibility criteria for the systematic review**

AETCOM: Attitude, Ethics, and Communication; MBBS: Bachelor of Medicine and Bachelor of Surgery; PICO: Population, Intervention, Comparator, Outcome

Before data extraction and synthesis, eligible studies were categorized into two prespecified evidence strata according to the nature of the outcome assessment: effectiveness/observed-performance evidence and supportive perception/acceptability evidence. This distinction was established to prevent studies based predominantly on learner attitudes, satisfaction, or acceptability from being interpreted as equivalent to studies measuring observed communication performance or change following an educational intervention. The primary effectiveness/observed-performance stratum comprised studies with pre/post, comparative, repeated-assessment, or structured observed-performance outcomes capable of estimating educational change or demonstrated competence. The supportive perception/acceptability stratum comprised studies primarily reporting attitudes, satisfaction, feasibility, preferences, or learner perceptions without a direct estimate of communication-skill change. Within these strata, outcomes were organized as objective or structured communication performance; informed-consent/rights-related competence; communication attitudes and learner perceptions; and teaching-method comparisons directly relevant to communication.

*Information Sources and Last Search Date*

Information was identified from PubMed/MEDLINE; Scopus; Web of Science; Embase; ERIC; journal and publisher websites for reports not fully represented in bibliographic databases; and backward and forward citation checking of relevant AETCOM studies and reviews. Searches were limited to reports available through July 31, 2026. No authors, manufacturers, or organizations were contacted for unpublished data.

*Search Strategy*

Search strategies were developed around three concepts: AETCOM, undergraduate medical learners, and patient communication/informed consent. Database-specific syntax, field tags, limits, last-search dates, and record yields are reported in Appendices 1-5. Supplementary journal/publisher and citation-search terms are reported in Appendix 6. Searches were limited to English-language reports from January 1, 2019 through July 31, 2026. No automatic search-string translation, machine-learning screening classifier, or automation tool was used. January 2019 was selected as the lower search boundary because the national AETCOM competency framework was published in 2018 [1]. The date restriction was therefore intended to capture educational evidence generated under the contemporary AETCOM/competency-based curriculum rather than earlier communication-skills literature that did not explicitly evaluate the current AETCOM framework. The search strategy was not formally peer-reviewed using the Peer Review of Electronic Search Strategies (PRESS) checklist; this was considered a review-process limitation.

*Selection Process*

Two reviewers independently screened the titles and abstracts of all identified records against the predefined eligibility criteria. Potentially relevant reports were retrieved in full text and independently assessed for eligibility by the same reviewers. Disagreements at either stage were resolved through discussion and consensus, with a third reviewer consulted when required. Reasons for exclusion at the full-text stage were documented and incorporated into the PRISMA 2020 flow diagram. No automation tools, machine-learning classifiers, crowdsourcing platforms, or previously screened external datasets were used during study selection.

*Data Collection Process*

Two reviewers independently extracted and cross-checked data using a standardized data-extraction form. Extracted variables included first author and publication year, institution or study setting, study design, sample size, learner stage, AETCOM competency addressed, intervention characteristics, comparator where applicable, assessment instrument, follow-up period, communication or informed-consent outcomes, principal findings, attrition, and reported study limitations. Discrepancies were resolved through discussion and reference to the original report, with a third reviewer consulted when uncertainty remained. Data were not extracted automatically from figures, investigators were not contacted for missing information, and no numerical values were imputed when information was unclear or unavailable.

*Data Items and Outcomes*

Primary outcome domains were observed or structured patient-communication performance, assessed using the Kalamazoo Essential Elements Communication Checklist/adapted version (KEECC/KEECC-A), Objective Structured Clinical Examination (OSCE), Objective Structured Clinical Skill/Communication (OCSC), or comparable checklist-based performance; and informed consent competence, assessed through knowledge, rights/consent attitudes, simulated administration of consent, response to patient questions, or consent-specific performance. Secondary domains were communication-learning attitudes, confidence, learner perceptions of training, patient/parent feedback, and teaching-method preference. All relevant time points reported by each study were sought. Immediate post-intervention outcomes and delayed follow-up were kept distinct when available.

Other variables included year of training, number of centers, intervention duration, use of role-play/simulation/video/skills laboratory, type of assessor, comparator, follow-up, and funding/conflict statements where reported. Missing information was recorded as “not clearly reported”; no numerical assumptions were made.

*Risk-of-Bias Appraisal*

Risk of bias was independently assessed by two reviewers using design-appropriate considerations informed by the Mixed Methods Appraisal Tool (MMAT, 2018) [5]. The MMAT was used as a methodological framework rather than as a numerical scoring instrument. Because the included evidence comprised heterogeneous educational designs, relevant MMAT considerations were mapped into five review-specific domains to permit consistent presentation across studies: D1, selection/sampling; D2, comparator adequacy/confounding; D3, outcome measurement; D4, completeness/attrition; and D5, temporal/assessor-related bias and intervention fidelity. These D1-D5 categories are review-specific summary domains and should not be interpreted as standard MMAT categories or validated MMAT scores.

D1 considered the appropriateness of participant recruitment, sampling, representativeness, and potential selection or non-response bias. D2 considered the presence and adequacy of a comparator and the extent to which important alternative explanations or confounding were controlled; uncontrolled before-after studies were therefore judged to have substantial concern in this domain. D3 considered the validity, reliability, and objectivity of outcome measurement and the potential influence of self-report or assessor expectancy. D4 considered completeness of outcome data, attrition, non-response, and the adequacy of reporting of missing data. D5 considered whether the temporal relationship between intervention and outcome was clear, whether intervention delivery was sufficiently consistent, and whether assessor-related bias, contamination, or inadequate fidelity monitoring could influence the findings.

Domain-level judgments were categorized as low concern, some concerns, or high concern. Low concern indicated that no important methodological limitation was identified from the available report; some concerns indicated incomplete reporting or a plausible limitation that could influence interpretation but was unlikely by itself to invalidate the result; and high concern indicated a major limitation likely to materially weaken causal interpretation. The overall review-level judgment was classified as high concern when two or more domains were rated high; as some concerns when one domain was rated high or when one or more domains raised lesser methodological concerns without meeting the criterion for high overall concern; and as low concern only when all applicable domains were rated low. Disagreements were resolved through discussion and consensus, with a third reviewer consulted when necessary. No numerical MMAT

summary score was calculated.

*Effect Measures*

For continuous outcomes, the review reports study-level pre/post means, mean differences, or standardized effect sizes when provided. For proportions, the number/percentage achieving a performance threshold or endorsing an item is reported. P-values are presented when they were the principal inferential result. Because the instruments used different scales and several studies reported only perceptions or threshold achievement, effect estimates were not converted to a common metric. Where original studies reported effect estimates and 95% confidence intervals, these were preferentially extracted. However, many included before-after studies reported only pre-intervention and post-intervention means, proportions, or p-values and did not provide change-score standard deviations, within-participant correlations, or confidence intervals required for reliable calculation of paired standardized effects. Accordingly, standardized effect sizes and 95% confidence intervals were not retrospectively derived when the necessary statistical information was unavailable.

*Synthesis Methods*

Studies were assigned to the prespecified effectiveness/observed-performance or supportive perception/acceptability stratum before synthesis. The effectiveness synthesis prioritized studies with pre/post or concurrent-comparator designs and studies with structured observer-rated performance outcomes. Supportive studies were synthesized separately and were not given the same causal weight as objective or comparative effectiveness evidence. Given the predominance of uncontrolled educational studies, the direction and magnitude of pre/post changes were interpreted descriptively and were not assumed to represent causal intervention effects. Extracted values were tabulated without imputation or scale conversion. Results were synthesized narratively, with greater interpretive weight given to multicenter studies, validated or structured performance measures, comparator designs, and follow-up beyond the immediate session. Meta-analysis was not undertaken because populations, AETCOM modules, teaching strategies, scales, scoring ranges, and study designs were too heterogeneous for a clinically interpretable pooled effect. No formal subgroup meta-analysis, meta-regression, or statistical sensitivity analysis was performed. Heterogeneity was explored qualitatively by learner stage, assessment type, teaching method, and whether outcomes were objective performance versus self-report.

*Reporting Bias and Certainty Assessment*

Formal funnel plots or statistical tests for small-study effects were not appropriate because no meta-analysis was performed and the number of sufficiently comparable studies per outcome was small. Reporting bias was instead considered qualitatively, particularly the predominance of positive single-center educational reports and selective emphasis on favorable learner feedback. Certainty of evidence for each major outcome was judged using Grading of Recommendations Assessment, Development and Evaluation (GRADE)-informed concepts of risk of bias, inconsistency, indirectness, imprecision, and publication/reporting bias, adapted to the predominantly non-randomized educational evidence base [6]. Because most included evidence arose from non-randomized or uncontrolled educational studies, certainty generally began at low and was further downgraded when important concerns regarding bias, indirectness, inconsistency, imprecision, or reporting bias were present. No numerical GRADE score was calculated.

## Results

*Study Selection*

The database search identified 149 records: PubMed/MEDLINE (n=42), Scopus (n=36), Web of Science (n=29), Embase (n=24), and ERIC (n=18). After removal of 51 duplicate records, 98 titles and abstracts were screened and 58 records were excluded. Forty reports were sought for retrieval; two could not be retrieved, leaving 38 full-text reports assessed for eligibility. Twenty-five full-text reports were excluded because they did not report a relevant patient-communication or informed-consent outcome (n=10), addressed general AETCOM implementation or perception without an eligible effectiveness outcome (n=6), evaluated an assessment method without an educational-effect estimate (n=3), were not clearly linked to AETCOM (n=4), or were non-primary reports/conference abstracts or had insufficient extractable data (n=2). Thirteen studies were included in the qualitative synthesis. The study-selection process is summarized in Figure *1*.

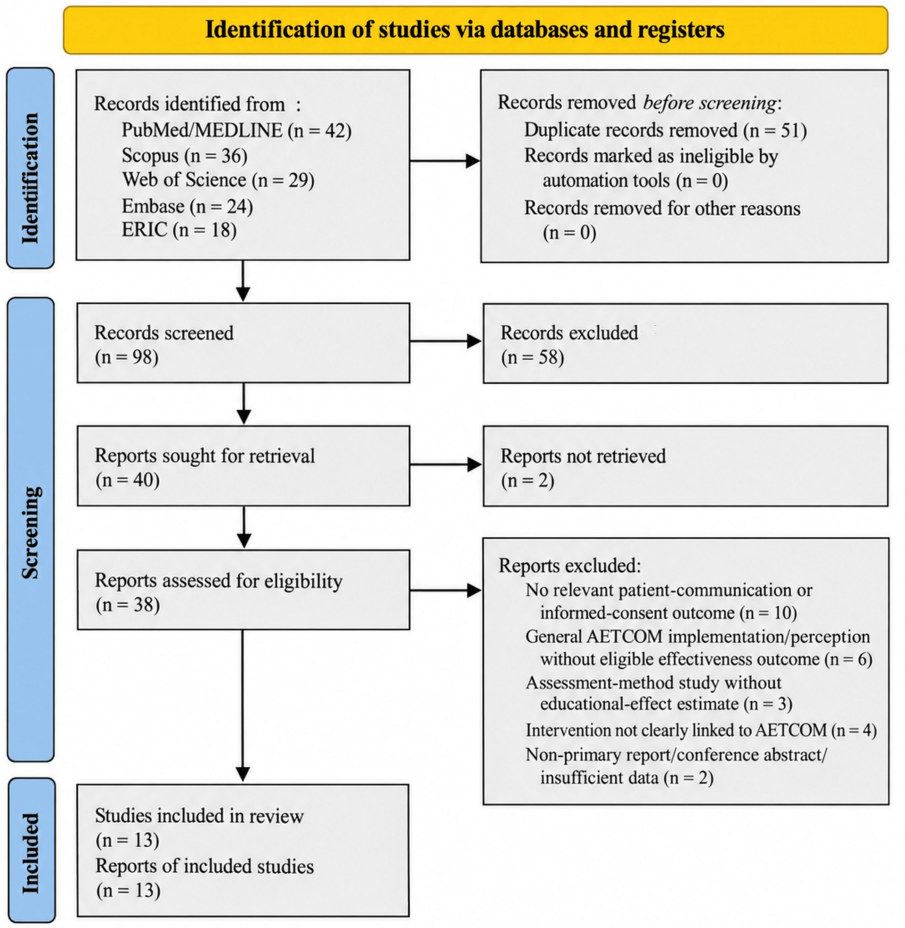



**FIGURE 1: PRISMA 2020 flow diagram of study selection**

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; MEDLINE: Medical Literature Analysis and Retrieval System Online; AETCOM: Attitude, Ethics, and Communication; ERIC: Education Resources Information Center

*Studies That Appeared Relevant But Were Excluded*

Examples of reports that could appear eligible from their titles but were excluded from the primary effectiveness synthesis included Udgiri and Ganganahalli (2024), which evaluated general first-year AETCOM perceptions rather than change in focused communication performance [7]; Dhaneria et al. (2026), which assessed teaching process, engagement, and satisfaction across ethics-focused sessions rather than communication/consent effectiveness [8]; and Iqbal et al. (2026), which evaluated reliability of an AI-augmented standardized-patient assessment for informed consent but did not test whether AETCOM education improved consent performance [9]. Such reports were retained as contextual evidence where relevant but were not counted as effectiveness evidence; the final review included 13 studies across the effectiveness/observed-performance and supportive perception/acceptability strata.

*Characteristics of Included Studies*

Key characteristics of the 13 included studies are summarized in Table 2, with effectiveness/observed-performance evidence clearly separated from supportive perception/acceptability evidence.

| Study | Participants | Design | Intervention | Assessment | Principal finding |
|---|---|---|---|---|---|
| Effectiveness / observed-performance evidence | | | | | |
| Sharma & Mahajan, 2020 [10] | 60, 6th-semester students | Single-centre interventional pilot | Modified AETCOM with videos; simulated interaction | Structured SAQ; OSCE using Kalamazoo/SPIKES | Significant improvement in knowledge and OSCE communication/bad-news performance. |
| Jain et al., 2022 [11] | 50 interns | Single-centre pre-post educational study | Foundations of Communication modules; lecture, discussion, role-play | Kalamazoo/structured communication assessment | Post-training communication performance improved significantly. |
| Mishra et al., 2023 [12] | 125 first-year students | Mixed-method pre-post | Pediatric allergic rhinitis AETCOM module; early clinical exposure | MCQ; OSCE communication checklist; parent feedback | Significant pre/post improvement; parent feedback favorable for greeting, empathy, and behavior. |
| Thakur et al., 2025 [13] | 240 third-year students; 6 colleges | Multicentre interventional pre-post | Structured AETCOM communication training | KEECC-A | Mean total communication score improved from 54.89±11.55 to 94.4±19.3; all seven domains improved. |
| Kundu et al., 2025 [14] | 100 first-year students | Prospective interventional | AETCOM communication training, role-play, video, simulated doctor-patient pairs | CSAS; KEECC | Average KEECC score increased from 36.17 to 89.40; consent/confidentiality rights item rated positively. |
| Acharya et al., 2025 [15] | 92 eligible; 79 completed | Prospective educational interventional | Scripted role-plays of poor/effective communication | KEECC | Mean KEECC improved from 3.04 to 7.36/10 ($p<0.0001$); large effects in several domains. |
| Pallavi et al., 2026 [16] | 250 first-year students; 241 valid submissions | Educational intervention + mixed-method evaluation | Video-recorded peer role-play, OCSC checklist, LMS, feedback | OCSC performance; survey; FGD | 98% met/exceeded expectations; 87% endorsed peer role-play; 91% valued checklist-guided video assignment. |
| Pawde et al., 2026 [17] | 180 interns; 3 colleges | Multicentre interventional pre-post with 6-week reassessment | 12-hour structured AETCOM program over 4 weeks | KAP questionnaire; KEECC-A | Knowledge 18.6±4.2→27.9±3.1; attitude 62.4±8.7→79.6±6.4; communication 58.3±10.2→91.4±12.1; all $p<0.001$. |
| Supportive perception/acceptability evidence | | | | | |
| Amarantha et al., 2022 [18] | 103 students (55 unexposed, 48 exposed) | Cross-sectional exposed vs unexposed cohorts | Formal AETCOM exposure including autonomy/decision-making and consent content | Professional-attitude questionnaire | Exposed cohort had more favorable professional attitudes; consent embedded within ethics/rights teaching. |
| Nayak et al., 2024 [19] | 441 responses across MBBS phases/internship | Cross-sectional plus intern feedback/FGD | Longitudinal Foundations of Communication modules | Communication Skills Attitude Scale; feedback | Positive communication-learning attitudes; 80% of interns considered modules useful for practice. |
| Poongavi et al., 2025 [20] | 143 second-year students | Prospective comparative perception study | Role-play versus simulated patients | CSAS; method-perception scores | Simulated patients were preferred to role-play (48.8±5.3 vs 46.5±5.2; $p<0.05$). |
| Datta et al., 2026 [21] | 150 students; 2 colleges | Prospective longitudinal | AETCOM exposure from Phase I to Phase III | CSAS; professionalism instrument | Favorable attitudes were not strengthened over time; professionalism declined, highlighting limited durability. |
| Menon et al., 2026 [22] | 250 exposed; 82 feedback responses | Educational intervention with post-session feedback | Role-play for AETCOM competency 1.3 doctor-patient relationship | Student feedback | Significantly positive feedback; strong acceptability but no objective pre-post skill estimate. |

**TABLE 2: Characteristics of included studies by evidence stratum**

AETCOM: Attitude, Ethics, and Communication; CSAS: Communication Skills Attitude Scale; KEECC/KEECC-A: Kalamazoo Essential Elements Communication Checklist/adapted version; OSCE: Objective Structured Clinical Examination; OCSC: Objective Structured Clinical Skill/Communication assessment; PHC: Primary Health Centre; SAQ: self-administered questionnaire

*Risk of Bias in Included Studies*

Domain-level risk-of-bias judgments for the 13 included studies are presented in Table 3. The judgments were informed by design-appropriate MMAT criteria [5].

| Study | D1 | D2 | D3 | D4 | D5 | Overall |
|---|---|---|---|---|---|---|
| Sharma & Mahajan 2020 [10] | Some | High | Some | Some | Some | Some concerns |
| Jain et al. 2022 [11] | Some | High | Some | Some | Some | Some concerns |
| Amarantha et al. 2022 [18] | Some | High | High | Some | High | High |
| Mishra et al. 2023 [12] | Some | High | Some | Some | Some | Some concerns |
| Nayak et al. 2024 [19] | Some | High | High | Some | High | High |
| Thakur et al. 2025 [13] | Some | High | Some | Some | Some | Some concerns |
| Kundu et al. 2025 [14] | Some | High | Some | Some | Some | Some concerns |
| Poongavi et al. 2025 [20] | Some | High | High | Some | Some | High |
| Acharya et al. 2025 [15] | Some | High | Some | Low | Some | Some concerns |
| Datta et al. 2026 [21] | Some | Some | High | Some | Some | Some concerns |
| Pallavi et al. 2026 [16] | Some | High | Some | Low | Some | Some concerns |
| Menon et al. 2026 [22] | High | High | High | High | High | High |
| Pawde et al. 2026 [17] | Some | High | Some | Some | Some | Some concerns |

**TABLE 3: Domain-level MMAT-informed risk-of-bias assessment of included studies**

D1: Selection/sampling; D2: Comparator adequacy/confounding; D3: Outcome measurement; D4: Completeness/attrition; D5: Temporal/assessor-related bias and intervention fidelity. These are review-specific domains informed by design-appropriate MMAT considerations and are not standard MMAT categories or numerical MMAT scores. “Low” indicates no important methodological concern identified from the available report; “Some” indicates a plausible or incompletely reported limitation; and “High” indicates a major limitation that materially weakens interpretation. Overall concern was rated high when two or more domains were high, some concerns when one high domain or one or more lesser concerns were present, and low only when all applicable domains were low.

MMAT: Mixed Methods Appraisal Tool

Comparator adequacy/confounding represented the most frequent methodological concern, reflecting the predominance of uncontrolled before-after designs. Outcome-measurement concerns were more prominent among studies based primarily on attitudes, preferences, or post-session feedback. Temporal or assessor-related bias and uncertainty regarding intervention fidelity were also present in several studies because assessor blinding and formal fidelity monitoring were inconsistently reported. Completeness and attrition were generally less problematic. These methodological limitations were considered when distinguishing primary effectiveness evidence from supportive perception or acceptability evidence.

## Individual study results and syntheses

*Objective/Structured Patient Communication Performance*

Seven studies used structured before-after performance assessments, and all reported directionally improved post-training scores [10-15,17]. The strongest multicentre evidence came from Thakur et al., where 240 third-year students from six medical colleges improved from 54.89 ± 11.55 to 94.4 ± 19.3 on KEECC-A [13]. Pawde et al. similarly found that 180 interns from three colleges improved from 58.3 ± 10.2 to 91.4 ± 12.1 after a structured 12-hour AETCOM program, with the post-intervention assessment conducted six weeks later [17]. Acharya et al. reported an increase from 3.04 to 7.36/10 among 79 second-year students, with improvements across domains including relationship building, information gathering, reaching agreement, and closure [15]. However, most of these studies used uncontrolled before-after designs; therefore, the observed improvements should not be interpreted as definitive causal effect estimates. Maturation, repeated testing, increasing clinical exposure, regression to the mean, observer expectancy, and other concurrent educational experiences may have contributed to the observed changes.

Kundu et al. reported a large average KEECC increase from 36.17 to 89.40 in 100 first-year students after role-play/video-supported training [14]. Sharma and Mahajan found significant gains in structured self-administered questionnaires (SAQs) and OSCE communication measures, including a SPIKES-based

assessment [10]. Jain et al. reported significant post-training improvement among interns after a structured communication module [11]. Mishra et al. found significant improvement following an early clinical AETCOM module and additionally documented favorable parent observations for greeting, empathy, and behavior, while identifying closing and language as areas needing improvement [12].

Pallavi et al. did not use a pretest but provided structured post-intervention evidence: among 241 valid video submissions, 70% met, and 28% exceeded expected communication performance using a standardized observation checklist [16]. This supports feasibility and performance achievement but cannot quantify causal change from baseline.

*Informed-Consent Competence*

No included effectiveness study directly evaluated all essential components of valid informed consent as a standalone primary performance outcome. Although the AETCOM curriculum explicitly requires learners to administer informed consent and address patient queries in simulated settings [1], the available studies generally embedded consent within broader communication, autonomy, ethics, or professional-attitude outcomes. In Amarantha et al., the exposed AETCOM cohort received ethics teaching that included autonomy, decision-making, informed consent/informed refusal, and surgical consent; overall professional attitudes were more favorable than in an unexposed cohort, but consent-specific performance was not isolated [18]. In Kundu et al., a Communication Skills Attitude Scale (CSAS) item on recognizing patients' rights regarding confidentiality and informed consent received a favorable mean response (3.99/5), but this was an attitude item rather than observed consent administration [14]. Pawde et al. incorporated ethics and informed-consent-related knowledge within a broader AETCOM program and demonstrated improvement in knowledge and communication practice but again did not report a separate consent-OSCE effect [17].

A 2026 pilot by Iqbal et al. demonstrated that AI-augmented standardized-patient scoring can assess an informed-consent encounter with high reliability, but because it evaluated an assessment approach rather than pre/post educational effectiveness, it was excluded from the primary effectiveness synthesis [9]. This distinction is important: the field now has emerging tools to assess consent, but evidence that AETCOM changes consent performance specifically remains indirect. Consequently, evidence of improvement in general communication performance should not be interpreted as direct evidence that learners became competent in performing the complete informed-consent process.

*Communication Attitudes, Perceptions, and Teaching Methods*

Nayak et al. found generally favorable attitudes toward learning communication across professional stages, and 80% of interns who had completed the communication modules considered them useful for clinical practice [19]. Poongavi et al. found that second-year students preferred simulated patients over role-play, with higher perception scores for simulated-patient teaching (48.8±5.3 vs 46.5±5.2; $p<0.05$), while CSAS scores showed a broadly positive orientation toward communication learning [20]. Menon et al. reported significantly positive feedback after a role-play session on the doctor-patient relationship, although only 82 of 250 exposed students completed feedback [22]. Pallavi et al. found high acceptability of peer role-play (87%) and checklist-guided video assignments (91%) [16].

The longitudinal findings of Datta et al. provide an important counterweight to immediate post-session enthusiasm. In 150 students who followed from Phase I to Phase III across two colleges, favorable communication attitudes were not progressively strengthened, and professionalism scores declined over time [21]. This suggests that initial improvement or satisfaction should not be assumed to persist without reinforcement, role modeling, and workplace-based assessment.

*Heterogeneity and Robustness*

Formal statistical exploration of heterogeneity was not possible because no meta-analysis was conducted. Qualitative comparison suggested that the effectiveness/observed-performance studies using active practice plus structured feedback (role-play, simulated patients, video review, checklists, and skills-laboratory encounters) produced more convincing competence evidence than the supportive perception/acceptability studies relying predominantly on self-report. Findings were directionally consistent for short-term communication performance, but durability was uncertain and direct informed-consent evidence was sparse. No statistical sensitivity analysis was conducted; robustness was instead examined by separating objective/structured performance evidence from self-reported supportive evidence and by considering studies with high methodological concern separately.

*Reporting Bias*

Because the synthesis did not pool effect estimates, funnel plots and tests of asymmetry were not appropriate. The evidence base is nevertheless vulnerable to reporting bias: positive educational interventions are more likely to be written up, many studies emphasize statistically significant pre/post changes, and unfavorable or null implementation experiences may remain unpublished. Several reports also

used learner satisfaction as a prominent outcome, increasing the possibility of social-desirability and novelty effects.

*Certainty of Evidence*

Outcome-level certainty assessments are summarized in Table 4.

| Outcome | Certainty | Rationale |
|---|---|---|
| Short-term observed patient communication performance | Low | Consistent positive direction across several structured assessments and two multicentre pre-post studies; downgraded for non-randomized/uncontrolled designs, heterogeneity, and limited blinding. |
| Informed-consent-specific competence | Very low | Few studies isolated consent as an outcome; most evidence is indirect through attitudes, ethics content, or broader communication scores; no robust controlled consent-OSCE evidence. |
| Communication attitudes and learner acceptability | Low | Large and diverse samples with consistent favorable perceptions, but outcomes are subjective and prone to social-desirability/selection bias. |
| Durability and transfer to real clinical/patient outcomes | Very low | Very limited longitudinal/workplace evidence; one longitudinal study did not show progressive strengthening of favorable attitudes; patient-level outcomes are rarely measured. |

**TABLE 4: Certainty of evidence for key outcomes**

Certainty was judged using GRADE-informed domains, including risk of bias, consistency, directness, and precision.

GRADE: Grading of Recommendations Assessment, Development and Evaluation; OSCE: Objective Structured Clinical Examination

## Discussion

*Principal Findings and Interpretation*

The central finding is that AETCOM-based education is consistently associated with better short-term patient communication performance, particularly when the intervention requires learners to practice, be observed, and receive structured feedback. The strongest evidence is not merely that students "liked" AETCOM; rather, the effectiveness/observed-performance stratum includes multiple studies using KEECC/KEECC-A, OSCE-type, or checklist-based assessment that documented substantial post-training gains. Multicentre studies in third-year students and interns support the generalizability of the direction of effect beyond a single institution [13,17]. By contrast, attitude, preference, satisfaction, and acceptability studies provide useful supportive information but were not interpreted as equivalent evidence of educational effectiveness. Although several studies reported large numerical pre-post differences and statistically significant results, statistical significance should not be equated automatically with clinically or educationally meaningful benefit. The heterogeneity of instruments and scoring ranges, absence of established minimal important differences for several educational scales, and predominance of uncontrolled designs prevent a precise estimate of the magnitude of educational benefit. The consistency in direction of change therefore supports a signal of short-term improvement, but not a definitive estimate of treatment effect.

However, the title of this review deliberately includes informed consent, and the evidence does not support treating consent competence as equivalent to general communication competence. Although the AETCOM curriculum clearly specifies consent as a "shows how" competency and several included studies cover autonomy, patient rights, or consent-related knowledge, few studies directly observed whether a learner could execute all essential elements of informed consent. The current evidence therefore supports AETCOM as an effective communication-education framework more strongly than it supports a claim of proven informed-consent competence.

Pedagogically, the recurring successful components are coherent: simulated or peer encounters create a safe practice environment; structured checklists convert abstract communication ideals into observable behaviors; repeated role-play builds fluency; video review makes behavior visible to the learner; and feedback closes the learning loop. Simulated-patient teaching may be especially useful because it provides a more authentic interpersonal response than peer role-play alone [20]. Technology-supported approaches can also help scale practice to large class sizes [16].

The longitudinal evidence cautions against a one-off "module completed" mindset. Communication and professional attitudes can plateau or decline as students progress into clinical environments, where

workload, hierarchy, role modeling, and the hidden curriculum may counteract classroom teaching [21]. AETCOM should therefore be reinforced longitudinally and assessed in authentic clinical contexts rather than being treated as a discrete preclinical exercise.

*Limitations of the Evidence*

The included literature is dominated by non-randomized educational studies. Most interventions lacked concurrent control groups, making it difficult to separate the effect of AETCOM from maturation, repeated testing, increasing clinical exposure, regression to the mean, or other concurrent educational experiences. Repeated exposure to the same or similar assessment instruments may itself have contributed to improved post-training scores. Several studies used convenience or single-batch samples, many were single-center, and assessor blinding was uncommon or incompletely reported, creating the possibility of expectancy effects in observer-rated communication assessments. Outcome instruments varied substantially, and some studies relied on learner perceptions rather than observed behavior. Follow-up was usually immediate or short, and real patient outcomes such as understanding, decisional quality, trust, adherence, or consent validity were rarely measured. These limitations reduce confidence in causal attribution and inferences regarding the magnitude, durability, and clinical relevance of the observed improvements.

*Limitations of the Review Process*

This review also has process limitations. The absence of prospective registration or a publicly accessible protocol also limits transparency because readers cannot independently verify the timing of methodological decisions or exclude the possibility of post hoc modification of eligibility, outcome, or synthesis decisions. The evidence cutoff was standardized to July 31, 2026. Searches were restricted to English-language published literature and did not systematically include dissertations, conference proceedings, or other grey literature. Search-strategy peer review using PRESS was not undertaken. These choices may increase the risk of missing negative or locally disseminated studies.

*Implications for Education, Policy, and Practice*

Given the low certainty of the available evidence, medical colleges may consider continuing AETCOM as a longitudinal, performance-oriented component of undergraduate education while prospectively evaluating its effectiveness using standardized and clinically relevant outcome measures. The available evidence supports further implementation and evaluation of structured role-play, simulated or standardized patients, direct observation, checklist-guided assessment, and timely feedback; however, comparative evidence is currently insufficient to establish one teaching strategy as definitively superior. For informed-consent training specifically, colleges may consider incorporating standardized consent OSCEs or simulated-patient assessments that evaluate disclosure of indication, benefits, material risks, and alternatives; understanding and capacity; patient questions; voluntariness; and appropriate closure/documentation. Such approaches should be evaluated prospectively rather than assumed to be effective on the basis of general communication outcomes.

At the policy level, national or university-level assessment frameworks could define a core set of observable communication and consent outcomes. This would reduce the current heterogeneity of local scales and enable multicentre benchmarking. Faculty development should address feedback skills, assessment reliability, and the distinction between “knowledge of consent” and “ability to obtain valid informed consent.”

*Priorities for Future Research*

Future research should prioritize multicenter controlled or cluster-randomized studies comparing AETCOM teaching strategies while minimizing contamination; consent-specific OSCEs or standardized-patient assessments with validated rubrics and blinded or independent raters; longitudinal follow-up from early MBBS through internship to test retention and transfer to workplace behavior; patient-centered outcomes such as comprehension, decisional conflict, trust, satisfaction, perceived respect, and quality of shared decision-making; comparisons of peer role-play, standardized patients, AI or virtual patients, and hybrid approaches on learning effectiveness, feasibility, and cost; and prespecified core outcome sets for communication and informed consent to permit future quantitative synthesis.

## Conclusions

AETCOM-based education is associated with improved short-term patient communication performance among medical students and interns, particularly in studies incorporating active practice, structured observation, and feedback. However, the certainty of evidence for short-term communication improvement is low because the available literature is dominated by non-randomized, uncontrolled educational studies with heterogeneous outcome measures and limited follow-up. Evidence for informed-consent-specific competence is substantially weaker; few studies directly assessed the complete consent process, and certainty for this outcome remains very low. Evidence regarding long-term retention, transfer to workplace

behavior, and patient-centered outcomes is also very limited. The current literature therefore supports continued implementation and rigorous evaluation of AETCOM-based communication training but does not establish definitive effectiveness for informed-consent competence or long-term clinical outcomes.

# Appendices

## Appendix 1

*Complete Electronic Search Strategies*

The database-specific search strategies are presented below to support reproducibility in accordance with PRISMA 2020. All searches were limited to English-language reports from January 1, 2019 through July 31, 2026. Record yields correspond to the search counts reported in the manuscript and PRISMA flow diagram.

| Item | Details |
|---|---|
| Database/interface | PubMed/MEDLINE (PubMed) |
| Last searched | July 31, 2026 |
| Date coverage | January 1, 2019-July 31, 2026 |
| Language | English |
| Records retrieved | 42 |
| Search string | (("AETCOM"[Title/Abstract] OR "Attitude Ethics Communication"[Title/Abstract] OR "Attitude Ethics and Communication"[Title/Abstract]) AND ("medical student*"[Title/Abstract] OR "undergraduate medical"[Title/Abstract] OR MBBS[Title/Abstract] OR intern*[Title/Abstract]) AND (communication[Title/Abstract] OR "doctor-patient"[Title/Abstract] OR "patient communication"[Title/Abstract] OR consent[Title/Abstract] OR "informed consent"[Title/Abstract] OR Kalamazoo[Title/Abstract] OR "role play"[Title/Abstract] OR role-play[Title/Abstract] OR simulation[Title/Abstract] OR "simulated patient*"[Title/Abstract])) AND ("2019/01/01"[Date - Publication] : "2026/07/31"[Date - Publication]) AND English[Language] |

**TABLE 5: PubMed/MEDLINE search strategy**

## Appendix 2

| Item | Details |
|---|---|
| Database/interface | Scopus |
| Last searched | July 31, 2026 |
| Date coverage | 2019-July 31, 2026 |
| Language | English |
| Records retrieved | 36 |
| Search string | TITLE-ABS-KEY ( AETCOM OR "Attitude Ethics Communication" OR "Attitude Ethics and Communication" ) AND TITLE-ABS-KEY ( "medical student*" OR "undergraduate medical" OR MBBS OR intern* ) AND TITLE-ABS-KEY ( communication OR "doctor-patient" OR "patient communication" OR consent OR "informed consent" OR Kalamazoo OR "role play" OR "role-play" OR simulation OR "simulated patient*" ) AND PUBYEAR > 2018 AND PUBYEAR < 2027 AND ( LIMIT-TO ( LANGUAGE, "English" ) ) |

**TABLE 6: Scopus search strategy**

## Appendix 3

| Item | Details |
|---|---|
| Database/interface | Web of Science Core Collection |
| Last searched | July 31, 2026 |
| Date coverage | 2019-July 31, 2026 |
| Language | English |
| Records retrieved | 29 |
| Search string | TS=(AETCOM OR "Attitude Ethics Communication" OR "Attitude Ethics and Communication") AND TS=("medical student*" OR "undergraduate medical" OR MBBS OR intern*) AND TS=(communication OR "doctor-patient" OR "patient communication" OR consent OR "informed consent" OR Kalamazoo OR "role play" OR "role-play" OR simulation OR "simulated patient*"); Timespan: 2019-2026; Language: English. |

**TABLE 7: Web of Science search strategy**

## Appendix 4

| Item | Details |
|---|---|
| Database/interface | Embase |
| Last searched | July 31, 2026 |
| Date coverage | 2019-July 31, 2026 |
| Language | English |
| Records retrieved | 24 |
| Search string | ('aetcom':ti,ab OR 'attitude ethics communication':ti,ab OR 'attitude ethics and communication':ti,ab) AND ('medical student*':ti,ab OR 'undergraduate medical':ti,ab OR mbbs:ti,ab OR intern*:ti,ab) AND (communication:ti,ab OR 'doctor-patient':ti,ab OR 'patient communication':ti,ab OR consent:ti,ab OR 'informed consent':ti,ab OR kalamazoo:ti,ab OR 'role play':ti,ab OR 'role-play':ti,ab OR simulation:ti,ab OR 'simulated patient*':ti,ab) AND [english]/lim; publication-year limit applied: 2019-2026 |

**TABLE 8: Embase search strategy**

## Appendix 5

| Item | Details |
|---|---|
| Database/interface | ERIC |
| Last searched | July 31, 2026 |
| Date coverage | 2019-July 31, 2026 |
| Language | English |
| Records retrieved | 18 |
| Search string | ("AETCOM" OR "Attitude Ethics Communication" OR "Attitude Ethics and Communication") AND ("medical students" OR "undergraduate medical" OR MBBS OR interns) AND (communication OR "doctor-patient" OR "patient communication" OR consent OR "informed consent" OR Kalamazoo OR "role play" OR simulation OR "simulated patient"); publication date filter: 2019 through July 31, 2026; language: English. |

**TABLE 9: ERIC search strategy**

## Appendix 6

*Supplementary Website and Citation Searching*

| Source/method | Search sequence or procedure | Date completed |
|---|---|---|
| Journal/publisher websites | "AETCOM communication skills medical students" | July 31, 2026 |
| Journal/publisher websites | "AETCOM informed consent" | July 31, 2026 |
| Journal/publisher websites | "AETCOM doctor-patient relationship" | July 31, 2026 |
| Journal/publisher websites | "AETCOM Kalamazoo" | July 31, 2026 |
| Journal/publisher websites | "AETCOM role play simulated patient" | July 31, 2026 |
| Backward citation searching | Reference lists of included AETCOM studies and relevant systematic reviews were screened for potentially eligible primary reports. | July 31, 2026 |
| Forward citation searching | Citing reports of included studies and relevant AETCOM reviews were checked for additional eligible primary studies. | July 31, 2026 |

**TABLE 10: Supplementary search sequences and citation-search methods**

# Additional Information

## Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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**Drafting of the manuscript:** Smriti Varshney, Mohd Sanan Khan, Brajeshwar Kumar, Paarth Garg, Tanupriya Bindal

## Disclosures

**Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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