

Research Article

Bioethics in Competency Based Medical Education

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Received: 17.06.26, Revised: 20.07.26, Accepted: 19.08.26

ABSTRACT

Background: Bioethics has become an indispensable component of modern medical education because it guides healthcare professionals in making morally sound, patient-centered, and socially responsible decisions. The rapid advancement of medical science, biotechnology, artificial intelligence (AI), genomics, organ transplantation, reproductive medicine, and digital healthcare has generated complex ethical challenges that extend beyond traditional clinical practice. Competency-Based Medical Education (CBME), introduced by the National Medical Commission (NMC), recognizes ethical competence as a core outcome of undergraduate medical training through the Attitude, Ethics, and Communication (AETCOM) module. Bioethics is therefore no longer confined to theoretical instruction but has become an integral part of clinical reasoning, professional identity formation, patient safety, and compassionate healthcare.

Objective: To review the principles of bioethics, examine their integration into Competency-Based Medical Education, and discuss the evolving role of ethical education in developing competent, compassionate, and socially accountable physicians.

Methods: A narrative review was conducted using peer-reviewed literature published between 2021 and 2026, together with recommendations from the National Medical Commission (NMC), World Health Organization (WHO), UNESCO, World Medical Association (WMA), and other international organizations. Recent publications addressing bioethics, professionalism, anatomy education, competency-based medical education, artificial intelligence, digital health, and healthcare ethics were critically reviewed.

Results: Bioethics provides the moral and professional framework necessary for ethical clinical decision-making, patient-centered care, informed consent, confidentiality, professionalism, and social accountability. Competency-Based Medical Education integrates ethical competencies throughout undergraduate training by emphasizing experiential learning, reflective practice, communication skills, professionalism, and interdisciplinary collaboration. Anatomy education, particularly cadaveric dissection and voluntary body donation, provides an early opportunity to cultivate respect for human dignity and professional responsibility. Emerging technologies such as artificial intelligence, telemedicine, genomic medicine, and digital health further highlight the need for comprehensive bioethical education.

Conclusion: Bioethics is a foundational pillar of Competency-Based Medical Education and is essential for developing physicians who combine scientific competence with ethical integrity, compassion, professionalism, and lifelong commitment to patient welfare. Strengthening bioethical education through integrated curricula, clinical application, faculty development, and reflective learning will prepare future physicians to address increasingly complex ethical challenges in modern healthcare.

Keywords: Bioethics, Competency-Based Medical Education, Cbme, Aetcom, Medical Ethics, Professionalism, Anatomy Education, Artificial Intelligence, Medical Humanities, Patient-Centered Care.

INTRODUCTION

Medicine has traditionally been regarded as both a science and a moral profession. While scientific knowledge enables physicians to diagnose and treat diseases, ethical principles guide decisions that directly affect human life, dignity, autonomy, and well-being. Every interaction between a physician and a patient involves ethical responsibilities that extend beyond technical competence. Consequently, bioethics has become an essential component of modern medical education and clinical practice (1).

Healthcare delivery has undergone profound transformation over the past two decades. Advances in artificial intelligence (AI), precision medicine, genomic technologies, organ transplantation, stem-cell research, reproductive medicine, telemedicine, and digital health have significantly improved diagnostic and therapeutic capabilities (2). However, these innovations have also introduced complex ethical dilemmas concerning patient autonomy, informed consent, confidentiality, equitable access to healthcare, algorithmic bias, data privacy, and responsible use of emerging technologies. Physicians must therefore possess not only scientific expertise but also the ethical competence necessary to navigate these evolving challenges (3).

Recognizing this need, the National Medical Commission (NMC) introduced Competency-Based Medical Education (CBME) for undergraduate medical training in India. Unlike traditional knowledge-based curricula, CBME focuses on the development of observable competencies encompassing knowledge, clinical skills, communication, professionalism, ethics, and lifelong learning (4). The Attitude, Ethics, and Communication (AETCOM) module forms one of the distinguishing features of CBME by ensuring that ethical reasoning and professional behaviour are cultivated throughout medical education rather than being taught as isolated theoretical concepts (5).

Bioethics is equally important in anatomy education, which represents one of the earliest professional experiences encountered by medical students. Cadaveric dissection introduces students to concepts of human dignity, voluntary body donation,

confidentiality, respect, gratitude, teamwork, and professional conduct. These experiences significantly influence the formation of professional identity and compassionate attitudes that remain fundamental throughout medical careers (6).

International organizations, including the World Health Organization (WHO), World Medical Association (WMA), UNESCO, and the World Federation for Medical Education (WFME), advocate integrating ethics and professionalism throughout undergraduate medical curricula to produce physicians who are scientifically competent, ethically responsible, culturally sensitive, and socially accountable (7). Such recommendations emphasize that ethical competence should develop alongside clinical competence through reflective practice, experiential learning, and patient-centered education (8).

This review explores the principles of bioethics, traces its evolution within medical education, and examines its integration into Competency-Based Medical Education. Particular emphasis is placed on anatomy education, professional identity formation, technological advancements, and the ethical competencies required for contemporary medical practice.

Fundamentals of Bioethics

The term bioethics combines the Greek words *bios* (life) and *ethos* (moral character) and refers to the systematic study of ethical issues arising in medicine, biology, public health, and healthcare. It provides physicians with a structured framework for making morally justifiable decisions while balancing scientific advances with respect for human values (9).

Modern bioethics is primarily founded upon four universally accepted ethical principles first articulated by Beauchamp and Childress: autonomy, beneficence, non-maleficence, and justice (2). These principles continue to underpin ethical decision-making across diverse clinical settings.

Respect for autonomy: recognizes every competent individual's right to make informed decisions regarding personal healthcare. Physicians must provide accurate information, obtain valid informed consent, and respect patients' preferences even when they differ from medical recommendations (10).

Beneficence: obligates healthcare professionals to promote patients' welfare by providing appropriate treatment, preventing disease, relieving suffering, and maximizing health benefits (11).

Non-maleficence: often summarized as "first, do no harm," requires physicians to avoid unnecessary injury while carefully balancing potential benefits against associated risks during diagnosis and treatment (12).

Justice: emphasizes fairness, equality, and equitable allocation of healthcare resources irrespective of socioeconomic status, ethnicity, religion, gender, or geographical location (13).

Beyond these foundational principles, contemporary bioethics encompasses confidentiality, privacy, truth-telling, accountability, professional integrity, cultural sensitivity, research ethics, environmental responsibility, and social justice (14). The rapid expansion of digital health technologies has further introduced concerns regarding cybersecurity, electronic health records, artificial intelligence, algorithmic transparency, and responsible data management (15).

Bioethics also recognizes that ethical decision-making extends beyond individual patient care to include family relationships, community health, healthcare policy, disaster management, resource allocation, and global health responsibilities. Physicians must therefore integrate ethical reasoning into every aspect of professional practice while maintaining compassion, empathy, and respect for human dignity (16).

Importantly, bioethics is not limited to theoretical discussions but represents a practical competency requiring continuous reflection, communication, and professional judgment. Effective bioethical education therefore combines classroom teaching with clinical experiences, case-based learning, role play, reflective writing, and patient interactions, enabling students to translate ethical principles into everyday medical practice (17).

Evolution of Bioethics in Medical Education

The ethical foundations of medicine date back more than two millennia. The Hippocratic Oath established enduring professional obligations including beneficence, confidentiality, professional integrity, and commitment to

patient welfare (18). Similar ethical traditions developed independently in ancient Indian, Chinese, Islamic, and other medical systems, emphasizing compassion, service, honesty, and moral responsibility.

During the twentieth century, unprecedented scientific advances and historical events profoundly influenced the development of modern bioethics. Ethical violations during human experimentation led to the Nuremberg Code (1947), which established voluntary informed consent as an essential requirement for biomedical research. Subsequent international guidelines, including the Declaration of Helsinki, further strengthened protections for research participants and reinforced ethical standards in clinical investigations (19).

Over subsequent decades, bioethics expanded beyond research ethics to encompass organ transplantation, reproductive medicine, genetic engineering, end-of-life care, public health ethics, healthcare resource allocation, and patients' rights. Medical schools worldwide gradually incorporated ethics education into undergraduate curricula through lectures, problem-based learning, simulated patient encounters, reflective exercises, and clinical case discussions (20).

In India, the National Medical Commission significantly advanced ethics education by introducing the Competency-Based Medical Education (CBME) curriculum in 2019 and embedding the AETCOM (Attitude, Ethics, and Communication) module across all phases of undergraduate medical training (9). Rather than treating ethics as a separate academic discipline, AETCOM integrates ethical reasoning into clinical practice, communication skills, professionalism, and patient care. Students progressively acquire competencies related to informed consent, confidentiality, empathy, teamwork, respect for diversity, end-of-life decisions, professional accountability, and ethical leadership (21).

Recent technological innovations have further expanded the scope of bioethics. Artificial intelligence, machine learning, digital pathology, telemedicine, wearable health technologies, and genomic medicine require physicians to address emerging ethical concerns regarding algorithmic fairness, privacy, transparency, cybersecurity, digital professionalism, and equitable healthcare access (22). Consequently, modern bioethics education increasingly emphasizes interdisciplinary learning, critical thinking, and

ethical decision-making within rapidly evolving healthcare systems.

Today, bioethics is recognized as a core competency rather than an ancillary subject. It equips future physicians with the knowledge, attitudes, and professional values necessary to deliver safe, compassionate, equitable, and ethically responsible healthcare throughout their careers. Its integration within CBME ensures that ethical competence develops alongside clinical competence, preparing graduates to meet the complex moral challenges of twenty-first-century medicine (23).

Bioethics in Competency-Based Medical Education (CBME)

Competency-Based Medical Education (CBME) represents a paradigm shift from the traditional time-based curriculum to an outcome-oriented educational model that emphasizes the development of measurable competencies required for safe, ethical, and patient-centered medical practice (24). Rather than focusing solely on knowledge acquisition, CBME integrates cognitive, psychomotor, and affective domains to produce physicians who are clinically competent, professionally responsible, ethically sound, and socially accountable (25).

Bioethics forms one of the fundamental pillars of CBME because ethical competence directly influences clinical decision-making, patient safety, communication, professionalism, and public trust. Every clinical encounter requires physicians to balance scientific evidence with ethical principles while respecting patients' rights, cultural diversity, and individual preferences (1–4). Consequently, ethical reasoning is no longer considered an optional attribute but an essential clinical competency. The National Medical Commission (NMC) has integrated bioethics throughout undergraduate medical education by embedding ethical competencies across all phases of learning rather than limiting ethics to isolated classroom sessions (9). Students progressively develop competencies related to informed consent, confidentiality, communication, empathy, teamwork, professional accountability, patient autonomy, and ethical decision-making during both preclinical and clinical training.

Experiential learning forms the cornerstone of ethical competency development. Clinical case discussions, standardized patient encounters,

role-play exercises, reflective writing, simulation-based learning, and supervised patient interactions allow students to apply ethical principles in realistic healthcare scenarios (10, 15, 16). Reflection on ethical dilemmas encourages students to appreciate multiple perspectives, recognize moral conflicts, and develop sound professional judgment.

CBME also promotes interprofessional education, where medical students collaborate with nursing, pharmacy, physiotherapy, and allied health students to understand ethical responsibilities within multidisciplinary healthcare teams (10, 16). Such collaborative learning strengthens communication, mutual respect, leadership, and shared accountability, all of which are essential for delivering safe and patient-centered healthcare.

Furthermore, CBME recognizes that ethical competence evolves throughout a physician's career. Continuous professional development, reflective practice, quality improvement initiatives, and evidence-based medicine ensure that physicians remain ethically responsive to emerging scientific and societal challenges (9, 10).

AETCOM and Ethical Competencies:

The Attitude, Ethics, and Communication (AETCOM) module introduced by the National Medical Commission represents one of the most significant educational reforms in undergraduate medical education in India (9). AETCOM aims to develop physicians who combine scientific excellence with compassion, ethical integrity, professionalism, and effective communication.

Unlike conventional ethics teaching, AETCOM adopts a longitudinal approach in which ethical competencies are reinforced throughout all phases of medical education. Students learn not only ethical theories but also practical application through clinical experiences, reflective exercises, role-play, simulated patient interactions, and real-world ethical discussions (9, 10).

The module addresses several core competency domains. Professionalism includes honesty, accountability, punctuality, integrity, respect, and responsibility toward patients, colleagues, and society (9, 16). Ethical competencies include informed consent, confidentiality, truth-telling, end-of-life decision-making, organ donation, conflict resolution, and responsible professional conduct (2, 9).

Communication skills represent another major component of AETCOM. Effective physician-patient communication improves diagnostic accuracy, enhances patient satisfaction, strengthens therapeutic relationships, and promotes shared decision-making (16). Students learn active listening, empathy, counselling skills, breaking bad news, culturally sensitive communication, and management of difficult conversations.

AETCOM also emphasizes social accountability by encouraging students to understand healthcare disparities, public health responsibilities, cultural diversity, disability, gender sensitivity, and healthcare equity (15, 18). Such competencies prepare future physicians to provide inclusive, respectful, and patient-centered care across diverse populations.

Assessment within AETCOM extends beyond written examinations. Workplace-based assessment, Objective Structured Clinical Examination (OSCE), Mini-Clinical Evaluation Exercise (Mini-CEX), Direct Observation of Procedural Skills (DOPS), reflective portfolios, peer assessment, and faculty feedback provide comprehensive evaluation of ethical behaviour and professional development (9,10).

The integration of AETCOM throughout CBME ensures that ethical competence develops alongside scientific knowledge, enabling graduates to become compassionate physicians capable of balancing technological innovation with humanistic patient care.

Role of Anatomy and Cadaveric Ethics

Anatomy serves as the foundation of medical education and provides one of the earliest opportunities for students to develop ethical awareness and professional identity (11–14). The anatomy dissection hall represents more than a laboratory; it is the environment where students first encounter human mortality, altruism, respect for body donors, teamwork, and professional responsibility.

Cadaveric dissection remains the gold standard for anatomical education despite remarkable advances in digital learning technologies (12–14). Human body donors, often referred to as "silent teachers," provide invaluable educational experiences through voluntary body donation. Respecting their altruistic contribution instills humility, gratitude, empathy, confidentiality, and ethical responsibility among medical students (26).

Cadaveric ethics begins before dissection itself. Institutions must ensure voluntary

informed consent for body donation, maintain donor confidentiality, preserve dignity throughout embalming and dissection, and conduct respectful memorial ceremonies acknowledging donors' invaluable contribution to medical education (11, 12).

The dissection hall also promotes professionalism through collaborative learning. Students develop communication skills, leadership, teamwork, discipline, mutual respect, and accountability while working in small groups. These experiences significantly influence professional identity formation and prepare students for multidisciplinary clinical practice (13, 14).

Modern anatomy education increasingly incorporates virtual dissection tables, three-dimensional visualization, augmented reality (AR), virtual reality (VR), digital microscopy, radiological anatomy, and artificial intelligence-assisted learning (5–8, 13). While these technologies improve visualization and accessibility, they cannot fully replicate the tactile experience, anatomical variations, and ethical lessons derived from cadaveric dissection (12–14).

Consequently, contemporary anatomy education should adopt a hybrid approach that combines cadaveric dissection with digital innovations. Such integration enhances scientific understanding while preserving the ethical values that remain central to medical professionalism.

AI, Digital Learning, and Bioethical Challenges

Artificial intelligence, machine learning, digital pathology, wearable health technologies, telemedicine, electronic health records, and mobile health applications have transformed healthcare delivery and medical education (5–8). These innovations offer substantial educational advantages, including personalized learning, adaptive assessments, automated feedback, intelligent tutoring systems, and virtual patient simulations.

Despite these benefits, digital transformation introduces important bioethical concerns. Protection of patient privacy and confidentiality remains paramount as increasing volumes of electronic health data are stored, shared, and analyzed (27). Physicians must ensure compliance with legal and ethical standards governing data security and informed consent.

Algorithmic bias represents another major challenge. AI systems trained using non-

representative datasets may generate inaccurate or inequitable clinical recommendations for certain patient populations, potentially exacerbating healthcare disparities (6–8). Physicians therefore retain ultimate responsibility for clinical decision-making and must critically evaluate AI-generated recommendations.

Academic integrity has also become increasingly relevant within digital learning environments. Responsible use of artificial intelligence in medical education requires clear institutional policies regarding plagiarism, authorship, assessment integrity, and ethical use of generative AI tools (28).

Telemedicine further raises ethical issues related to informed consent, patient identity

verification, confidentiality, professional accountability, and equitable access to healthcare (15, 18). Physicians must balance technological efficiency with compassionate communication and individualized patient care. CBME therefore emphasizes responsible digital professionalism, encouraging students to develop competencies in ethical technology use, digital communication, cybersecurity awareness, social media professionalism, and evidence-based evaluation of AI-assisted clinical decision-making. Future physicians must embrace technological innovation while preserving the humanistic values that define ethical medical practice.

Table 1. Core Principles of Bioethics in Competency-Based Medical Education

No.	Bioethical Principle	Description	Clinical Application in CBME
1.	Autonomy	Respect for patients' right to make informed decisions	Informed consent, shared decision-making
2.	Beneficence	Acting in the patient's best interest	Evidence-based treatment and patient advocacy
3.	Non-maleficence	Avoiding harm	Safe clinical practice and patient safety
4.	Justice	Fair and equitable healthcare	Equal access to healthcare services
5.	Confidentiality	Protection of patient information	Ethical management of health records
6.	Professional Integrity	Honesty and accountability	Ethical clinical conduct and professionalism
7.	Compassion	Empathy toward patients	Patient-centered communication and care
8.	Social Accountability	Commitment to community health	Public health and preventive medicine

Table 2. Integration of Bioethics across Undergraduate Medical Education

No.	Phase of MBBS	Bioethical Focus	Learning Methods
1.	First Professional	Cadaveric ethics, body donation, professionalism	Anatomy dissection, reflective learning
2.	Second Professional	Confidentiality, informed consent	Case discussions, role play
3.	Third Professional Part I	Public health ethics, equity	Community postings, field visits
4.	Third Professional Part II	Clinical ethics and communication	Bedside teaching, OSCE
5.	Internship	Ethical decision-making and professionalism	Supervised patient care, Mini-CEX
6.	Continuing Medical Education	Lifelong ethical practice	CPD, workshops, reflective portfolios



Figure 1. Integration of Bioethics in Competency-Based Medical Education



Figure 2. Bioethical Framework for Anatomy Education

Challenges and Future Perspectives

Bioethics education within Competency-Based Medical Education (CBME) has made significant progress in integrating ethical reasoning, professionalism, communication, and patient-centered care into undergraduate medical training. Nevertheless, several educational, technological, institutional, and societal challenges continue to influence the effective implementation of bioethics in medical education (9,10).

One of the major challenges is the transition from teaching ethical principles to ensuring their consistent application in real clinical practice. Although medical students acquire theoretical knowledge of autonomy, beneficence, non-maleficence, and justice during classroom teaching, applying these principles while managing complex clinical situations often remains difficult (1,2). Ethical dilemmas involving end-of-life care, informed consent, confidentiality, allocation of scarce healthcare resources, and conflicts between patient autonomy and physician responsibility require mature ethical reasoning that develops only through continuous clinical exposure and reflective practice (2, 15).

Faculty preparedness also remains an important challenge. Effective bioethics education requires educators who possess expertise in ethics, communication, professionalism, and educational methodologies. However, many institutions continue to experience shortages of trained faculty capable of facilitating ethical

discussions, reflective learning, and competency-based assessment (9, 10). Continuous Faculty Development Programmes (FDPs) are therefore essential for strengthening ethics education within CBME.

Assessment of ethical competencies represents another area requiring improvement. Unlike cognitive knowledge, professionalism, empathy, honesty, compassion, and ethical reasoning cannot be adequately evaluated using conventional written examinations alone. CBME therefore encourages workplace-based assessments, Objective Structured Clinical Examinations (OSCEs), Mini-Clinical Evaluation Exercises (Mini-CEX), reflective portfolios, multisource feedback, and direct observation of professional behaviour (9, 10).

Developing reliable and objective assessment tools remains an ongoing educational priority. Rapid technological advancement has introduced new bioethical challenges. Artificial intelligence (AI), machine learning, digital pathology, electronic health records, wearable devices, genomic medicine, and telemedicine have transformed healthcare delivery but have simultaneously raised concerns regarding privacy, cybersecurity, algorithmic bias, informed consent, accountability, transparency, and equitable healthcare access (5–8). Recent literature emphasizes that AI should augment—not replace—human ethical judgment, and medical curricula must prepare future physicians to evaluate AI-generated recommendations critically while maintaining professional accountability.

Digital professionalism has become increasingly important. Physicians and medical students routinely use electronic communication, social media, teleconsultation, and online educational platforms. Maintaining patient confidentiality, professional boundaries, responsible online behaviour, and appropriate use of digital information are now essential ethical competencies (5, 7, 16).

Global healthcare disparities present additional ethical concerns. Unequal access to healthcare, shortages of healthcare professionals, economic inequality, cultural diversity, climate change, humanitarian crises, and emerging infectious diseases require physicians to balance individual patient care with broader public health responsibilities (15, 18). CBME therefore emphasizes social accountability, community engagement, health equity, and culturally sensitive practice.

Looking toward the future, bioethics education should increasingly adopt integrated, longitudinal, and competency-based approaches. Ethical reasoning should be reinforced throughout undergraduate and postgraduate medical education using case-based learning, simulation, reflective writing, standardized patient encounters, and interdisciplinary teaching (9, 10, 16). International recommendations similarly advocate embedding ethics across the curriculum rather than teaching it as an isolated subject.

Artificial intelligence itself offers opportunities for improving ethics education through adaptive learning platforms, virtual patients, intelligent tutoring systems, personalized feedback, and AI-assisted formative assessment. However, these technologies should always be implemented within robust ethical frameworks emphasizing transparency, fairness, accountability, and human oversight.

Anatomy education will continue to play a unique role in ethical development. Cadaveric dissection, voluntary body donation programmes, memorial ceremonies, and reflective learning remain powerful educational experiences that cultivate humility, empathy, gratitude, professionalism, and respect for human dignity. Contemporary digital technologies should complement these experiences rather than replace them (11–14). Recent discussions on the evolving role of anatomical sciences within CBME reinforce the importance of maintaining this balance (29).

Future physicians must therefore be scientifically competent, ethically grounded, technologically literate, culturally sensitive, and socially accountable. Strengthening bioethics education will enable medical graduates to navigate increasingly complex clinical environments while preserving the humanitarian values that define the medical profession.

CONCLUSION

Bioethics has emerged as a cornerstone of Competency-Based Medical Education and is fundamental to the development of competent, compassionate, and ethically responsible physicians. While scientific knowledge and clinical skills remain essential, they must be complemented by professionalism, integrity, empathy, effective communication, and respect for human dignity.

The integration of the Attitude, Ethics and Communication (AETCOM) module within the National Medical Commission's CBME curriculum represents a major advancement in undergraduate medical education by embedding ethical competencies throughout the learning continuum. This longitudinal approach enables students to develop ethical reasoning through experiential learning, reflective practice, clinical exposure, and patient-centered education.

Anatomy education provides one of the earliest opportunities for cultivating ethical values. Cadaveric dissection, voluntary body donation, anatomy museums, and clinical anatomy collectively contribute to professional identity formation, empathy, teamwork, accountability, and lifelong respect for human life.

The rapid integration of artificial intelligence, digital health, precision medicine, and telemedicine presents unprecedented opportunities while simultaneously generating complex ethical challenges involving privacy, transparency, fairness, data governance, and professional accountability. Medical education must therefore prepare future physicians to integrate technological innovation with ethical reasoning and compassionate patient care. Emerging competency frameworks for AI in medicine also emphasize ethical literacy as a core capability.

Ultimately, bioethics should not be regarded as a separate academic discipline but as an integral component of every clinical encounter, educational activity, research endeavour, and

healthcare decision. Strengthening bioethics within Competency-Based Medical Education will prepare future physicians who are capable of balancing scientific excellence with ethical integrity, technological innovation with humanism, and professional competence with

unwavering commitment to patient welfare. Such physicians will uphold the highest standards of medical practice while preserving public trust in an increasingly complex healthcare environment.

Table 3. Challenges and Future Strategies for Strengthening Bioethics in Cbme

No.	Challenge	Impact on Medical Education	Future Strategy
1.	Limited faculty expertise in bioethics	Variable quality of ethics teaching	Regular faculty development programmes
2.	Assessment of ethical competencies	Difficult to objectively evaluate professionalism	OSCE, Mini-CEX, reflective portfolios, multisource feedback
3.	Artificial intelligence and digital health	Privacy, bias, accountability concerns	AI ethics curriculum and governance frameworks
4.	Maintaining patient confidentiality	Increased risk with electronic records	Cybersecurity training and digital professionalism
5.	Healthcare inequalities	Ethical issues in equitable care	Community-based education and social accountability
6.	Cultural diversity	Complex ethical decision-making	Cultural competence training
7.	Cadaveric ethics	Declining exposure in some institutions	Hybrid anatomy education with donor ethics
8.	Rapid technological advances	Emerging ethical dilemmas	Continuous curriculum revision and lifelong learning

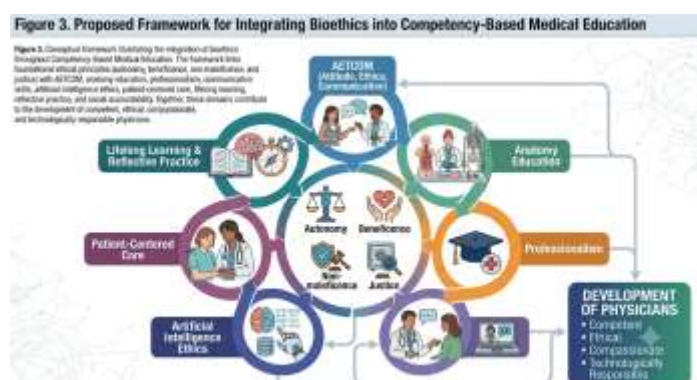


Figure 3. Proposed Framework for Integrating Bioethics into Competency-Based Medical Education

Acknowledgement: The authors are thankful to Dr. Piyush Sunda, Paediatrician, Chairman of Prince Eduhub and Prince Hospital, and Dr. Ramratan Yadav, Consultant Surgeon and Professor at Government Medical College, Sikar. The authors are also thankful to the faculty and staff of the Department of Anatomy, Prince Medical College, for their continuous support and encouragement throughout the study. Special appreciation is extended to the body donors and their families whose noble contribution to medical education continues to inspire generations of future doctors. Authors also acknowledge the immense help received from the scholars

whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

Ethical Approval: Not applicable for this narrative review. This review article is based on published literature and does not involve human participants, live animals, or identifiable cadaveric data. Therefore, institutional ethical approval was not required.

Consent for Publication: Not applicable.

Funding: The authors received no financial support for the preparation of this manuscript.

Conflict of Interest: The authors declare that they have no competing interests.

Author contributions: Sharadkumar Pralhad Sawant (SPS) conceptualized the study, designed the framework of the manuscript, and prepared the original draft with critical intellectual inputs. Amit Manchanda (AM) done plagiarism assessment to ensure the academic integrity and originality of the manuscript. Dr. Nikita Jakhar (NJ) helped in literature review. All authors reviewed and approved the final version of the manuscript for publication.

REFERENCES

1. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. 9th ed. New York: Oxford University Press; 2024.
2. World Medical Association. WMA Declaration of Geneva. Ferney-Voltaire: World Medical Association; 2022.
3. Wear D, Zarconi J. Humanism and professionalism in contemporary medical education. *Med Teach*. 2022;44(10):1085-1092.
4. Cruess RL, Cruess SR, Steinert Y. Professional identity formation and professionalism in medical education. *Med Educ*. 2022;56(10):1032-1041.
5. Lazarus MD, Truong M, Douglas P, Selwyn N. Artificial intelligence and clinical anatomical education: Promises and perils. *Anat Sci Educ*. 2022;15(6):1068-1082.
6. Li L, Cui Y, Liu HY, Qin XZ, Zhang YJ, Piao LH. Precision pedagogy in anatomy education: Integrating AI, narrative medicine, and professional stratification. *Clin Anat*. 2026.
7. Dr. S. P. Sawant, Dr. S. Rizvi, Ethics for Medical Educators, Anatomy & Physiology: Current Research, 2017; Vol 7, Issue 2 (257) Peer-reviewed open access journal Publons, Google Scholar, Euro Pub, Geneva Foundation for Medical Education and Research. Received Date: March 28, 2017; Accepted Date: March 30, 2017; Published Date: March 31, 2017, DOI: [10.4172/2161-0940.1000257](https://doi.org/10.4172/2161-0940.1000257)
8. Samuel A, Soh M. Redesigning medical education for AI-mediated practice. *New Dir Adult Contin Educ*. 2026.
9. Hunt VM, Sprehe LK, de Lomba WC, et al. What the AI era doctor should know: A scoping review of proposed artificial intelligence competencies for medical education. *npj Digit Med*. 2026.
10. National Medical Commission. Competency Based Undergraduate Medical Education Curriculum. New Delhi: NMC; 2024.
11. World Federation for Medical Education. Standards for Quality Improvement in Basic Medical Education. 2023.
12. Pather N, Blyth P, Chapman JA, et al. The role of anatomy education in professional identity formation. *Anat Sci Educ*. 2021;14:1-9.
13. Estai M, Bunt S. Best teaching practices in anatomy education. *Ann Anat*. 2022;241:151902.
14. Moro C, Phelps C, Redmond P, Stromberga Z. Extended reality in anatomy education: A literature review. *Ann Anat*. 2022;239:151817.
15. Khalil MK, Iwanaga J, Tubbs RS. Competency-Based Medical Education and the evolving role of anatomical sciences in undergraduate medical education. *Clin Anat*. 2026.
16. Dr. S. P. Sawant, Dr. S. Rizvi, The Evolution of Human Anatomy in India, MOJ Anatomy and Physiology, April 2017, Volume 4, Issue 2, 00132, 2017, Page No. 285–289, Received: March 18, 2017, Published: September 18, 2017, Peer-reviewed open access journal Genamics Journal Seek, Similarity Check, Sci lit, OCLC, World Cat, ROAD. DOI: [10.15406/mojap.2017.04.00132](https://doi.org/10.15406/mojap.2017.04.00132)
17. World Health Organization. Global Strategy on Digital Health 2020-2025. Geneva: WHO; 2021.
18. General Medical Council. Outcomes for Graduates. London: GMC; 2023.
19. UNESCO. Guidance for Digital Learning in Higher Education. Paris: UNESCO; 2023.
20. World Health Organization. Health Workforce Strategic Directions 2021-2025. Geneva: WHO; 2022.
21. World Medical Association. WMA Statement on Medical Education. Ferney-Voltaire: WMA; updated 2024.
22. World Medical Association. Resolution on the Inclusion of Medical Ethics and Human Rights in the Curriculum of Medical Schools Worldwide. Reaffirmed 2021.

23. Dr. Sharadkumar Pralhad Sawant¹, Dr. Priyatama Sharadkumar Sawant², Viren Sharadkumar Sawant³, Dr. Shaheen Rizvi⁴, Dr. Amit Manchanda⁵. Bioethics in Medical Education: Strengthening Professionalism, Compassion, and Ethical Healthcare Practice. Advanced International Journal for Research (AIJFR). Volume 7, Issue 3 (May-June 2026). Page No. 1-7. E-ISSN: 3048-7641. DOI: <https://doi.org/10.36948/ijfmr.2026.v08i03.79657>
24. Quinn TP, Coghlan S. Readyng medical students for medical AI: The need to embed AI ethics education. AI Ethics. 2021.
25. Gordon M, Daniel M, Ajiboye A, et al. Artificial intelligence in medical education: BEME Guide No. 84. Med Teach. 2024.
26. Zheng C, Zhang H. Ethical issues in medical AI education: Challenges and prospects. Int J Ethics Educ. 2026.
27. JMIR Medical Education. Health CARE-AI framework: Principles for responsible AI in health professions education, research, and care. JMIR Med Educ. 2026.
28. Dr. S. P. Sawant, Dr. S. T. Shaikh, Dr. A. D'Souza, The Cadaveric Oath: An Important Bio ethical perspective in Anatomy, National Journal of Clinical Anatomy Vol. 4., (4) 2015; Pg 210-211, Double-blinded peer-reviewed, Open Access DOAJ, SCOPUS, SC Imago Journal Ranking, DOI: <http://dx.doi.org/10.4103/2277-4025.295988>
29. Association of American Medical Colleges. Competency-Based Medical Education and AI competencies for medical learners. Washington, DC: AAMC; 2025.