Review Article

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A REVIEW ON YOGYA SUTRIYA ADHYAYA AND MODERN PEDAGOGY: A TIMELESS BLUEPRINT FOR PRACTICAL TRAINING IN MEDICAL EDUCATION

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ABSTRACT

The Yogya Sutriya Adhyaya of Sushruta Samhita is a pioneering chapter on the importance of experiential and skill-based learning. It outlines systematic methods to make a student Yogya for practical medical and surgical procedures through repeated demonstrations, model-based simulations, and guided mentorship. This article explores the pedagogical relevance of this ancient teaching in the context of modern medical and Ayurveda education. By correlating Sushruta's instructional design with contemporary frameworks such as Competency-Based Medical Education, simulation based learning, and experiential learning theories, it argues that Sushruta's methods are an enduring model of outcome-oriented training. The study concludes that integration of Yogya Sutriya principles can enrich current Ayurveda curriculum by balancing theoretical knowledge with practical mastery, ethical grounding, and reflective competence.

Keywords: Yogya Sutriya Adhyaya, Pedagogy, Experimental learning

INTRODUCTION

Ayurveda, the ancient Indian science of life, is rooted in a balanced synthesis of theory and practice. Among the great exponents, Acharya Sushruta stands unparalleled as the father of surgery. In the Sushruta Samhita Sutrasthana, the ninth chapter Yogya Sutriya Adhyaya deals exclusively with the imparting of practical training[1]. The central educational philosophy of Ayurveda is that "knowledge attains perfection only through practice"[2]. Sushruta insisted that intellectual comprehension without hands-on skill leads to incompetence[3]. Thus, Yogya Sutriya Adhyaya may rightly be considered the world's earliest manual on pedagogical training through simulation and demonstration.

The Importance of Practical Training

Susrutha Acharya says that, "Even if a student has mastered all theoretical knowledge, he becomes unfit for surgery if not trained practically"[4]. The message is unequivocal that is true competence arises only through direct performance under supervision. This notion anticipates the modern concept of competency-based education, where learning outcomes are measured through demonstrable skills rather than rote memorization[5]. In both paradigms, Yogya (competent) and Ayogya (incompetent) are not labels of intelligence but of ability to apply knowledge safely and effectively.

Sushruta's Model of Practical Training

Sushruta provides an elaborate list of materials and models upon which students should practice. Each surgical or procedural skill such as cutting, puncturing, scraping, suturing, bandaging and cauterization is demonstrated on an appropriate dummy or natural object before attempting on living beings. (Table 1)

Through such methodical practice, students developed dexterity, judgment, and confidence. "An intelligent student thus trained through proper materials never falters in actual surgical work." This is a clear description of simulation-based training, centuries before the term existed[7].

Simulation-Based Learning Modalities in Modern Medical Pedagogy

Simulation-based education has revolutionized modern medical pedagogy by integrating digital, physical, and hybrid approaches to develop clinical competence in a safe, ethical, and effective manner. [8]

Digital and virtual simulations

Digital and virtual simulations include immersive **Virtual Reality (VR)** systems that replicate realistic surgical environments such as laparoscopy and robotic surgery with haptic feedback, enabling repetitive, risk-free practice and enhancing psychomotor and spatial skills. [9]

Augmented Reality (AR) tools like Microsoft HoloLens overlay 3D anatomical visuals on real-world objects, promoting active visualization and conceptual clarity.

Surgical simulators such as the da Vinci Skills Simulator and RobotiX Mentor provide computer-based modules for endoscopic and vascular procedures, offering measurable performance feedback to improve precision and hand–eye coordination.

Virtual dissection tables, like the Anatomage Table, enable life-sized 3D cadaveric dissections that support cost-effective, ethical,

and reusable anatomy learning while enhancing spatial orientation.

3D-printed models, often patient-specific, allow tactile preoperative rehearsals and individualized procedural training. (Figure 1)

Physical models and animal tissue simulations

Physical models and animal tissue simulations continue to hold significance in foundational and advanced surgical training. [10]

Synthetic cadavers such as SynDaver mimic human tissue and organ properties, offering realistic surgical experiences without ethical concerns.

Benchtop trainers, including silicone suturing pads and animal tissues like pigskin, are ideal for beginners to develop basic motor coordination skills.

Animal models, whether live or cadaveric, are employed for advanced microsurgery and trauma management due to their unmatched physiological realism.

Platinated specimens and pro-sections preserved through polymer replacement ensure long-term anatomical study without decay or odour. (Figure 2)

Patient-centred and hybrid simulation models

Patient-centred and hybrid simulation models integrate the humanistic and technological aspects of learning.

Standardized patients, portrayed by trained actors, provide opportunities to refine communication, clinical reasoning, and professionalism in realistic settings. [11] (Figure 3)

Hybrid methods that combine VR, synthetic models, and live simulations offer a progressive and comprehensive learning experience, reinforcing cognitive, psychomotor, and affective domain competencies. Together, these diverse simulation modalities form the cornerstone of competency-based medical education, bridging theoretical learning with practical expertise in a controlled, replicable environment.

Thus, summarizes major simulation modalities currently applied in medical pedagogy, integrating digital, physical, and hybrid approaches for competency-based education. Examples include technologies such as the da Vinci Skills Simulator, Anatomage Table, RobotiX Mentor, and SynDaver synthetic models. (Table 2)

Relevance to Modern Pedagogy and Medical Education

Modern pedagogy emphasizes active, experiential, and learner centric methods, all of which Sushruta practiced intuitively. Table 3 demonstrate his timeless insight.

Experiential Learning Theories and Sushruta's Approach

Modern educational psychology validates Sushruta's ancient methodology. According to Kolb's Experiential Learning Theory (1984), learning occurs through a cycle of[12]

Sushruta's training followed the same sequence demonstration, observation, reflective learning, and re-practice until perfection. Similarly, Bloom's Taxonomy (1956) divides learning into cognitive, affective, and psychomotor domains[13]. Hence, Yogya Sutriya Adhyaya may be viewed as an ancient integrated competency framework. (Figure 4)

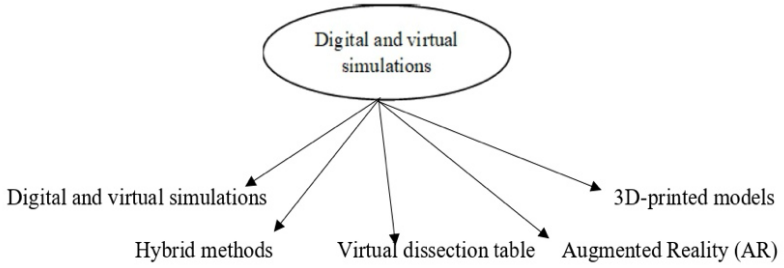
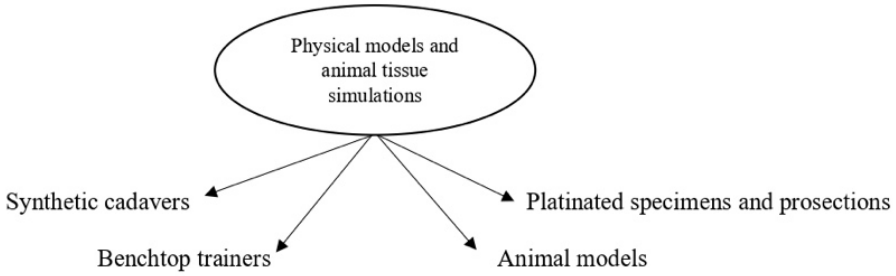


Figure 1



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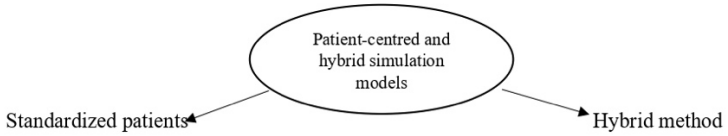

Figure 3

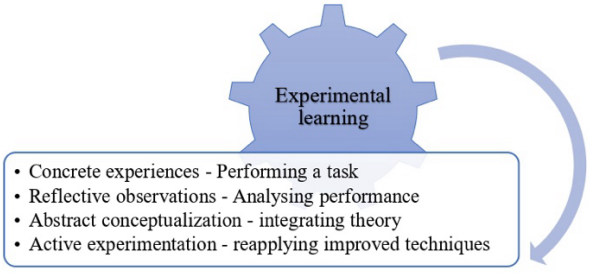

Figure 4

Table 1: Training materials suggested by Susrutha to study surgical procedures[6]

Procedure (Karma)	Training Material Suggested by Sushruta
Chedana (excision), Utkartana, Parikartana	Fruits like Kushmanda, Alabu, Kalindaka, Trapusa
Bhedana (splitting, incision)	Animal bladders, bellows, leather sacs filled with water
Lekhana (scraping)	Hairy leather sheets
Vedhana (puncturing)	Veins of dead animals, stalks of lotus
Eshana (probing)	Worm-eaten wood, bamboo, hollow reeds
Aharana (extracting)	Flesh of Panasa, Bimbi, Bilva fruits; teeth of dead animals
Visravana (drainage)	Wax-smeared planks of Salmali wood
Sivana (suturing)	Thin/thick cloths, soft leather for stitching edges
Bandhana (bandaging)	Models made of clay, cloth, or artificial limbs
Agni-Karma / Kshara-Karma	Soft muscle pieces
Karna-Sandhi-Bandhana	Soft skin, muscle, lotus stalks
Vasti-Karma / Vrana Vasti	Water-filled pots or Alabu gourds with openings

Table 2: Comparative Pedagogy Between Sushruta's Simulation Methods and Modern Surgical Training Tools

Traditional Procedure (Karma)	Training Material Suggested by Sushruta	Modern Equivalent / Simulation Pedagogy	Pedagogical Correlation
Chedana, Utkartana, Parikartana (Excision, Cutting, Carving)	Fruits like Kusmaṇḍa (*Benincasa hispida*), Alabu (*Lagenaria siceraria*), Kalindaka (*Citrullus lanatus*), Trapusa (*Cucumis sativus*).	Synthetic cadavers, benchtop trainers with silicone pads, 3D-printed models	Skill-based tactile learning; practice of incision depth and control without harm to living beings.
Bhedana (Splitting/Incision)	Animal bladders, bellows, leather sacs filled with water	Surgical simulators (VR/AR) replicating tissue tension and fluid compartments	Mimics resistance and pressure sensation; emphasizes precision and depth perception.
Lekhana (Scraping)	Hairy leather sheets	Synthetic models with layered texture; SynDaver tissues	Develops controlled instrument movement and sensitivity during tissue removal.
Vedhana (Puncturing)	Veins of dead animals, stalks of lotus	Virtual dissection tables; robotic simulators with haptic feedback	Simulates puncture resistance, enhancing psychomotor accuracy.
Eshana (Probing)	Worm-eaten wood, bamboo, hollow reeds	Endoscopic and laparoscopic trainers	Trains navigation within cavities; develops visual–spatial coordination.
Aharana (Extraction)	Flesh of Panasa (*Artocarpus heterophyllus*), Bimbi (*Coccinia grandis*), Bilva (*Aegle marmelos*) fruits; teeth of dead animals	VR retrieval modules; mechanical extraction trainers	Strengthens grip, traction, and removal techniques.
Visravana (Drainage)	Wax-smeared planks of Salmali (*Bombax ceiba*) wood	Fluid-drainage simulators; vascular access trainers	Enhances understanding of flow dynamics and wound management.
Sivana (Suturing)	Thin/thick cloths, soft leather	Benchtop suturing pads, animal skin simulators	Fundamental training in precision stitching, tension control, and wound closure.
Bandhana (Bandaging)	Models made of clay, cloth, or artificial limbs	Patient mannequins, synthetic limbs	Reinforces hand dexterity, pressure balance, and dressing techniques.

Agni-Karma / Kshara-Karma (Cauterization / Chemical Cautery)	Soft muscle pieces	Thermal cautery and laser simulators	Allows safe practice of controlled thermal tissue application.
Karna-Sandhi-Bandhana (Ear surgery or fine tissue joining)	Soft skin, muscle, lotus (*Nelumbo nucifera*) stalks	Microsurgery trainers, synthetic fine-tissue models	Fine motor coordination and visual precision enhancement.
Vasti-Karma / Vraṇa-Vasti (Enema or Wound Irrigation)	Water-filled pots or Alabu (*Langenaria siceraria*) gourds with openings	Catheterization and endoscopic simulators	Teaches pressure management, insertion technique, and aseptic fluid handling.

Table 3: Modern pedagogical equivalents to Sushruta's concepts

Sushruta's Concept	Modern Pedagogical Equivalent
Yogya Abhyasa (skill-based competence)	Competency-Based Medical Education (CBME)
Dravya Abhyasa (Practice on models)	Simulation-Based Learning and Skill Labs
Guru–shiṣya Parampara (Mentorship / Apprenticeship Programs)	Stepwise procedural training Scaffolded Learning / Spiral Curriculum
Ethical conduct (Acara Suddhi)	Professionalism and Bioethics Modules
Observation–Practice–Mastery	Kolb's Experiential Learning Cycle

DISCUSSION

The Yogya Sutriya Adhyaya of Sushruta Samhita, written over two millennia ago, presents a profound educational model that anticipates many principles found in modern medical pedagogy, especially in terms of outcome-based education emphasizing competence, professionalism, and patient safety. In this chapter, Sushruta emphasizes making a student "Yogya" or fit for surgical practice through a triadic integration of Buddhi (intellectual clarity), Hasta-Kaushalya (manual skill), and Achara Suddhi (moral integrity). This holistic approach aligns remarkably well with the modern medical education focus on the development of competent, ethical, and skilled health professionals.

Sushruta's approach to training includes rigorous practical exposure long before clinical work, such as surgical practice on simulated models resembling human tissues, which anticipates contemporary simulation-based training in medical schools. This emphasis on hands-on, experiential learning ensures that technical expertise is developed alongside theoretical knowledge, forming a foundation for patient safety and quality care. Additionally, the high moral standards and professionalism outlined by Sushruta constitute a timeless guideline for maintaining ethical behaviour and fostering trust in the doctor-patient relationship.

Modern medical education frameworks, such as the World Federation for Medical Education (WFME) and Outcome-Based Education (OBE) models, define educational outcomes clearly with a focus on competence assessment, professionalism, and patient-centred care. They stress flexible learning timelines to achieve defined competencies, frequent assessments including ethical and communication skills, and comprehensive integration of cognitive, psychomotor, and attitudinal domains. Sushruta's Yogya Sutriya Adhyaya similarly stresses the importance of intellectual understanding (cognitive), practical surgical skills (psychomotor), and ethical conduct (affective), effectively anticipating this triadic competency framework.

By revisiting Yogya Sutriya Adhyaya, contemporary medical educators can derive enduring pedagogical insights: The integration of "head" (knowledge), "hand" (skill), and "heart" (professionalism/ethics) forms the holistic basis for training health professionals capable of delivering safe, effective, and compassionate care. Sushruta's model also underscores the importance of continuous learning, supervised practice, and ethical vigilance, which resonate with modern calls for lifelong learning and reflective practice in medicine.

CONCLUSION

The Yogya Sutriya Adhyaya of Sushruta Samhita is not merely a surgical guide but an educational philosophy century ahead of its time. It provides a structured model for transforming a student from theoretical learner to competent practitioner through demonstration, repetition, supervision, and ethical discipline. Both Sushruta's model and modern pedagogy emphasize simulation before practice on living beings, ensuring ethical training and reducing errors. Sushruta's approach used naturally available materials that mimic texture and resistance, thus fostering manual dexterity and sensory judgment. Modern simulation uses digital and synthetic technologies to create controlled, repeatable, and measurable learning environments.

In essence, the Yogya Sutriya Adhyaya embodies the earliest framework for experiential and competency-based learning, which now finds its technological counterpart in VR, AR, 3D printing, and hybrid simulation reaffirming Ayurveda's timeless contribution to global medical pedagogy. Sushruta's dictum "He who seeks proficiency in surgical and cauterization procedures should practice on suitable similar objects to attain skill" is the essence of all practical pedagogy.

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