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Research on Curriculum Reform of Surgical Nursing Based on KTA Knowledge-to-Action and 6E Model

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Abstract: Taking the undergraduate nursing course *Surgical Nursing* as the carrier, this paper clarifies the core connotations of the two models and constructs a two-tier framework with top-level macro curriculum design by the KTA Knowledge-to-Action model and micro classroom implementation by the 6E model. Reform strategies are implemented from five dimensions: reconstruction of curriculum content, re-engineering of classroom procedures, construction of practical-training systems, development of teaching teams, and establishment of multi-dimensional evaluation systems. Action research is adopted for teaching practice. Teaching resources, including VR virtual simulation, intelligent mannequins, and standardized patients (SP), are integrated, and the latest clinical guideline-based evidence is incorporated into the whole teaching process. This teaching model can promote the transformation of evidence-based nursing knowledge into clinical practical competence, improve students' theoretical mastery level, complication-identification ability, and efficiency of emergency decision-making, while strengthening their awareness of humanistic care, increasing satisfaction with clinical internship teaching, and stimulating students' enthusiasm for scientific-research innovation. This study also objectively recognizes limitations of the reform such as equipment dependence and single-institution samples. It can provide practical paradigms for teaching innovation in practice-oriented undergraduate nursing courses.

Keywords: KTA knowledge-to-action model; 6E inquiry-based teaching; Surgical nursing; Curriculum reform; Evidence-based nursing

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1. Overview of connotations of KTA knowledge-to-action model and 6E model

The KTA (Knowledge-to-Action) Knowledge-to-Action Model originates from the Canadian Institutes of Health Research. Its purpose is to translate scientific-research evidence into real-world practical scenarios. It effectively breaks down barriers between knowledge and practice. It emphasizes that existing evidence should not be directly applied. Instead, evidence should be selected according to contextual characteristics and adaptively adjusted before intervention implementation and continuous effect tracking are carried out. When

applied to undergraduate nursing teaching, this model mainly addresses the problems of slow textbook updates and teaching content lagging behind clinical guidelines for *Surgical Nursing* from the perspective of top-level curriculum design [1]. With the KTA framework, teachers can identify real-world nursing problems in clinical posts, select the latest industry guidelines and evidence-based research findings, and convert scattered clinical evidence into knowledge points, teaching objectives, and assessment criteria suitable for classroom teaching. It solves the problem of content sources for "what to teach" in traditional teaching, provides a theoretical backbone for the whole curriculum reform, and guarantees the cutting-edge nature and clinical practicality of teaching content.

Developed from the classic 5E instructional model by adding the Engineer link, the 6E inquiry-based teaching model consists of six teaching links: Explore, Engage, Explain, Engineer, Evaluate and Elaborate. It abandons the traditional teacher-centered one-way knowledge indoctrination, transfers the initiative of learning to students, and enables students to independently search for materials, discriminate evidence, conduct hands-on operations and reflect for review, so as to achieve knowledge internalization and competence transfer. In *Surgical Nursing* classrooms, the 6E model undertakes micro-level classroom implementation and solves the practical problem of "how to teach and how to learn" [2-3]. Its links advance step-by-step, forming a complete pre-class, in-class and post-class learning chain covering six phases: pre-class evidence inquiry, in-class speculative discussion, key-knowledge explanation, simulation-based practical training, feedback-oriented evaluation, and post-class extended learning. The newly added Engineer link puts greater emphasis on practical-application training, conforming to the disciplinary characteristics of nursing, which stresses hands-on practice and clinical decision-making. It provides classroom-implementation pathways for evidence-based practice screened by KTA.

2. Ideas for *Surgical Nursing* curriculum reform combining KTA knowledge-to-action model and 6E model

2.1. Reconstruct curriculum content based on KTA and build an evidence-based knowledge system adapted to 6E teaching

Based on the core steps of problem identification and intervention tailoring within the action cycle of the KTA Knowledge-to-Action Model, combined with post competency requirements of undergraduate nursing students for surgical posts, this paper systematically reconstructs the original content of the *Surgical Nursing* textbook, so as to provide reliable evidence-based materials for subsequent 6E teaching links. Together with clinical nursing experts, teachers sort out high-frequency nursing problems in clinical posts. In reference to the latest clinical guidelines and industry consensus, the complicated 39 chapters of original textbook content are reorganized into six teaching modules: perioperative fundamentals, head-neck-thoracic diseases, abdominal diseases, urinary-system diseases, orthopedic diseases, and rehabilitation & continuing nursing. Detailed evidence-based knowledge points are sorted out for each module, and cutting-edge clinical evidence such as enterostomy nursing and enhanced recovery after surgery (ERAS) is incorporated into module contents to break the bondage of relying merely on textbooks.

After content reconstruction, teaching materials are split corresponding to different 6E teaching links. Clinical cases and original guideline documents are assigned to the Explore link as pre-class assignments; contradictory evidence points are used for classroom debates in the Engage link; tailored standardized nursing workflows are adopted for focused explanation in the Explain link; operational criteria serve as execution

bases for simulation practical training in the Engineer link; and key evidence-based points are simultaneously included in assessment indicators of the Evaluate link. Through evidence screening and adaptation of teaching contents by KTA, all teaching activities are guaranteed to be grounded in the best clinical evidence. This prevents inquiry-oriented teaching from degenerating into superficial case discussions and truly realizes evidence-supported inquiry teaching. Macro-level curriculum contents are matched with micro-level classroom activities to improve overall teaching efficiency [4].

2.2. Re-engineer classroom procedures according to the six 6E links and realize in-class transformation of KTA-screened evidence-based evidence

Taking typical surgical-nursing projects such as stoma nursing as teaching examples, the complete six-step 6E classroom procedure is implemented. Evidence-based evidence screened by KTA runs through the whole pre-class, in-class and post-class learning process, transforming students from passive knowledge recipients into active problem-solvers who apply evidence to tackle clinical problems.

In the pre-class Explore phase, teachers release real clinical cases and assign tasks of completing preliminary evidence-based inquiry reports after consulting guidelines, enabling students to independently access clinical evidence filtered by the KTA framework. In the in-class Engage link, authentic clinical epidemiological data are presented. Group debates are organized over conflicts in evidence application. Teachers guide students to analyze practical obstacles encountered when evidence-based evidence is applied in clinical scenarios. In the Explain link, teachers deliver lectures following KTA-tailored nursing-assessment workflows and standardized operational mnemonics, and demonstrate how to flexibly adjust nursing plans in accordance with individual patient conditions. In the Engineer link, three-tier progressive simulation-based practical training is carried out: students complete VR-based knowledge simulation for complication identification, skill-simulation drills with intelligent mannequins, and scenario-simulation exercises for sudden clinical conflicts with standardized-patient participation, cultivating students' competence in applying evidence-based knowledge to solve real-world scenario-based problems. In the Evaluate link, the mini-CEX tool is adopted for peer assessment among students and instant feedback from teachers. Multi-dimensional comments and corrections are made, covering knowledge, skills, clinical thinking, and humanistic care. In the Elaborate link, advanced complex cases are pushed and outpatient clerkship is arranged, encouraging students to develop new project ideas supported by evidence-based reasoning [5-6].

The whole set of classroom procedures advances progressively. Each teaching activity complies with evidence-based requirements set by KTA. Inquiry-oriented teaching is prevented from turning into simple classroom games. Evidence-based evidence truly guides students' thinking, operations and decision-making behaviors in class, achieving high-efficiency classroom teaching.

2.3. Construct a three-tier progressive simulation-training system and connect the practical-teaching chain of the KTA-6E model

Centering on the core Engineer link of the 6E model and based on key practical-teaching priorities of nursing disciplines, a three-tier progressive simulation-training system of knowledge simulation, skill simulation and scenario simulation is built. It receives evidence-based-nursing standards output by KTA and addresses the drawback of traditional practical training, which only emphasizes mechanical operations while neglecting the cultivation of clinical thinking.

Knowledge simulation draws various surgical-patient case materials sorted by KTA via VR teaching

systems, enabling students to receive training in complication identification and condition judgment and consolidate their foundational awareness of evidence recognition. In skill simulation, students repeatedly practice operational movements in accordance with KTA-tailored standardized nursing workflows using intelligent nursing mannequins to master standardized operational skills. Scenario simulation combines simulation mannequins and standardized patients to construct highly realistic conflict-prone clinical scenarios, including family-member doubts, postoperative sudden hemorrhage, and stoma leakage. Students are required to perform nursing operations, conduct condition assessment, implement emergency disposal and deliver humanistic communication simultaneously. This trains students' ability to rapidly and accurately apply evidence-based evidence for clinical decision-making under complex and uncertain circumstances.

During practical training, teachers set practical-training assessment criteria according to evidence-based standards defined by KTA, record practical-training procedures and deliver instant feedback as required by the Evaluate link of the 6E model. After practical training, post-class assignments are arranged in the Elaborate link to guide students to review deficiencies in evidence application exposed in training [7]. Following cognitive rules of cognition-acquisition, hands-on practice and comprehensive decision-making, the three-tier practical training integrates KTA-derived evidence-based requirements into every detail of simulation training. It gives full play to the practical-educational value of the 6E Engineer link, enabling students to grow from novices into clinical decision-makers within zero-risk simulated environments and improving practical-teaching quality.

2.4. Establish a three-party collaborative teaching team to guarantee efficient implementation of KTA-6E curriculum reform

A three-party collaborative teaching team consisting of full-time university instructors, front-line clinical nursing experts, and evidence-based methodology experts is established. Division-of-labor cooperation guarantees high-quality progress of each link of KTA-6E curriculum reform, and solves realistic problems such as slow updating of clinical evidence, insufficient reserve of evidence-based methodologies and unrealistic clinical-scenario design among university teachers.

Full-time university instructors take charge of overall curriculum teaching design, organize classroom activities for each 6E link, control teaching progress, and deliver in-class evaluation and feedback. Front-line clinical nursing experts participate in curriculum-content reconstruction under the KTA model, provide authentic clinical cases and up-to-date post requirement information, take part in compiling teaching cases, guide script design for standardized-patient scenario-simulation sessions, and integrate real-world clinical nursing obstacles into teaching. Evidence-based-methodology experts guide the team to retrieve, identify and interpret domestic and international clinical guidelines and scientific-research evidence, instruct teachers to adapt evidence for classroom application, and help teachers master application approaches for the seven KTA procedural steps.

The team implements regular joint teaching-research sessions to polish teaching plans, case libraries and practical-training rating scales collectively, discuss teaching problems emerging during reform implementation, and conduct simultaneous teaching-competency training to improve all team members' understanding and practical-application proficiency of KTA theory and 6E inquiry-based teaching. The three-party collaborative team compensates for knowledge-structure deficiencies of individual teachers, preventing the reform from remaining merely on paper. It provides human-resource and professional support for curriculum-content reconstruction, classroom implementation and practical-training development, and guarantees stable and

efficient operation of the whole teaching model.

2.5. Build a four-dimensional, three-stage, five-subject multi-dimensional evaluation system to close the whole teaching loop of KTA-6E

A multi-dimensional evaluation system covering four dimensions (knowledge, skills, thinking, humanistic care), three stages (pre-class diagnostic evaluation, in-class formative evaluation and post-class summative evaluation), and five subjects (teachers, students, intelligent teaching systems, clinical internship preceptors and standardized patients) is constructed. The mini-CEX scale is adopted as the core evaluation tool to form a closed teaching loop and drive continuous optimization of teaching quality under the KTA-6E model.

All evaluation indicators are based on evidence-based-nursing criteria screened by KTA. The four dimensions correspond to mastery of theoretical knowledge, nursing operational skills, evidence-based clinical-decision-making thinking, and humanistic-care literacy, respectively. The three-stage evaluation covers the complete teaching cycle. Pre-class diagnostic evaluation adopts questionnaires and teaching platforms to obtain students' prior-knowledge foundation, supporting difficulty adjustment for 6E teaching tasks. In-class formative evaluation runs through all 6E classroom links [8]. Practical-training data generated by VR systems and intelligent mannequins are collected, together with group peer review, on-site teacher comments and feedback from standardized patients. Misunderstandings of evidence and operational errors of students are identified and corrected on the spot. Post-class summative evaluation combines final theoretical examinations and practical-training tests. It also incorporates assessments from hospital clinical preceptors during internships and counts outcomes of students' innovation-project applications to comprehensively evaluate long-term educational effects of the reform.

Evaluation results serve not only for scoring judgment, but also feed back into KTA-driven curriculum-content tailoring and 6E teaching design. Teaching cases are continuously improved and key & difficult teaching modules are adjusted according to common problems exposed among students, realizing closed-loop management where evaluation feeds back into teaching design [9]. It transforms the traditional final-exam-centered evaluation mode. Evidence-based thinking and humanistic literacy are incorporated into observable and gradable assessment items. Evaluation exerts its baton-guiding effect, prompting students to attach importance to evidence application and improvement of comprehensive capabilities, thus enhancing overall teaching effectiveness [10].

3. Conclusion

To sum up, the integrated KTA-6E model provides both theoretical and practical references for curriculum reform of *Surgical Nursing*. It can also bring new enlightenment for teaching innovation in other practical-oriented medical and nursing courses. By combining the KTA Knowledge-to-Action Model with the 6E inquiry-based-teaching model, a two-tier teaching architecture is established, where KTA undertakes top-level curriculum-content planning and 6E is responsible for micro-level classroom implementation. Targeting existing drawbacks in traditional *Surgical Nursing* teaching including poor implementation of evidence-based teaching, lack of clinical-thinking cultivation, and separation between humanistic education and skill training, complete reform implementation strategies are proposed from five aspects: curriculum-content reconstruction, classroom-procedure re-engineering, construction of simulation practical training, development of teaching teams, and establishment of multi-dimensional evaluation systems. Based

on action-research-driven reform practice, teaching resources such as virtual simulation and standardized patients are fully integrated. The latest clinical guideline-based evidence is embedded into pre-class, in-class and post-class whole-process teaching. It improves satisfaction with clinical internship teaching and stimulates students' innovative awareness, and deserves further exploration and practice.

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