

**DEVELOPMENT, VALIDATION, AND
EVALUATION OF A CLINICAL REASONING
MODEL FOR MALAYSIAN NURSING STUDENTS**

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**DEVELOPMENT, VALIDATION, AND
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MODEL FOR MALAYSIAN NURSING STUDENTS**

by

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TABLE OF CONTENT

ACKNOWLEDGEMENT.....	ii
TABLE OF CONTENT.....	iii
LIST OF TABLES.....	xii
LIST OF FIGURES.....	xiv
LIST OF ABBREVIATIONS.....	xv
LIST OF APPENDICES.....	xvi
ABSTRAK.....	xviii
ABSTRACT.....	xx
CHAPTER 1 INTRODUCTION.....	1
1.1 Introduction to the Chapter.....	1
1.2 Background.....	2
1.3 Problem Statement.....	4
1.4 Research Questions.....	7
1.5 Research Objectives.....	8
1.6 Research Hypothesis.....	10
1.7 Definition of Terms... ..	10
1.8 Summary of the Chapter.....	13
CHAPTER 2 LITERATURE REVIEW.....	14
2.1 Introduction to the Chapter.....	14
2.2 Historical and Current Trends in Clinical Reasoning Education.....	15
2.3 Clinical Reasoning Defined.....	17
2.4 Clinical Reasoning as a Core Competency in Nursing Education	18
2.5 Educational Strategies for Clinical Reasoning Development.....	18
2.6 Lack of Clinical Reasoning Skills in Undergraduate Nursing Students.....	19

2.6.1	Evidence of Deficiencies in Nursing Students' Clinical Reasoning.....	20
2.6.2	Challenges in Developing Clinical Reasoning.....	20
2.7	Clinical Reasoning in Nursing Education in Malaysia.....	22
2.7.1	Limited National Definition and Framework.....	22
2.7.2	Predominance of the Nursing Process.....	23
2.7.3	Traditional Teaching and Learning Approaches.....	23
2.7.4	Gaps in Clinical Reasoning Assessment.....	24
2.7.5	The Need for a Contextualised Malaysian Model.....	24
2.8	Global Clinical Reasoning Frameworks.....	25
2.8.1	Dual-Process Theory.....	25
2.8.2	Tanner's Clinical Judgment Model.....	26
2.8.3	Levett-Jones' Clinical Reasoning Cycle.....	27
	2.8.3 (a) Comparative Analysis: Tanner's Model and Levett-Jones' Cycle.....	28
2.8.4	Challenges and Considerations for Implementing Global Frameworks in Malaysia.....	28
2.9	Summary of the Chapter.....	29
	CHAPTER 3 MATERIALS AND METHODS.....	31
3.1	Introduction to the Chapter.....	31
3.2	Research Design.....	31
3.3	Phase 1: Scoping Review.....	33
3.3.1	Study Setting.....	33
3.3.2	Research Duration.....	33
3.3.3	Search Strategy.....	34
3.3.4	Inclusion and Exclusion Criteria.....	35
	3.3.4 (a) Participants.....	35
	3.3.4 (b) Concept.....	35
	3.3.4 (c) Context.....	36

3.3.4 (d) Types of Sources.....	36
3.3.5 Study Screening and Selection.....	37
3.3.6 Data Extraction.....	37
3.3.7 Data Analysis and Presentation.....	38
3.3.8 Ethical Considerations.....	39
3.4 Phase 2: Development of the Clinical Reasoning Model	39
3.4.1 Study Setting.....	40
3.4.2 Research Duration.....	41
3.4.3 Research Population.....	42
3.4.3 (a) Content Validation: Expert Review.....	42
3.4.3 (a)(i) Inclusion Criteria.....	42
3.4.3 (a)(ii) Exclusion Criteria.....	42
3.4.3 (b) Response Process Validation: Newly Graduated Nursing Students.....	42
3.4.3 (b)(i) Inclusion Criteria.....	43
3.4.3 (b)(ii) Exclusion Criteria.....	43
3.4.4 Sampling Method and Sample Size Determination.....	43
3.4.5 Research Instruments.....	44
3.4.5 (a) Validity and Reliability of Instruments.....	45
3.4.6 Data Collection Process.....	45
3.4.6 (a) Content Validation.....	45
3.4.6 (b) Putting Model into Implementation.....	47
3.4.6 (c) Response Process Validation and Pilot Study.....	50
3.4.7 Data Analysis.....	50
3.4.7 (a) Content Validation.....	50
3.4.7 (b) Response Process Validation.....	52
3.4.8 Ethical Considerations.....	53

3.5	Phase 3: Implementation and Evaluation of the Model.....	54
3.5.1	Study Setting.....	55
3.5.2	Research Duration.....	56
3.5.3	Sampling Method and Sample Size Determination.....	56
3.5.3 (a)	Inclusion Criteria.....	56
3.5.3 (b)	Exclusion Criteria.....	57
3.5.3 (c)	Sampling Method.....	57
3.5.3 (d)	Sample Size Determination.....	57
3.5.4	Intervention Design and Implementation.....	58
3.5.4 (a)	Instructor Demonstration of Clinical Reasoning.....	60
3.5.4 (b)	Guided Student Practice with Clinical Scenarios.....	60
3.5.4 (c)	Development of Metacognitive Awareness.....	61
3.5.4 (d)	Formative Assessment through Key Feature Questions.....	61
3.5.5	Research Instruments.....	62
3.5.5 (a)	Key Feature Questions (KFQ).....	62
3.5.5 (b)	Nurses Clinical Reasoning Scale (NCRS).....	64
3.5.5 (c)	Metacognitive Awareness Inventory (MAI).....	65
3.5.5 (d)	Motivated Strategies for Learning Questionnaire (MSLQ).....	66
3.5.5 (e)	Self-Regulated Learning Scale in Clinical Nursing Practice (SRLS-CNP).....	68
3.5.5 (f)	Existing Assessments.....	70
3.5.5 (f)(i)	Case Study in Clinical Practice.....	70
3.5.5 (f)(ii)	Clinical Supervisor Evaluation.....	72
3.5.5 (g)	Validity and Reliability of Instruments.....	74
3.5.5 (g)(i)	KFQ.....	75
3.5.5 (g)(ii)	NCRS.....	76
3.5.5 (g)(iii)	MAI.....	77

3.5.5 (g)(iv) MSLQ.....	77
3.5.5 (g)(v) SRLS-CNP.....	79
3.5.5 (g)(vi) Case Study Analysis.....	81
3.5.5 (g)(vii) Clinical Supervisor Evaluation.....	83
3.5.6 Research Variables and their Measurement.....	84
3.5.6 (a) Independent Variable.....	84
3.5.6 (b) Dependent Variable.....	85
3.5.6 (b)(i) Direct Measures of Clinical Reasoning.....	85
3.5.6 (b)(ii) Supporting Measures for Clinical Reasoning Development.....	86
3.5.7 Data Collection Process.....	87
3.5.7 (a) Ethical and Institutional Approvals.....	87
3.5.7 (b) Classroom Recruitment and Consent.....	87
3.5.7 (c) Baseline Data Collection.....	89
3.5.7 (c)(i) Personal Information.....	89
3.5.7 (c)(ii) KFQ.....	89
3.5.7 (c)(iii) NCRS.....	90
3.5.7 (c)(iv) MAI.....	90
3.5.7 (c)(v) MSLQ.....	90
3.5.7 (c)(vi) SRLS-CNP.....	90
3.5.7 (d) Model Implementation and Data Collection.....	90
3.5.7 (d)(i) Mid-Intervention Data Collection (KFQ).....	91
3.5.7 (d)(ii) Post-Intervention Data Collection (KFQ, NCRS, MAI, MSLQ, SRLS-CNP).....	91
3.5.7 (d)(iii) Clinical Practicum and Follow-Up Data Collection.....	92
3.5.7 (e) Retrieval and Re-Evaluation of Existing Assessment Data.....	92
3.5.7 (e)(i) Case Study Analysis.....	92

3.5.7 (e)(ii) Clinical Supervisor Evaluation.....	93
3.5.7 (e)(iii) Final Data Collection and Analysis.....	93
3.5.8 Data Analysis.....	94
3.5.8 (a) Descriptive Analysis.....	94
3.5.8 (b) Data Screening and Handling of Missing Data.....	94
3.5.8 (c) Analysis of Case Study Assessment (Paired Sample <i>t</i> -Test).....	94
3.5.8 (d) Analysis of KFQs, Clinical Supervisor Evaluation, and Student Self-Reports (Repeated Measures ANOVA).....	95
3.5.9 Ethical Considerations.....	96
3.6 Summary of the Chapter.....	98
CHAPTER 4 RESULT.....	100
4.1 Introduction to the Chapter.....	100
4.2 Phase 1: Characteristics of Included Studies in Scoping Review.....	100
4.2.1 Study Inclusion.....	100
4.2.2 Characteristics of Included Studies.....	102
4.3 Phase 1: Theoretical Framework Guiding the Design, Implementation, and Evaluation of Clinical Reasoning Model.....	103
4.4 Phase 1: Essential Elements in Developing the Clinical Reasoning Model.....	105
4.4.1 Teaching Strategies.....	105
4.4.2 Assessment Methods.....	107
4.4.3 Key Supporting Elements of Clinical Reasoning.....	109
4.4.3 (a) Metacognitive Awareness.....	109
4.4.3 (b) Self-Regulation.....	110
4.5 Phase 2: Development of a Preliminary Clinical Reasoning Model for Malaysian Nursing Students.....	110
4.5.1 Scaffolded Reasoning.....	112
4.5.1 (a) Reveal: Exposure to Expert Reasoning Patterns.....	112

4.5.1 (b) Application Challenge: Structured Practice in Clinical Reasoning.....	114
4.5.2 Facilitating Self-Regulated Learning.....	115
4.5.2 (a) Metacognition Emphasis: Encouraging Self-Monitoring and Cognitive Awareness.....	116
4.5.2 (b) Reflective Practices: Strengthening Clinical Reasoning Through Reflection.....	116
4.5.3 Progress Assessment.....	117
4.5.3 (a) Use of KFQ as an Assessment Tool.....	117
4.6 Phase 2: Content Validity of the Preliminary Clinical Reasoning Model for Malaysian Nursing Students.....	118
4.6.1 Demographic Characteristics of Expert Panel.....	118
4.6.2 Content Validity Assessment.....	119
4.6.2 (a) Expert Feedback on the Model.....	119
4.7 Phase 2: Response Process Validity of the Model.....	120
4.7.1 Participant Demographics.....	120
4.7.2 Face Validity Index (FVI) Scores.....	120
4.7.2 (a) Participants' Feedback on Clarity and Comprehensibility of the Model.....	121
4.7.3 Pilot Study Findings.....	121
4.7.4 Participants' Feedback in Pilot Study.....	122
4.7.5 Refinements of Model Delivery Prior to Full Implementation.....	123
4.7.5 (a) Incorporation of a Nursing Diagnosis Reference Book.....	123
4.7.5 (b) Use of a Whiteboard for Clinical Reasoning Processes....	123
4.7.5 (c) Reformatting Question Prompts into Table Format and Providing Printed Copies.....	124
4.7.5 (d) Incorporation of Visual Reminders in Presentation Slides.....	124
4.8 Phase 3 Implementation and Evaluation of the Model.....	124
4.8.1 Demographic Characteristics of Participants.....	125

4.8.2	Empirical Observations During Model Implementation.....	125
4.8.2 (a)	Structure of Model Implementation.....	126
4.8.2 (b)	Self-Regulated Learning and Reflective Practice.....	127
4.8.2 (c)	KFQs as a Formative Learning Activity.....	127
4.8.3	Assumption Testing for Paired Sample t-Test and Repeated Measures ANOVA.....	129
4.8.3 (a)	Normality Assessment.....	129
4.8.3 (b)	Outlier Detection.....	129
4.8.3 (c)	Sphericity Assessment (Repeated Measures ANOVA Only).....	130
4.8.4	Comparison of Clinical Reasoning Scores Over Time.....	130
4.8.4 (a)	Case Study Scores (Paired Sample t-Test Results).....	131
4.8.4 (b)	Comparison of Clinical Reasoning Scores Using Repeated Measures ANOVA.....	132
4.8.4 (b)(i)	Significant Findings.....	132
4.8.4 (b)(ii)	Non-Significant Findings.....	137
4.9	Summary of the Chapter.....	137
CHAPTER 5 DISCUSSION.....		139
5.1	Introduction to Chapter.....	139
5.2	Theories Guiding the Design, Implementation, and Evaluation of the Clinical Reasoning Model.....	140
5.3	Essential Elements in Developing a Clinical Reasoning Model	141
5.4	Construction of a Structured Clinical Reasoning Model.....	143
5.5	Content and Response Process Validation	144
5.5.1	Practical Implementation Challenges and Considerations.....	145
5.5.2	Need for Cross-Institutional Validation.....	147
5.5.3	Strategies to Enhance Practical Applicability and Long-Term Impact.....	148

5.6	Impact of the Clinical Reasoning Model on Nursing Students’ Outcomes.....	150
5.6.1	Key-Feature Questions (KFQ): Assessing Information Processing, Problem Identification, Goal Setting, and Action Planning.....	151
5.6.2	Nursing Clinical Reasoning Scale (NCRS): Assessing Self-Perception on Clinical Reasoning Competency.....	153
5.6.3	Case Study Analysis: Evaluating Clinical Reasoning Across the Clinical Reasoning Cycle.....	156
5.6.4	Self-Regulated Learning Scale for Clinical Nursing Practice (SRLS-CNP): Measuring Self-Regulation in Clinical Learning.....	158
5.6.5	Clinical Supervisor Evaluation: Observable Application of Clinical Reasoning.....	159
5.6.6	Interpretation of Negative Findings.....	162
5.6.7	Differential Impact on Clinical Reasoning Process and Self-Regulated learning.....	165
5.7	Summary of the Chapter.....	167
CHAPTER 6 CONCLUSION.....		169
6.1	Introduction to the Chapter.....	169
6.2	Limitations and Strengths.....	170
6.2.1	Limitations.....	170
6.2.2	Strengths.....	173
6.3	Implications.....	175
6.3.1	Implications for Future Research.....	175
6.3.2	Implications for Nursing Education.....	176
6.3.3	Implications for Nursing Practice and Policy.....	177
6.4	Conclusion.....	178
6.4.1	Key Contributions and Future Impact.....	180
REFERENCES.....		181
APPENDICES		
LIST OF PUBLICATIONS		

LIST OF TABLES

	Page
Table 1.1 Conceptual and Operational Definitions of Key Terms.....	10
Table 2.1 Four Key Phases of Tanner’s Clinical Judgment Model (2006).....	26
Table 3.1 Summary of Research Phases, Participants, Sampling, and Instruments	32
Table 3.2 Search Strategy Conducted on MEDLINE (EBSCO host) on 1 February 2023	35
Table 3.3 Pilot Implementation of the Clinical Reasoning Model.....	48
Table 3.4 Rating Scale for Content Validity Index (CVI) Assessment	51
Table 3.5 Rating Scale for Face Validity Index (FVI) Assessment.....	52
Table 4.1 Theories Guiding the Development, Implementation, and Evaluation of the Clinical Reasoning Model	104
Table 4.2 Teaching Strategies Identified in the Scoping Review	106
Table 4.3 Assessment Methods Identified in the Scoping Review	108
Table 4.4 Detailed Breakdown of Assessment Methods with Mostly Cited Method	109
Table 4.5 Key Supporting Elements of Clinical Reasoning.....	111
Table 4.6 Scaffolded Reasoning: Integrating the Nursing Process with the Clinical Reasoning Cycle.....	113
Table 4.7 Expert Panel Demographics	118
Table 4.8 Content Validity Index (CVI) Results.....	119
Table 4.9 Face Validity Index Scores	121
Table 4.10 Pilot Study Ratings on Model Implementation.....	122
Table 4.11 Paired Samples t-Test Results for Case Study Scores	131

Table 4.12	Repeated Measures ANOVA Results for Clinical Reasoning Instruments.....	133
Table 4.13	Pairwise Comparisons of Clinical Reasoning Scores Across Time Points	133
Table 4.14	Non-Significant Findings from Repeated Measures ANOVA	137

LIST OF FIGURES

	Page
Figure 3.1 Phases of the study and integration of qualitative and quantitative components.	33
Figure 3.2 Flowchart of Data Collection in Phase 1	39
Figure 3.3 Flowchart of Data Collection in Phase 2	46
Figure 3.4 Flowchart of Data Collection in Phase 3	88
Figure 4.1 PRISMA Flow Chart of Studies Selection and Inclusion Process (Page et al., 2021).....	101
Figure 4.2 Publication Trends Across Response Categories (By Year Period)	102
Figure 4.3 Clinical Reasoning Model for Malaysian Nursing Students.....	111
Figure 4.4 Estimated Marginal Means of Case Study Scores Before and After the Intervention. Error Bars Represent Standard Errors.....	131
Figure 4.5 Estimated Marginal Means of KFQ Scores Across Time. Error Bars Represent Standard Errors.	132
Figure 4.6 Estimated Marginal Means of Nurse Clinical Reasoning Scale (NCRS) Scores Across Time. Error Bars Represent Standard Errors.....	134
Figure 4.7 Estimated Marginal Means of Clinical Supervisor Evaluation Scores Across Time. Error Bars Represent Standard Errors.....	135
Figure 4.8 Estimated Marginal Means of SRLS-CNP Synthesized Knowledge and Nursing Skills Scores Across Time. Error Bars Represent Standard Errors.....	136

LIST OF ABBREVIATIONS

CINAHL	Cumulative Index to Nursing and Allied Health Literature
JB I	Joanna Briggs Institute
KFQ	Key Feature Question
LCJR	Lasater Clinical Judgment Rubric
MAI	Metacognitive Awareness Inventory
MCQ	Multiple-choice question
MEDLINE	Medical Literature Analysis and Retrieval System Online
MSLQ	Motivated Strategies for Learning Questionnaire
NCLEX	National Council Licensure Examination
NCRS	Nurse Clinical Reasoning Scale
OPT	Outcome-Present State Test
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews
SAGAT	Situation Awareness Global Assessment Technique
SBAR	Situation, Background, Assessment, Recommendation
SCT	Script Concordance Test
SRLS-CNP	Self-Regulated Learning Scale in Clinical Nursing Practice
UNIMAS	Universiti Malaysia Sarawak
USM	Universiti Sains Malaysia

LIST OF APPENDICES

Appendix I	Extraction Guidance Sheet
Appendix II	Instruction and Rating Scale for Content Validation
Appendix III	The Model and its Components' Descriptions Provided to the Experts for Evaluation
Appendix IV	Instruction and Rating Scale for Response Process Validation
Appendix V	Pilot Study Data Collection Form
Appendix VI	Manual on Using The Clinical Reasoning Cycle to Enrich the Nursing Process
Appendix VII	Manual Explaining Strategies to Facilitate Self-Regulated Learning
Appendix Viii	Research Information for Participants in Phase Two of the Study: Content Validation
Appendix IX	Research Information for Participants in Phase Two of the Study: Response Process Validation
Appendix X	Participant's Information and Consent Form
Appendix XI	Participant's Material Publication Consent Form
Appendix XII	Weekly Schedule of Model Implementation and Learning Activities
Appendix XIII	Example of KFQs in a Topic with its Blueprint
Appendix XIV	Nurse Clinical Reasoning Scale (Liou Et Al., 2015)
Appendix XV	Metacognitive Awareness Inventory (Schraw & Dennison, 1994)
Appendix XVI	Motivated Strategies for Learning Questionnaire (Pintrich Et Al., 1991)
Appendix XVII	Self-Regulated Learning Scale in Clinical Nursing Practice (Iyama & Maeda, 2018)
Appendix XVIII	Case Study Report Guidelines based on the Nursing Process Framework

Appendix XIX	Case Study Report Guidelines Integrating the Clinical Reasoning Cycle within the Nursing Process Framework
Appendix XX	The Rubric of Clinical Reasoning based on the Nursing Process (Ramazanzadeh et al., 2023)
Appendix XXI	Five Criteria Selected in Clinical Supervisor Evaluation
Appendix XXII	Reliability Assessment of Instruments used in Phase Three
Appendix XXIII	Research Information for Participants in Phase Three of the Study
Appendix XXIV	Students' Baseline Information
Appendix XXV	Ethical Approval Obtained from the Human Research Ethics Committee (HREC), Universiti Sains Malaysia (USM)
Appendix XXVI	Institutional Permissions from the Dean of the Faculty of Medicine and Health Sciences (FMHS), Universiti Malaysia Sarawak (UNIMAS)
Appendix XXVII	Institutional Permissions from Head of the Nursing Department, FMHS Universiti Malaysia Sarawak (UNIMAS)
Appendix XXVIII	List of Included Studies in the Scoping Review
Appendix XXIX	Reformatted Worksheet with Structured Table Format
Appendix XXX	Assumption Testing for Paired Sample <i>t</i> -Test and Repeated Measures Anova

**PEMBANGUNAN, PENGESAHAN, DAN PENILAIAN MODEL
PENAAKULAN KLINIKAL UNTUK PELAJAR KEJURURAWATAN DI
MALAYSIA**

ABSTRAK

Kekurangan kemahiran penaakulan klinikal dalam kalangan jururawat baharu bergraduasi menimbulkan risiko yang signifikan, termasuk kelewatan mengenal pasti kemerosotan keadaan pesakit, intervensi klinikal yang tidak sesuai dan kejadian buruk yang boleh dielakkan. Membentuk kemahiran penaakulan klinikal dalam kalangan pelajar kejururawatan adalah penting untuk meningkatkan keselamatan dan hasil perawatan pesakit. Kajian ini bertujuan untuk mereka bentuk, mengesahkan, dan menilai model penaakulan klinikal sesuai untuk pelajar kejururawatan di Malaysia melalui pendekatan kaedah campuran menggunakan rekabentuk eksploratori berturutan dalam tiga fasa. Dalam Fasa Pertama, tinjauan skop terhadap teori dan elemen-elemen berkaitan telah dilakukan untuk pembangunan model. Fasa kedua melibatkan pembinaan awal model penaakulan klinikal yang telah disemak dan ditambah baik berdasarkan maklum balas daripada pakar serta jururawat graduan. Pengesahan kandungan dan muka mengesahkan kejelasan serta kerelevanan model tersebut. Fasa Ketiga melibatkan pelaksanaan model yang telah dimuktamadkan kepada 58 pelajar kejururawatan, dan hasilnya dinilai menggunakan Key Feature Questions, kajian kes, penilaian penyelia klinikal, dan skala penilaian sendiri. Tinjauan dalam Fasa Pertama mengenal pasti tiga tema utama: teori, pengajaran, dan penilaian. Dalam Fasa Ketiga, keputusan menunjukkan bahawa intervensi ini meningkatkan penaakulan klinikal secara signifikan, dengan skor Key Feature yang lebih tinggi, peningkatan prestasi kajian kes dan penilaian penyelia klinikal. Perubahan kecil tetapi positif turut

diperhatikan dalam beberapa subskala pembelajaran sendiri, menunjukkan perkembangan awal dalam aspek kognitif dan reflektif pelajar. Kesimpulannya, telah membawa kepada peningkatan yang signifikan dalam penaakulan klinikal pelajar, seperti yang ditunjukkan melalui pelbagai kaedah penilaian merangkumi aplikasi, pemerhatian, dan pelaporan sendiri. Walaupun peningkatan dalam metakognisi dan keupayaan pengawalan sendiri secara umumnya adalah sederhana, intervensi ini menawarkan kaedah yang praktikal dan mudah disesuaikan untuk melaksanakan integrasi penaakulan klinikal dalam kurikulum pendidikan kejururawatan prasiswazah. Pendekatan ini juga menyediakan asas untuk peluasan ke arah strategi pengajaran yang lebih maju atau berdasarkan sumber yang intensif pada masa hadapan. Selain itu, pendekatan tersebut turut menyokong pembangunan kemahiran penaakulan klinikal yang penting bagi amalan kejururawatan yang selamat dan kompeten.

DEVELOPMENT, VALIDATION, AND EVALUATION OF A CLINICAL REASONING MODEL FOR MALAYSIAN NURSING STUDENTS

ABSTRACT

The lack of clinical reasoning skills among newly graduated nurses poses significant risks, including delayed recognition of patient deterioration, inappropriate clinical interventions, and preventable adverse events. Developing clinical reasoning abilities in nursing students is essential for enhancing patient safety and care outcomes. This study aimed to design, validate, and evaluate a clinical reasoning model tailored for Malaysian nursing students using a mixed-methods approach with an exploratory sequential design across three phases. In Phase 1, a scoping review of relevant theories, teaching strategies, and assessment methods was conducted to inform the development of the model. In Phase 2, a preliminary clinical reasoning model was constructed and refined through expert and graduate nurse feedback. Content and face validation confirmed its clarity and relevance. Phase 3 involved implementing the finalised model with 58 nursing students. Outcomes were assessed using Key Feature Questions, case studies, clinical supervisor evaluations, and self-rated scales. Findings demonstrated a significant improvement in clinical reasoning, as indicated by increased Key Feature scores, enhanced performance in case studies, and higher evaluations from clinical supervisors. Small but positive changes were also seen in specific self-regulation subscales, suggesting early cognitive and reflective development. In conclusion, the proposed clinical reasoning model yielded significant gains in students' clinical reasoning, as demonstrated through various assessment formats encompassing application, observation, and self-report measures. While gains in metacognitive and broader self-regulatory abilities were modest, the intervention offers a feasible and

adaptable means to integrate clinical reasoning into undergraduate nursing education. It also lays the groundwork for future adoption of more advanced or resource-intensive pedagogical strategies, and supports the development of clinical reasoning skills essential for safe and competent nursing practice.

CHAPTER 1

INTRODUCTION

1.1 Introduction to the Chapter

Nursing education in Malaysia aims to produce competent, holistic graduates, guided by the Malaysian Qualifications Agency (2024), which outlines key learning outcomes: knowledge, cognitive skills, functional work abilities, personal and entrepreneurial capacities, and ethical professionalism. Among these, cognitive skills, including critical thinking, clinical reasoning, problem-solving, and decision-making, are the most critical, as they directly influence the accuracy and timeliness of nursing actions in patient care. In high-risk situations, failures in these cognitive processes can result in incorrect, delayed, or omitted interventions, ultimately compromising patient safety (Jessee, 2021).

Clinical reasoning is singled out in this study because it precedes clinical judgment and decision-making, underpinning these processes by enabling nurses to interpret patient data, identify problems, and determine appropriate actions (El Hussein et al., 2022; Jessee, 2021; Tanner, 2006). Without robust clinical reasoning, even well-trained nurses may struggle to make sound judgments or execute timely interventions, particularly in critical situations (Mohammadi-Shahboulaghi et al., 2021). Given its foundational role in nursing practice, this study focuses on the development and assessment of clinical reasoning skills to enhance the preparedness of nursing graduates for complex, real-world healthcare environments.

This chapter provides an overview of the study, beginning with the research background, followed by the problem statement that highlights the challenges and gaps in clinical reasoning development. The research questions and objectives are then

presented to define the study's focus. Key terms are clarified to ensure conceptual precision, and the chapter concludes with a discussion of the study's significance within the context of nursing education in Malaysia.

1.2 Background

Cognitive skills, particularly clinical reasoning, are fundamental to nursing practice, as they drive the ability to make informed clinical judgments and decisions. Clinical reasoning is a complex, iterative process that involves collecting and analysing clinical cues, identifying patterns, planning and implementing interventions, and reflecting on outcomes to refine future practice (Huang et al., 2018; Levett-Jones et al., 2010; Tanner, 2006). This process bridges theoretical knowledge with clinical application, allowing nurses to anticipate complications and provide safe, effective care (Lasater, 2011).

While established models such as Tanner's (2006) Clinical Judgment Model and Levett-Jones' (2010) Clinical Reasoning Cycle have been widely referenced, there is limited recent work that significantly expands or challenges these definitions. However, emerging studies emphasise the integration of self-regulated learning and metacognitive strategies in clinical reasoning education (Kautz et al., 2009; Kuiper et al., 2009). These developments suggest a growing recognition that clinical reasoning is not merely a cognitive skill but also a dynamic interplay between knowledge acquisition, reflective practice, and environmental influences.

Despite its recognised importance, clinical reasoning remains susceptible to errors. Cognitive biases, heuristic shortcuts, and misinterpretation of clinical cues can result in flawed decision-making, affecting patient outcomes (Norman et al., 2017; Thirsk et al., 2022). These errors are further compounded by systemic factors such as

high workload, limited mentorship, and inconsistencies in faculty training (Jansen et al., 2022; Jay et al., 2024; Rencic et al., 2020; Richards et al., 2020). Thus, structured, evidence-informed educational strategies are essential to support the development of clinical reasoning skills.

Globally, integrating clinical reasoning into nursing curricula has proven challenging due to factors such as limited access to high-fidelity simulations, inconsistent faculty training, and variations in curriculum standards (Al-Omari et al., 2024; Bristol et al., 2019; Herron, 2018a; Issa et al., 2024; Najafi & Nasiri, 2023; Robinson et al., 2024; Salifu et al., 2019; Ulfa et al., 2021). In Malaysia, these challenges appear more acute, as nursing programmes continue to emphasise theoretical content and procedural skills, with limited incorporation of structured approaches to teaching or assessing clinical reasoning (Atan et al., 2024; Jamil & Ibrahim, 2017; Lee et al., 2020; Mansor et al., 2017). While critical thinking is a key focus within national competency frameworks (Malaysian Qualifications Agency, 2024), it may not fully capture the nuanced and context-dependent nature of clinical reasoning required in practice. Moreover, the concept of clinical reasoning is seldom referenced in local nursing conferences, academic publications, protocols, or educational guidelines, indicating a substantial gap in both awareness and implementation.

Given these challenges, it is essential to develop structured, localised approaches to integrating clinical reasoning into Malaysian nursing education. This requires moving beyond content-heavy curricula to incorporate active learning strategies that foster cognitive flexibility and reflective practice, ensuring that nursing graduates are equipped with the skills necessary for making safe and effective clinical decisions.

1.3 Problem Statement

Clinical reasoning is a universally recognised skill essential for safe, effective nursing care. However, its development remains a global challenge due to the complexity of the cognitive processes involved (Rencic et al., 2020). As a largely internal, dynamic activity, clinical reasoning is difficult to observe directly, complicating both its teaching and assessment (Lasater, 2011; Rencic et al., 2016, 2020). Many nursing programmes worldwide struggle to develop effective, evidence-based methods for cultivating this skill, leaving graduates underprepared for the demands of modern healthcare (Al-Moteri et al., 2020; Chan, 2023; Poledna et al., 2022).

In Malaysia, this challenge is particularly evident. Current nursing curricula tend to prioritise critical thinking over the broader and more nuanced processes involved in clinical reasoning, and formal guidelines for its teaching and assessment have yet to be established (Malaysian Qualifications Agency, 2024). Although critical thinking is embedded within national educational frameworks, clinical reasoning remains relatively underexplored, with limited familiarity among nursing educators, faculty members, and students. Consequently, structured efforts to support the development of clinical reasoning are lacking, and curricular content continues to focus predominantly on theoretical knowledge, psychomotor skills, teamwork, and communication (Jamil & Ibrahim, 2017; Kalsom et al., 2023; Mansor et al., 2018; Ministry of Education, 2020).

To date, no Malaysian studies have directly examined clinical reasoning as a distinct construct in nursing education. Existing research has primarily focused on critical thinking, assessed using instruments such as the Health Science Reasoning Test (Lee et al., 2020). This limited focus is also evident in academic and professional

discourse, where references to clinical reasoning are scarce in nursing conferences, scholarly publications, and national guidelines. While components of clinical reasoning may be present within the Nursing Process framework commonly used in Malaysia, the depth, contextual complexity, and cognitive demands of clinical reasoning extend beyond the structured stages of assessment, diagnosis, planning, implementation, and evaluation (Benner et al., 1992; Guerrero, 2019; Kalyani et al., 2019; Zamanzadeh et al., 2015).

Additionally, structural features of the Malaysian healthcare system may further influence the development of clinical reasoning. Although bedside nurses are the primary caregivers and play a critical role in monitoring patients and initiating escalation of care, clinical decision-making is often shaped by hierarchical norms in which nurses are expected to follow medical orders. Senior nursing positions, such as matrons and sisters, typically hold administrative responsibilities, offering limited clinical mentorship (Lee et al., 2020). In the absence of formal clinical reasoning training, nursing decisions at the bedside may be inconsistent, delayed, or inadequately justified, impacting patient safety (Lapkin et al., 2010; Theobald et al., 2021).

International models for teaching clinical reasoning cannot be directly applied in Malaysia due to contextual differences in educational culture, resource availability, and instructional practices. The learning environment in Malaysian nursing education tends to emphasise structured, instructor-led approaches, where students often acquire knowledge through guided delivery rather than independent exploration or inquiry-based learning (Jamil & Ibrahim, 2017; Kelly et al., 2018; Mansor et al., 2017; Pong et al., 2021). While this approach supports consistency and content mastery, it may offer fewer opportunities for analytical discussion and self-directed decision-making, which are the processes essential for developing clinical reasoning. In clinical learning

contexts, nurses frequently rely on detailed instructions provided in patients' case notes by medical officers, which specify nursing responsibilities and interventions (Lee et al., 2020). Such structured task delegation, although ensuring clarity and accountability, can inadvertently limit opportunities for autonomous interpretation of patient cues or independent clinical judgment. Over time, this pattern may reinforce a reliance on directive practices rather than active reasoning, highlighting the need for gradual pedagogical and cultural shifts to support reflective and independent learning.

While models such as the Clinical Reasoning Cycle (Levett-Jones et al., 2010) or Clinical Judgment Model (Tanner, 2006) offer structured pathways to develop clinical reasoning skills, their effectiveness is highly dependent on pedagogical readiness, faculty capability, and student autonomy, areas that are still evolving within many Malaysian nursing programmes (Jamil & Ibrahim, 2017; Kelly et al., 2018; Lee et al., 2020; Mansor et al., 2017; Pong et al., 2021). The use of high-fidelity simulation, commonly adopted in Western nursing education, faces practical limitations locally due to infrastructure constraints, financial considerations, and limited faculty training (Ismail et al., 2019; Pong et al., 2021). In addition, traditional norms that prioritise teacher-centred instruction, rote memorisation, and hierarchical clinical structures can pose challenges to the adoption of reflective, student-centred learning strategies (Ministry of Education, 2020).

Given these contextual realities, a phased and culturally responsive approach is needed. This includes raising awareness about the importance of clinical reasoning, gradually integrating its principles into both theoretical and clinical components of the curriculum, enhancing faculty competence, and progressively incorporating interactive, simulation-based strategies. Such an approach would support the

meaningful and sustainable development of clinical reasoning in Malaysian nursing education.

The long-standing gaps in teaching and assessing clinical reasoning underscore the need for a structured, evidence-informed framework tailored to local needs. In the absence of clear pedagogical guidance, nursing graduates may lack the cognitive skills required for safe, effective, and autonomous practice. This study therefore aims to develop, validate, and evaluate the impact of a clinical reasoning model specifically designed for the Malaysian nursing context. By integrating evidence-based instructional and assessment strategies and addressing local educational, cultural, and systemic factors, this initiative aims to enhance student learning outcomes, improve the quality of patient care, and contribute to a more competent and confident nursing workforce.

In summary, while clinical reasoning is well established internationally, its structured integration into Malaysian nursing education remains limited. Existing frameworks such as Tanner's and Levett-Jones' models cannot be directly adopted due to contextual, curricular, and resource constraints. Therefore, this study addresses a critical gap by developing and validating a structured, context-specific model to guide the teaching, learning, and assessment of clinical reasoning among Malaysian nursing students.

1.4 Research Questions

i. Research Question 1

What theoretical perspectives guide the design, implementation, and evaluation of a clinical reasoning model for Malaysian nursing students?

ii. Research Question 2

What are the essential elements required in a clinical reasoning model for Malaysian nursing students?

iii. Research Question 3

How can a structured clinical reasoning model be designed and implemented to address the specific needs of Malaysian nursing students?

iv. Research Question 4

What is the content validity of the preliminary clinical reasoning model for Malaysian nursing students?

v. Research Question 5

What is the response process validity of the preliminary clinical reasoning model for Malaysian nursing students?

vi. Research Question 6

How does the implementation of the clinical reasoning model influence Malaysian nursing students' clinical reasoning scores over time?

1.5 Research Objectives

i. General Objective

To develop, validate, and evaluate the impact of a clinical reasoning model for Malaysian nursing students.

ii. Specific Objective 1

To identify theories guiding the design, implementation, and evaluation of a clinical reasoning model for Malaysian nursing students.

iii. Specific Objective 2

To identify the essential elements in a clinical reasoning model for Malaysian nursing students.

iv. Specific Objective 3

To construct a structured clinical reasoning model tailored to the needs of Malaysian nursing students.

v. Specific Objective 4

To investigate the content validity of the preliminary clinical reasoning model for Malaysian nursing students.

vi. Specific Objective 5

To investigate the response process validity of the preliminary clinical reasoning model for Malaysian nursing students.

vii. Specific Objective 6

To evaluate changes in Malaysian nursing students' clinical reasoning scores at defined intervals following the implementation of the clinical reasoning model.

1.6 Research Hypothesis

Null hypothesis: There is no statistically significant improvement in Malaysian nursing students' clinical reasoning scores following the implementation of the clinical reasoning model.

1.7 Definition of Terms

The following definitions presented in Table 1.1, which include both conceptual and operational components, provide clarity on key terms used in this study. These definitions are specific to the study context and essential for understanding the processes, variables, and outcomes examined.

Table 1.1 Conceptual and Operational Definitions of Key Terms

Term	Conceptual Definition	Operational Definition
Clinical reasoning	A complex, iterative cognitive process in which nurses systematically collect, interpret, and synthesise clinical cues to formulate accurate patient assessments, make evidence-based decisions, and refine future actions (Huang et al., 2018; Levett-Jones et al., 2010). The process is dynamic and inherently covert, necessitating diverse assessment methods to capture its full scope (Rencic et al., 2020).	Clinical reasoning among Malaysian nursing students was evaluated using a multimodal approach that incorporates both direct (Key Feature Questions, case study analyses, clinical supervisor evaluations, Nurses' Clinical Reasoning Scale) and supporting measures (metacognitive awareness, self-regulated learning, and motivation strategies) for understanding factors that influence clinical reasoning development and sustainability. Higher scores in

Table 1.1 Continued

Term	Conceptual Definition	Operational Definition
		these measurements indicates higher clinical reasoning.
Model development	A systematic process of designing, implementing, and refining a structured framework to address an identified educational or clinical need (Kim, 2010).	In this study, model development involved literature synthesis, expert validation, and pilot testing within a Malaysian nursing education context.
Theoretical frameworks	A set of interrelated concepts and principles that guide the creation and evaluation of educational interventions, grounded in learning and cognitive theories (Kim, 2010).	A set of educational and cognitive principles that provide a conceptual foundation for the development, implementation, and evaluation of clinical reasoning models in Malaysian nursing education.
Essential elements	Core components considered necessary for an effective clinical reasoning model, covering cognitive strategies, instructional methods, and assessment tools.	In this study, essential elements were identified through a multi-phase process including literature review, expert panel consensus, and iterative refinement.
Preliminary model	An initial version of a model, built on theoretical foundations and preliminary feedback, subject to ongoing refinement and validation.	In this study, preliminary model was developed based on evidence in the literature, intended for further refinement through expert review and empirical testing.

Table 1.1 Continued

Term	Conceptual Definition	Operational Definition
Content validity	The degree to which the components of the clinical reasoning model accurately reflect the construct being measured, as evaluated by subject matter experts (Lynn, 1986).	In this study, content validity was assessed using the Content Validity Index (CVI), which quantifies expert agreement on the relevance and representativeness of each model component. A CVI score above the established threshold will indicate strong content validity.
Response process validity	The extent to which participants' responses during the model's assessment align with the intended constructs, ensuring clarity, usability, and practical relevance (Yusoff, 2019b).	In this study, the Face Validity Index (FVI) was used to measure response process validity, capturing participants' perceptions of the model's clarity, comprehensibility, and ease of use. An FVI score meeting the accepted standard will confirm that the model is well-understood and practically applicable.
Malaysian nursing students	Undergraduate nursing students in Malaysia who have not yet obtained licensure and are enrolled in accredited nursing programmes.	Participants targeted for model evaluation and implementation, reflecting the local educational context and population characteristics.

1.8 Summary of the Chapter

This chapter has established the intellectual foundation for the study by exploring the current gaps in clinical reasoning education within Malaysian nursing programmes. It highlighted clinical reasoning as a critical yet underrepresented competency and noted the limited presence of structured frameworks for its teaching and assessment. The problem statement underscored the need for a contextually relevant model, as existing curricula tend to focus on critical thinking without explicitly addressing clinical reasoning as a distinct construct. This chapter sets the stage for the following chapter, which will critically review the existing literature on clinical reasoning to further inform the study's development.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to the Chapter

This chapter reviews literature on clinical reasoning in undergraduate nursing education, focusing on its theoretical foundations, curricular integration, assessment strategies, and contextual challenges. Clinical reasoning is presented as a core cognitive competency distinct from critical thinking and clinical judgment, with direct implications for patient safety, diagnostic accuracy, and decision-making.

The chapter first provides a global overview of how clinical reasoning is embedded in nursing curricula through strategies such as simulation-based learning, problem-based learning, and structured reasoning models, while highlighting barriers to consistent implementation. It then examines the Malaysian context, where clinical reasoning remains insufficiently defined, inconsistently taught, and rarely assessed. Despite growing healthcare demands, current curricula still prioritise procedural knowledge and generic critical thinking, with limited faculty expertise or assessment frameworks to support reasoning development.

Finally, key theoretical models, including Tanner's Clinical Judgment Model, Levett-Jones' Clinical Reasoning Cycle, and major cognitive learning theories, are reviewed to establish the conceptual foundation for this study. The discussion concludes by underscoring the need for a structured, evidence-informed model suited to Malaysia's educational context to strengthen nursing students' reasoning and clinical decision-making abilities.

2.2 Historical and Current Trends in Clinical Reasoning Education

The conceptualisation and integration of clinical reasoning in nursing education have evolved significantly over the past century, shaped by advancements in medical pedagogy and cognitive science. Historically, clinical reasoning was implicit in bedside teaching and apprenticeship models, where students learned by observing and imitating experienced practitioners. The formal study of clinical reasoning as a distinct cognitive process began in the mid-20th century, largely influenced by advances in medical education and psychology.

Clinical reasoning can be traced back to Hippocrates (460–370 BC), who emphasised careful observation, logical deduction, and pattern recognition in diagnosing diseases. However, until the 20th century, medical education largely relied on experiential learning without a structured reasoning framework. The Flexner Report (1910) marked a turning point, advocating for scientific rigor in medical education and promoting clinical teaching that integrated basic sciences with patient care (Custers, 2018). Despite this shift, clinical reasoning itself remained implicit rather than explicitly taught.

The 1970s and 1980s saw an increased focus on understanding clinical reasoning as a cognitive skill rather than a tacit ability. Research by Elstein et al. (1978) led to the development of the hypothetico-deductive reasoning model, which describes clinical reasoning as a process of generating and testing diagnostic hypotheses (Norman, 2005). Around the same time, Benner's Novice-to-Expert model (1984) gained prominence in nursing education, describing the progression of nurses from rule-based beginners to intuitive experts. However, Benner's model, while influential, does not explicitly define clinical reasoning as a structured cognitive process, a critique often raised in nursing education research (Norman, 2005).

By the 1990s, research had shifted towards understanding how knowledge is structured and retrieved during clinical reasoning. Scholars such as Schmidt et al. (1990) introduced illness scripts theory, which posits that expert clinicians develop mental frameworks that allow for rapid pattern recognition and decision-making. The cognitive dual-process theory also emerged, distinguishing between fast, intuitive reasoning (System 1) and slow, analytical reasoning (System 2), both of which are essential in clinical decision-making (Norman et al., 2024).

The 2000s marked a paradigm shift in nursing education, with explicit efforts to embed clinical reasoning into curricula. Tanner's Clinical Judgment Model (2006) emphasised noticing, interpreting, responding, and reflecting, formalising the reasoning process in nursing practice (Hahn & Ryu, 2022). Around the same time, Levett-Jones et al. (2010) introduced the Clinical Reasoning Cycle, providing a structured framework for nursing students to systematically process patient information.

Currently, many countries have transitioned towards competency-based education, recognising clinical reasoning as a core nursing competence. The American Association of Colleges of Nursing (2021) and other global accrediting bodies like The Korea Accreditation Board of Nursing Education (Hahn & Ryu, 2022) have incorporated clinical reasoning into programme outcomes, requiring nursing students to demonstrate decision-making capabilities through structured assessments. Assessments now go beyond traditional knowledge-based exams to include Objective Structured Clinical Examinations, case-based discussions, concept mapping, and self-reflection tools.

2.3 Clinical Reasoning Defined

Clinical reasoning is a fundamental cognitive process in nursing practice, enabling nurses to collect, interpret, and synthesise clinical cues to make timely, informed decisions that directly impact patient safety and outcomes (Huang et al., 2018; Levett-Jones et al., 2010). Unlike critical thinking, which involves broad analytical abilities, clinical reasoning is context-dependent, iterative, and essential for real-time decision-making in complex patient care situations (El Hussein et al., 2022; Rencic et al., 2016). It is integral to clinical judgment, ensuring nurses can recognise patient deterioration, anticipate complications, and intervene appropriately (Lasater, 2011; Mohammadi-Shahboulaghi et al., 2021). Given the high-risk nature of healthcare, deficiencies in clinical reasoning contribute to diagnostic errors, delayed interventions, and preventable adverse events, highlighting its critical role in nursing education (Jessee, 2021).

Conventionally understood as the cognitive process leading to clinical judgment, some literature, particularly from U.S.-based studies, conceptualises clinical judgment as a broader, multilayered process that encompasses discipline-specific knowledge, cognitive reasoning, and metacognitive skills. This aligns with Jessee (2021), who highlights how clinical judgment and clinical reasoning are sometimes used interchangeably, despite their distinctions. This variation in conceptualisation complicates their application in nursing education and assessment, necessitating further exploration of how these constructs are operationalised across different educational and healthcare contexts (Gordon et al., 2022; Young et al., 2018, 2019, 2020).

2.4 Clinical Reasoning as a Core Competency in Nursing Education

Internationally, clinical reasoning is recognised as a core competency in nursing education and practice. In the United States and Canada, the National Council of State Boards of Nursing (NCSBN) (2023) explicitly incorporates clinical judgment and reasoning into licensing examinations, reinforcing their necessity for safe entry-level nursing practice. The American Association of Colleges of Nursing (2021) underscores clinical judgment as a key competency in professional nursing practice, describing it as a decision-making process that integrates nursing knowledge, critical thinking, and clinical reasoning. The Korea Accreditation Board of Nursing Education (2021) recognised clinical reasoning competence as a fundamental learning outcome for nursing graduates, emphasising its critical role in ensuring safe, effective, and evidence-based patient care (Hahn & Ryu, 2022). Similarly, the World Health Organization (2024) highlights the importance of clinical reasoning in improving patient safety, reinforcing the global imperative for clinical reasoning development in nursing education. These perspectives collectively emphasise the need for structured educational strategies that cultivate clinical reasoning skills, ensuring that nursing graduates are equipped to deliver competent, evidence-based care in diverse and complex healthcare environments.

2.5 Educational Strategies for Clinical Reasoning Development

Empirical research demonstrates that structured interventions enhance clinical reasoning abilities, leading to reduced errors and improved patient outcomes. For instance, Lapkin et al. (2010) found that the use of patient simulation manikins significantly improves knowledge acquisition, critical thinking, and the ability to identify deteriorating patients, all of which are fundamental to clinical reasoning.

Similarly, Domm et al. (2021) reported that structured reasoning exercises enhance clinical reasoning skills in nursing education, leading to greater medication safety and fewer errors, thereby reinforcing the need for explicit training in clinical reasoning.

Simulation-based education, particularly when coupled with reflective debriefing, has been shown to facilitate clinical reasoning development by encouraging analytical thinking, self-reflection, and real-time application of knowledge (Abulebda et al., 2022; Decker et al., 2013; Fegran et al., 2022). However, disparities in access to simulation-based learning persist globally. High-income countries frequently integrate high-fidelity simulations into curricula, whereas low-resource settings often rely on traditional lectures and passive learning methods, limiting opportunities for experiential clinical reasoning development (Salifu et al., 2019, 2022).

2.6 Lack of Clinical Reasoning Skills in Undergraduate Nursing Students

This section critically examines the extent of clinical reasoning deficiencies among nursing students globally, analysing key educational, student-related, and institutional barriers that hinder its development. Despite the well-established importance of clinical reasoning in nursing education, significant global deficiencies persist in nursing students' ability to apply this skill effectively in real-world clinical settings. These deficits are largely shaped by educational models, institutional constraints, and assessment methodologies, which often fail to provide structured opportunities for students to develop and refine clinical reasoning skills (Leal et al., 2024; Pérez-Perdomo & Zabalegui, 2023).

2.6.1 Evidence of Deficiencies in Nursing Students' Clinical Reasoning

Numerous empirical studies highlight undergraduate nursing students' struggles with clinical reasoning, raising concerns about their preparedness for autonomous decision-making in clinical environments. A common deficiency is the failure to recognise early warning signs of patient deterioration, leading to delayed or missed interventions (Al-Moteri et al., 2020; Poledna et al., 2022). Additionally, research suggests that many students over-rely on rote memorisation rather than engaging in analytical reasoning, which limits their ability to adapt to complex, unpredictable clinical scenarios (Abunab et al., 2023; Chan, 2023; Pesut & Herman, 1999). These deficiencies translate into suboptimal patient outcomes, reinforcing the need for robust clinical reasoning-focused education.

Studies using high fidelity simulation and other methods further reveal that nursing students exhibit weak clinical reasoning across multiple domains, particularly in high-pressure situations requiring rapid clinical judgment and prioritisation (Abdulmohdi & Mcvicar, 2023; Alamouti et al., 2020; Ayed et al., 2022; Chan, 2023; Hallin et al., 2016). While such findings are extensively documented in nursing education research, particularly in Western contexts, there is a notable lack of comparable studies in Malaysia, making it difficult to determine whether these global trends align with local nursing education outcomes. This research gap underscores the necessity of conducting empirical studies to assess clinical reasoning competencies among Malaysian nursing students.

2.6.2 Challenges in Developing Clinical Reasoning

The development of clinical reasoning is influenced by a multifaceted interplay of educational practices, student-related factors, and institutional constraints. One of

the most prominent educational barriers is the continued emphasis on content-heavy curricula, which prioritise knowledge acquisition over clinical reasoning application (Al-Omari et al., 2024; Baron, 2017; Giddens & Brady, 2007). Many nursing programmes still rely on traditional lecture-based instruction, limiting students' exposure to interactive, case-based, and problem-solving approaches that have been shown to enhance clinical reasoning skills (Bristol et al., 2019; Ulfa et al., 2021; Xue et al., 2021). This passive learning environment does not adequately foster the cognitive flexibility needed for clinical decision-making.

From a student perspective, two primary challenges hinder clinical reasoning development: information overload and limited self-regulated learning. Nursing students are often expected to process vast amounts of theoretical content within a constrained timeframe, leaving little room for deliberate clinical reasoning exercises and structured reflection (Ghods et al., 2022; Günay & Kılınç, 2018). Additionally, many students lack self-regulation strategies, making it difficult for them to critically evaluate and refine their clinical reasoning processes over time (Jin & Ji, 2020; Mohamed et al., 2019).

Institutional constraints further exacerbate these issues. Faculty members often receive minimal training in teaching reasoning-based strategies, relying instead on conventional knowledge-based assessments that do not measure students' ability to integrate and apply information in clinical contexts (Herron, 2018; Kavanagh & Sharpnack, 2021; Najafi & Nasiri, 2023). Furthermore, resource limitations, particularly in low- and middle-income countries, restrict the implementation of high-fidelity simulations (Issa et al., 2024; Robinson et al., 2024), which have been shown to enhance clinical reasoning (Lapkin et al., 2010).

In summary, the global literature highlights persistent challenges in developing clinical reasoning among nursing students, despite the availability of established educational frameworks and pedagogical innovations. These findings reveal that while international models have advanced the understanding and teaching of clinical reasoning, their impact varies across educational systems and resource settings. Within this global context, the Malaysian nursing education system presents a unique case where reasoning remains insufficiently defined, inconsistently taught, and rarely assessed. The following section examines these local challenges in greater depth to clarify the contextual need for a tailored clinical reasoning model.

2.7 Clinical Reasoning in Nursing Education in Malaysia

The integration of clinical reasoning into Malaysian nursing education remains limited compared with international standards. While global reforms emphasise structured reasoning frameworks and standardised assessments, Malaysian curricula still focus primarily on procedural competence and critical thinking, with few structured approaches for teaching or assessing clinical reasoning. This gap raises concerns about graduates' preparedness for independent decision-making in complex clinical contexts.

2.7.1 Limited National Definition and Framework

Malaysian nursing education is guided by the Malaysian Qualifications Agency (2024) and the Nursing Board of Malaysia, which outline competency-based standards but do not explicitly define clinical reasoning as a learning outcome. The emphasis remains on general critical thinking, leading to variability in how reasoning is interpreted and taught across institutions (Lee et al., 2020). In the absence of a

national framework or validated instruments, clinical reasoning is often addressed implicitly through other competencies rather than as a distinct construct. Research examining this area also remains scarce, reflecting a limited national focus on reasoning-specific pedagogy and assessment.

2.7.2 Predominance of the Nursing Process

The Nursing Process: Assessment, Diagnosis, Planning, Implementation, and Evaluation, remains the principal framework guiding nursing education (Thet et al., 2018; Yusof et al., 2020). While it provides a structured approach to patient care, it lacks the flexibility and contextual adaptability required for higher-order clinical reasoning (Benner et al., 1992; Guerrero, 2019). The process often encourages procedural compliance rather than cognitive engagement, with students following predetermined steps rather than analysing patient cues or exploring alternative hypotheses. Integrating reasoning-focused frameworks such as Benner's Novice-to-Expert Model could complement the Nursing Process by emphasising reflective practice, situational awareness, and judgment formation.

2.7.3 Traditional Teaching and Learning Approaches

Malaysian nursing programmes continue to rely heavily on lecture-based and teacher-centred instruction, limiting opportunities for students to engage in active reasoning. Educators often emphasise factual recall and task completion rather than case analysis or self-directed inquiry (Jamil & Ibrahim, 2017; Mansor et al., 2017). Faculty capacity remains a challenge, with limited formal training in facilitating reasoning-focused learning or simulation pedagogy (Atan et al., 2024; Lee et al., 2020).

Simulation-based learning, though effective internationally (Cant & Cooper, 2017; Theobald et al., 2021), faces local barriers including cost, infrastructure, and lack of trained facilitators (Ismail et al., 2019). Lower-fidelity and role-playing methods are more common but may not adequately mirror the complexity of real clinical reasoning. Hierarchical norms in clinical settings further discourage students from questioning decisions or verbalising reasoning processes (Kelly et al., 2018; Pong et al., 2021). Addressing these pedagogical and cultural barriers is crucial for cultivating reflective and autonomous practitioners.

2.7.4 Gaps in Clinical Reasoning Assessment

Assessment in Malaysian nursing education remains largely knowledge-based. Multiple-choice questions dominate both coursework and licensing examinations (Lee et al., 2020), limiting evaluation of analytical reasoning or contextual decision-making (Rear, 2019). Although Objective Structured Clinical Examinations (OSCEs) are used, they focus mainly on procedural competence rather than reasoning processes. Internationally validated instruments such as the Lasater Clinical Judgment Rubric (LCJR) and Key Feature Questions (KFQs) have shown strong potential for measuring reasoning in applied contexts (Lasater, 2007; Page et al., 2012), but such tools remain underutilised in Malaysia. Strengthening assessment methods would support a more systematic and measurable approach to reasoning development.

2.7.5 The Need for a Contextualised Malaysian Model

The observed gaps in curriculum design, pedagogy, assessment, and research underscore the need for a locally adapted model that integrates international best practices while respecting Malaysia's educational realities. A structured, context-