

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT (ENGLISH)	v
ABSTRACT (THAI)	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
CHAPTER 1 INTRODUCTION	1
1.1 Principles	1
1.2 Objectives	4
CHAPTER 2 REVIEW OF THE LITERATURE	5
2.1 Nitrous oxide and dentistry	7
2.2 General properties of nitrous oxide	8
2.2.1 Physical properties of nitrous oxide	8
2.2.2 Pharmacokinetic of nitrous oxide	8
2.2.3 Mechanism of action of nitrous oxide	10
2.2.4 Potency of nitrous oxide	11
2.3 Advantages and disadvantages of nitrous oxide use as an inhalation sedation agent	12

2.3.1	Advantages	12
2.3.2	Disadvantages	12
2.4	Indications and contraindications of N ₂ O/O ₂ inhalation sedation	13
2.4.1	Indications	13
2.4.2	Contraindications	13
2.5	The concentration of nitrous oxide used as a minimal sedation	14
2.6	Patient assessment	16
2.7	The administrative techniques of N ₂ O/O ₂ inhalation sedation	18
2.7.1	Slow titration technique	18
2.7.2	Rapid induction technique	20
2.8	Clinical effects	24
2.8.1	Objective signs and subjective symptoms of ideal sedation	24
2.8.2	Objective signs and subjective symptoms of oversedation	26
2.8.3	Effects of N ₂ O/O ₂ inhalation sedation to physiologic parameters	27
2.9	Recovery from N ₂ O/O ₂ inhalation sedation	28
2.10	Complications of N ₂ O/O ₂ inhalation sedation	31
2.11	Anxiety and satisfaction assessment	32
2.12	Potential biohazards for health personnel associated with chronic exposure to nitrous oxide	34
CHAPTER 3 MATERIALS AND METHODS		37
3.1	Research design	37
3.2	Materials	37
3.3	Research population and sample groups	38

3.3.1	Study populations	38
3.3.1.1	Inclusion criteria	38
3.3.1.2	Exclusion criteria	39
3.3.2	Sample size	39
3.3.3	Random sampling	39
3.4	Calibration	39
3.5	N ₂ O/O ₂ administration protocol	40
3.6	Clinical procedure of N ₂ O/O ₂ administration	44
3.6.1	Before N ₂ O/O ₂ administration	44
3.6.2	N ₂ O/O ₂ administration	44
3.6.2.1	Slow titration technique	45
3.6.2.2	Rapid induction technique	46
3.7	Criteria for the ideal stage of sedation	46
3.8	Criteria for oversedation	47
3.9	Criteria for discharge	48
3.10	Data analysis	49
CHAPTER 4 RESULTS		50
4.1	Demographic data	50
4.2	Clinical effects	51
4.2.1	Objective signs	51
4.2.2	Subjective symptoms	52
4.3	Physiologic parameters	57
4.3.1	Blood pressure	57
4.3.2	Heart rate	60

4.3.3	Hemoglobin oxygen saturation	61
4.4	Time to achieve the ideal stage of sedation	61
4.5	Nitrous oxide concentration	62
4.6	Complications	63
4.7	Level of satisfaction	64
CHAPTER 5 DISCUSSION		65
BIBLIOGRAPHY		81
APPENDICES		90
Appendix A	Certificate of ethic clearance	91
Appendix B	Data collection forms	92
Appendix C	Patient information and informed consent	97
Appendix D	Statistical analysis	102
CURRICULUM VITAE		108

LIST OF TABLES

Table		Page
1	Blood: gas partition coefficient and minimum alveolar concentration (MAC) of inhalation anesthetic agents	11
2	Symptoms and signs of ideal stage of nitrous oxide inhalation sedation	26
3	Percentage of objective signs observed in N ₂ O/O ₂ administration with the slow titration and the rapid induction techniques	51
4	Percentage of subjective symptoms in each part of the body in the slow titration and the rapid induction techniques	55
5	The differences of blood pressure from the baseline at each step of sedation in each administrative technique	58
6	Comparisons of the differences of blood pressure from baseline between the slow titration and rapid induction techniques at each step of sedation	59
7	The differences of heart rate from the baseline at each step of sedation In the slow titration and the rapid induction techniques	60
8	Concentration of nitrous oxide to achieve the ideal stage of sedation in each administrative technique	62
9	Complications in slow titration and rapid induction techniques	63
10	Paired T-test comparing the level of anxiety between the slow titration and rapid induction techniques	102

11	One-Way ANOVA comparing systolic and diastolic blood pressure and heart rate in each administrative technique of N ₂ O/O ₂ inhalation sedation	102
12	Independent Sample T-test comparing means of the change of systolic blood pressure from the baseline between the slow titration and rapid induction techniques	103
13	Independent Sample T-test comparing means of the change of diastolic blood pressure from the baseline between the slow titration and rapid induction techniques	104
14	Independent Sample T-test comparing means of the change of heart rate from the baseline between the slow titration and rapid induction techniques	105
15	Paired T-Test comparing the time to achieve the ideal stage of sedation between the slow titration and rapid induction techniques	106
16	Chi-square analysis comparing 50% N ₂ O that provided the ideal stage of sedation between the slow titration and rapid induction techniques	106
17	Chi-square analysis comparing overall complications between the slow titration and rapid induction techniques	107
18	Paired T-test comparing the level of satisfaction between the slow titration and rapid induction techniques	107

LIST OF FIGURES

Figure	Page
1 Sequence of N ₂ O/O ₂ administration	40
2 Clinical procedure for N ₂ O/O ₂ administration by <i>'the slow titration'</i> technique	42
3 Clinical procedure for N ₂ O/O ₂ administration by <i>'the rapid induction'</i> technique	43
4 Visual Analog Scale	48