

**UNIVERSITI SAINS MALAYSIA  
PROJEK PENYELIDIKAN JANGKA PENDEK  
LAPORAN AKHIR**

**A COMPARATIVE STUDY OF TARGET  
CONTROLLED INFUSION (TCI) AND  
MANUAL CONTROLLED INFUSION (MCI) OF  
PROPOFOL FOR SEDATION DURING  
CEREBRAL PROTECTION IN SEVERE  
TRAUMATIC BRAIN INJURED PATIENT**

**PENYELIDIK**

**DR. WAN MOHD NAZARUDDIN WAN HASSAN**

**PENYELIDIK BERSAMA**

**DR. ANWAR AHMAD  
PROF. NIK ABDULLAH NIK MOHAMED**

## SENARAI SEMAKAN UNTUK BUKU LAPORAN AKHIR GERAN USM JANGKA PENDEK

NAMA PENYELIDIK UTAMA	:	Dr W Mohd Nazaruddin W Hassan
NAMA CO-RESEARCHER	:	Dr Anwar B Ahmad & Prof Nik Abdullah Nik Mohamed
TAJUK GERAN	:	A comparative study of target controlled infusion (TCI) and manual controlled infusion (MCI) of propofol for sedation in severe traumatic brain-injured patient
NO.AKAUN	:	304/ PPSP/6131479

**SENARAI SEMAKAN SEMASA PENYERAHAN BUKU LAPORAN AKHIR  
(Sila Tandakan (4) Pada Kotak Yang Berkenaan)**

NO	PERKARA	ADA	TIDAK
1.	Borang Laporan Akhir Projek Penyelidikan USM Jangka Pendek	√	
2.	Borang Laporan Hasil Penyelidikan, PPSP	√	
3.	i) Salinan Menuskrip	√	
	ii) Salinan surat/email bukti penghantaran kepada mana-mana journal	√	
4.	Penyata Perbelanjaan (Financial Statement) (Sila dapatkan daripada Jabatan Bendahari)	√	
5.	Laporan Komprehensif (termasuk kertas persidangan atau seminar dan penerbitan saintifik hasil daripada projek ini)	√	
6.	Surat pemakluman penghantaran Laporan Akhir ke Bhg. Penyelidikan	√	

**Nota:**

- \* Sila buat 3 salinan buku laporan Akhir
- \* No. 1-5 - Perlu dimasukkan dalam Buku Laporan Akhir
- \* No.6 - Hantar terus Kepada Pn. Che Merah Ismail (RCMO) hanya salinan kepada Bhg. R&D, PPSP

My doc/checklist borang2/sue



## LAPORAN AKHIR PROJEK PENYELIDIKAN JANGKA PENDEK

### FINAL REPORT OF SHORT TERM RESEARCH PROJECT

Sila kemukakan laporan akhir ini melalui Jawatankuasa Penyelidikan di Pusat Pengajian dan Dekan/Pengarah/Ketua Jabatan kepada Pejabat Pelantar Penyelidikan

<b>1. Nama Ketua Penyelidik:</b> <i>Name of Research Leader: Dr W Mohd Nazaruddin W Hassan</i>							
<input type="checkbox"/> Profesor Madya/ <i>Assoc. Prof.</i>		<input checked="" type="checkbox"/> Dr./ <i>Dr.</i>		<input type="checkbox"/> Encik/Puan/Cik <i>Mr/Mrs/Ms</i>			
<b>2. Pusat Tanggungjawab (PTJ):</b> <i>School/Department: PPSP</i> <i>(Department of Anaesthesiology)</i>							
<b>3. Nama Penyelidik Bersama:</b> <i>Name of Co-Researcher: Dr Anwar B Ahmad &amp; Prof. Dr Nik Abdullah B Nik Mohamed</i>							
<b>4. Tajuk Projek:</b> A comparative study of target controlled infusion (TCI) and manual controlled infusion <hr/> (MCI) of propofol for sedation during cerebral protection in severe traumatic brain-injured <hr/>							
<b>5. Ringkasan Penilaian/Summary of Assessment:</b>							
		Tidak Mencukupi <i>Inadequate</i>		Boleh Diterima <i>Acceptable</i>		Sangat Baik <i>Very Good</i>	
		1	2	3	4	5	
i) Pencapaian objektif projek: <i>Achievement of project objectives</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
ii) Kualiti output: <i>Quality of outputs</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
iii) Kualiti impak: <i>Quality of impacts</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
iv) Pemindahan teknologi/potensi pengkomersialan: <i>Technology transfer/commercialization potential</i>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
v) Kualiti dan usahasama : <i>Quality and intensity of collaboration</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
vi) Penilaian kepentingan secara keseluruhan: <i>Overall assessment of benefits</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**6. Abstrak Penyelidikan**

(Perlu disediakan di antara 100 - 200 perkataan di dalam Bahasa Malaysia dan juga Bahasa Inggeris. Abstrak ini akan dimuatkan dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & masyarakat luar).

**Abstract of Research**

(An abstract of between 100 and 200 words must be prepared in Bahasa Malaysia and in English).

This abstract will be included in the Annual Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large)

Rujuk lampiran

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**7. Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.**

[Sila gunakan kertas berasingan]

Applicant are required to prepare a Comprehensive Technical Report explaining the project.

(This report must be appended separately)

The research has been presented in Annual Scientific Meeting, Malaysian Society of Anaesthesiology 2008, and has won The Young Investigator Award

**Senaraikan kata kunci yang mencerminkan penyelidikan anda:**

List the key words that reflects your research:

<u>Bahasa Malaysia</u>	<u>Bahasa Inggeris</u>
propofol	propofol
teknik aliran kawalan sasaran kepekatan	target-controlled infusion
aliran	infusion

**8. Output dan Faedah Projek**

Output and Benefits of Project

(a) \* **Penerbitan Jurnal**

(Sila nyatakan jenis, tajuk, pengarang/editor, tahun terbitan dan di mana telah diterbitkan/  
(State type, title, author/editor, publication year and where it has been published/submitted)

Publication of Journals: British Journal of Anaesthesia. Sedation in Traumatic Brain Injury: Target-Controlled Infusion (TCI) versus Manually-Controlled Infusion (MCI) of Propofol. Submitted on 29 August 2010 (Lihat lampiran)

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- (b) **Faedah-faedah lain seperti perkembangan produk, pengkomersialan produk/pendaftaran paten atau impak kepada dasar dan masyarakat.**  
*State other benefits such as product development, product commercialisation/patent registration or impact on source and society.*

This was a clinical trial. The outcomes of the study are potential to give a new dimension to provide  
sedation in traumatic brain injured patients. There was no new product developed in this study

\* Sila berikan salinan/Kindly provide copies

- (c) **Latihan Sumber Manusia**  
*Training in Human Resources*

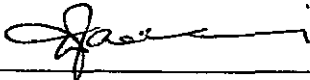
- i) **Pelajar Sarjana:**  
*Graduates Students*  
(Perincikan nama, ijazah dan status)  
*(Provide names, degrees and status)*  
Dr Anwar B Ahmad – Master in Medicine

(Anaesthesiology) Nov 2009

- ii) **Lain-lain:**  
*Others*

9. **Peralatan yang Telah Dibeli:**  
*Equipment that has been purchased:*

Perfusor Space –TCl infusion pump



Tandatangan Penyelidik  
Signature of Researcher

1 SEPT 2014

Tarikh  
Date

Dr. W MOHD NAZARUDDIN W HASSAN  
Pakar Anestesiologi  
Jabatan Anestesiologi & Rawatan Rapi  
Hospital Universiti Sains Malaysia  
Kampus Kesihatan  
16150 Kubang Kerian, Kelantan  
No. Peng Penuh : 36634

Laporan Akhir Projek Penyelidikan Jangka Pendek  
Final Report Of Short Term Research Project

Komen Jawatankuasa Penyelidikan Pusat Pengajian/Pusat  
Comments by the Research Committees of Schools/Centres

This project has been completed successfully and all study objectives achieved. The output of the research include a master of medicine Anaesthesiology dissertation, My D Award Award, a presentation at the Annual Scientific Meeting Malaysian Society of Anaesthesiology 2014 and won the Young Investigator Award.

A manuscript was also been submitted to the British Journal of Anaesthesia.

The report has been independently assessed and approved by the PTJ research committee.

PROFESSOR AHMAD SUKARI HALIM  
Chairman of Research Committee  
School of Medical Sciences  
Health Campus  
Universiti Sains Malaysia  
16150 Kubang Kerian, Kelantan.

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**TANDATANGAN PENGERUSI**  
**JAWATANKUASA PENYELIDIKAN**  
**PUSAT PENGAJIAN/PUSAT**  
*Signature of Chairman*  
*[Research Committee of School/Centre]*

29/10/20

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**Tarikh**  
*Date*

## Lampiran

### TITLE:

A comparative study of target controlled infusion (TCI) and manual controlled infusion (MCI) of propofol for sedation in severe traumatic brain-injured patient

### ABSTRACT


**Background.** The aims of this study are to compare TCI with MCI propofol as sedation in severe traumatic brain-injured (TBI) patients.

**Methods.** Post emergency craniotomy for severe TBI patients (n = 50), were randomly assigned to receive propofol sedation over 24 hours using two modes of infusion: TCI versus MCI (n = 25 in each groups). Sedation was monitored using bispectral index (BIS) monitor and sedation agitation scale (SAS). TCI was titrated between 0.2-2.0  $\mu\text{g ml}^{-1}$  and MCI was between 0.3-4.0  $\text{mg kg}^{-1} \text{h}^{-1}$  to achieve sedative state at BIS 60-70 and SAS 2-3. Mean arterial pressure (MAP), heart rate (HR), intracranial pressure (ICP), cerebral perfusion pressure (CPP), time taken and volume used to achieve BIS 70, total volume of propofol over 24 hours and recovery time to BIS 90 were recorded.

**Results.** TCI achieved BIS 70 significantly faster than MCI ( $6.3 \pm 2.9$  min vs.  $19.7 \pm 7.0$  min). Total volume of propofol at BIS 70 was significantly less in TCI ( $12.0 \pm 2.9$  ml vs.  $17.8 \pm 4.3$  ml). Recovery time to BIS 90 was also significantly faster in TCI ( $24.4 \pm 11.5$  min vs.  $57.3 \pm 19.9$  min). TCI showed significantly lower in HR and ICP trends over 24 hours. CPP trends were significantly higher in TCI. There were no significant differences in MAP and total volume over 24 hours.

**Conclusions.** TCI modes had more advantages for propofol sedation in TBI by providing faster onset and offset of sedation and better in controlling ICP and CPP.

**Keywords:** anaesthetic i.v., propofol; anaesthetic techniques, computer-assisted continuous infusion; equipment, infusion pump.





## **ABSTRAK**

### **Latar belakang:**

Sasaran kajian ini adalah untuk membandingkan teknik aliran kawalan kepekatan sasaran (AKKS) dengan teknik aliran kawalan secara manual (AKM) dalam pelalian menggunakan ubat propofol di kalangan pesakit yang mengalami kecederaan otak yang teruk akibat trauma.

### **Metodologi:**

Pesakit kecederaan otak yang teruk akibat trauma yang telah ~~telah selesai~~ pembedahan kecederaan (n = 50), di bahagikan secara rawak untuk menerima ubat pelalian propofol selama 24 jam menggunakan 2 teknik infusi: AKKS dan AKM (n = 25 bagi setiap kumpulan). Tahap pelalian diawasi menggunakan mesin pengawasan "bispectral index" (BIS) dan skala tahap pelalian dan keresahan (STPK). AKKS di beri dalam julat 0.2-2.0  $\mu\text{g ml}^{-1}$  dan AKM di beri dalam julat 0.3-4.0  $\text{mg kg}^{-1} \text{h}^{-1}$  untuk mencapai tahap BIS 60-70 and STPK 2-3. Tekanan darah (TK), denyutan jantung (DJ), tekanan di dalam tempurung otak (TTO), tekanan pengairan darah dalam otak (TPDO), tempoh di ambil serta isipadu ubat propofol digunakan untuk mencapai BIS 70, isipadu keseluruhan ubat propofol selama 24 jam dan tempoh pemulihan untuk mencapai BIS 90, telah direkodkan

### **Keputusan:**

Teknik AKKS mencapai BIS 70 lebih cepat berbanding dengan AKM ( $6.3 \pm 2.9$  min berbanding  $19.7 \pm 7.0$  min). Isipadu ubat propofol digunakan untuk mencapai BIS 70 lebih rendah bagi AKKS ( $12.0 \pm 2.9$  ml berbanding  $17.8 \pm 4.3$  ml). Tempoh pemulihan untuk mencapai BIS 90 juga lebih cepat bagi AKKS ( $24.4 \pm 11.5$  min berbanding  $57.3 \pm 19.9$  min). AKKS menunjukkan perubahan DJ dan TTO yang lebih rendah sepanjang 24 jam. Tiada perbezaan yang signifikan dalam TK serta isipadu keseluruhan ubat propofol selama 24 jam.

### **Kesimpulan:**

Teknik AKKS mempunyai lebih kelebihan untuk pelalian ubat propofol di kalangan pesakit kecederaan otak yang teruk akibat trauma dengan memberikan kesan pelalian serta kesan pemulihan dari pelalian lebih cepat berbanding teknik AKM. Di samping itu ia juga lebih baik dalam mengawal TTO serta TPDO.