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Appendix A: Clearance from the Human Research Ethics Committee (Medical) of
the University of the Witwatersrand

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

1

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

R14/49 Moch

CLEARANCE CERTIFICATE

PROTOCOL NUMBER M080949

PROJECT

Developing Rational Rescribing
Competence in Medical School:
Student Perceptions VS Examination
of Therapeutic Proficiency in the
Graduate Entry medical Programms.....

INVESTIGATORS

Mrs S Moch

DEPARTMENT

Pharmacy & Pharmacology

DATE CONSIDERED

08.09.26

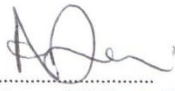
DECISION OF THE COMMITTEE*

Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 08.09.29

CHAIRPERSON


(Professor P E Cleaton Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Dr D Naidoo

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES



Appendix B:

TABLE B1: PERCEPTIONS QUESTIONNAIRE: TYPE OF DATA PRODUCED BY QUESTION AND PERCENTAGE RESPONSE RATES				
Question Number	Type of Data Produced by Question	Response - % of Total Starters	Response as a % of Class Number	Comment
1.	Quantitative	100.0	67.8	
2.	Quantitative	69.2	n.a.	Participants who answered “yes” to Q1 were immediately routed to Q6
3.	Quantitative	64.1	n.a.	Full class percentages were not calculated for Q2-Q5 inclusive since these Qs only applied to graduates.
4.	Quantitative	41.0	n.a.	5 free-text responses on the category labelled “other”
5.	Quantitative	53.8	n.a.	
6.	Quantitative	69.9	47.4	3 free-text responses for the question “Any other ideas?”
7.	Quantitative	69.9	47.4	
8.	Quantitative	91.3	61.8	
9.	Quantitative	91.3	61.8	
10.	Quantitative	89.3	60.5	
10 _{subsection}	Qualitative	25.2	17.1	26 free-text responses for the sub-question “Do you want to add a comment?”
11.	Quantitative	89.3	60.5	
12.	Quantitative	89.3	60.5	
13.	Qualitative	34.0	23.0	
14.	Qualitative	32.0	21.7	
15.	Quantitative	87.4	59.2	9 free-text responses under the heading “other (specify)”

16.	Quantitative	86.4	58.6	5 free-text responses under the heading “other (specify)”
17.	Quantitative	85.4	57.9	
17 _{subsection}	Qualitative	46.6	31.6	48 free-text responses to the instruction “Explain your answer to this statement”
18.	Quantitative	86.4	58.6	
19.	Quantitative	87.4	59.2	
20.	Quantitative	81.6	55.3	
21.	Qualitative	82.5	55.9	
22.	Qualitative	82.5	55.9	
23.	Quantitative	81.6	55.3	
23 _{subsection}	Qualitative	18.4	12.5	19 free-text responses to the question “Do you use any other sources?”
24.	Quantitative	81.6	55.3	
25.	Qualitative	81.6	55.3	
26.	Qualitative	27.2	18.4	
27.	Quantitative	14.6	9.9	

Appendix C: Perceptions Questionnaire Data

Questions 1-5 related to the graduate status of the students. Only 5 graduates had studied pharmacology in their previous degree.

6. When do you think medical students/doctors really learn how to prescribe safely?						
	GEMP I and II	GEMP III	GEMP IV	Internship	Community service	Registrar training
Choose one option only	0.0%	0.0%	19.4%	54.2%	18.1%	8.3%

7. How confident do you feel to accomplish the following tasks unaided?		
	%P	%N
Writing a legal prescription	59.7	40.3
Using abbreviations to give instructions on medicine usage	62.5	37.5
Choosing therapy for a patient on the basis of evidence in the literature (EBM)	59.7	40.3
Prescribing in special cases (pregnancy, renal failure, hepatic failure, extremes of age)	11.1	88.9
Avoiding Adverse Drug Reactions and Drug Interactions	11.1	88.9
Taking a drug-history	90.3	9.7
Calculating the dose of drug to administer	80.5	19.4
Completing discharge prescriptions	68.1	31.9
Ordering IV fluids	50.0	50.0
Knowledge and management of different formulations used in diabetic patients	27.8	72.2
Initiating warfarin therapy	25.0	75.0
Initiating therapy for TB	88.9	11.1
Initiating therapy for hypertension	88.9	11.1
Initiating antiretroviral therapy	80.6	19.5
Giving advice on malaria prophylaxis	70.9	29.2
Giving advice on contraception	88.9	11.1

8. Rate the QUANTITY of the following in relation to learning about drugs in GEMP I and II

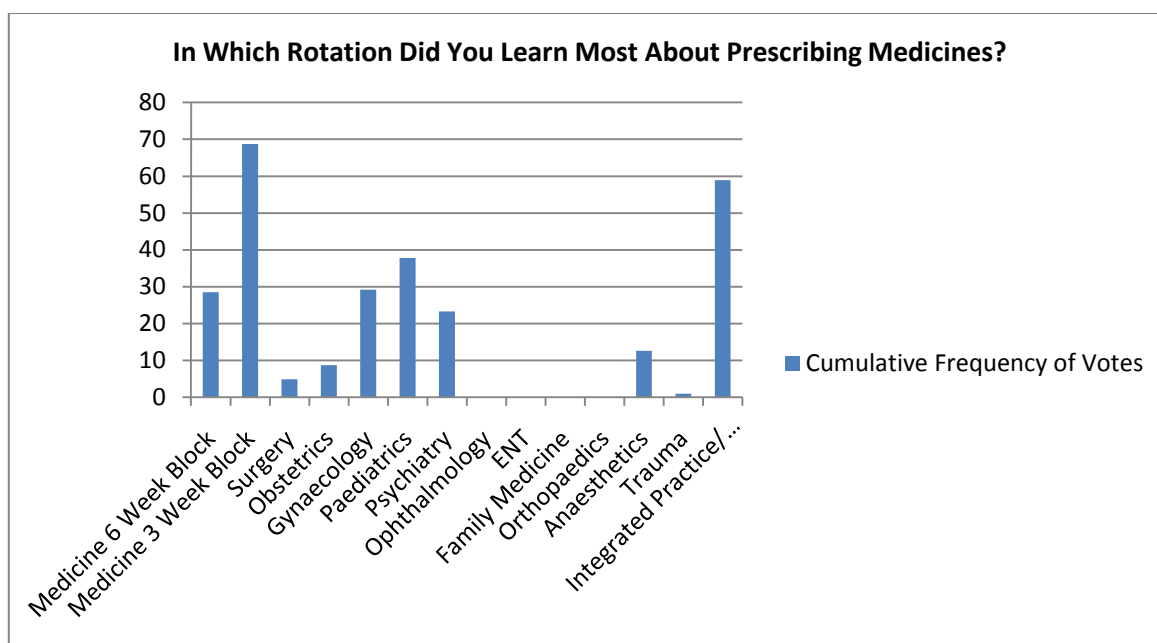
	%P	%N
Lectures on the basic pharmacology of drugs	2.1	67.0
Lectures on the use of drugs in clinical practice	0.0	93.5
Learning topics on the basic pharmacology of drugs	5.4	60.2
Learning topics on the use of drugs in clinical practice	1.1	90.3
Patient management information in terms of drug use in PBL sessions	0.0	89.1
Theme sessions on prescribing issues	2.2	89.2
Electronic learning opportunities (computer-based tutorials, problems, practice questions) regarding pharmacology	0.0	92.5

9. Rate the QUANTITY of the following in relation to learning about drugs in GEMP III and IV		
	%P	%N
Lectures on the use of drugs in clinical practice (med school days)	0.0	87.2
Learning opportunities during ward rounds	2.2	46.3
Tutorials on drug use	0.0	92.5
Tutorials on rational prescribing	1.1	89.1
Tutorials on information retrieval	8.9	53.4
Tutorials on evidence-based medicine	21.6	39.5

10. The following statements relate to your prescribing learning experiences. Mark the option that best represents your opinions and feelings		
	%P	%N
I find it easier to learn pharmacology from learning topics than from lectures	16.3	72.9
I can apply pharmacology learned in GEMP I and II to making prescribing choices in GEMP III and IV	28.6	58.3
I feel that assessments in pharmacology during my course thoroughly tested my knowledge and skills in this area	2.2	85.7
I feel that assessments in prescribing competence during my course thoroughly tested my knowledge and skills in this area	4.4	88.1
I rate the overall teaching of pharmacology during my course to be good	10.9	72.9
I rate the overall teaching of rational prescribing during my course to be good	5.4	78.3
I feel confident that my training will enable me to prescribe rationally when I am qualified	13.1	66.3

11. This question is about what you think influenced your learning of prescribing		
	%P	%N
Having a separate examination in pharmacology would help me to improve my prescribing skills	70.6	17.4
Learning the pharmacology of more drugs would help me to improve my prescribing skills	52.1	23.9
Learning where to look up reputable information about drugs would help me to improve my prescribing skills	79.4	3.3
Teaching about prescribing in the wards is opportunistic (it just depends on the cases and patients that you see during your rotation)	90.2	5.4

12. In which rotation did you learn most about prescribing medicines?							
	Medicine 6 Week Block	Medicine 3 Week Block	Integrated Practice/ Community Health	Paediatrics	Gynaecology	Psychiatry	Anaesthetics
First Choice	13.0%	25.0%	33.7%	9.7%	4.9%	5.8%	1.9%
Second Choice	9.7%	31.1%	15.5%	8.7%	9.7%	5.8%	3.9%
Third Choice	5.8%	12.6%	9.7%	19.4%	14.6%	11.7%	6.8%



15. Say how much influence the following groups had in teaching you about pharmacology in GEMP I and II		
	%P	%N
GEMP I PBL facilitator	2.2	66.7
GEMP II PBL facilitator	2.2	63.3
Registrar	51.1	26.7
Senior doctor	43.3	25.6
Consultant	28.9	28.9
Pharmacology lecturer	48.3	11.2
Pharmacist	6.7	73.3
Nurse	5.6	62.2
Peers (students in your class)	21.3	27.0
GEMP students in a higher class	10.0	67.8
Myself (through finding my own information)	69.7	4.5

16. How much influence did the following groups have in teaching you about clinical therapeutics in GEMP III and IV		
	%P	%N
GEMP I PBL facilitator	1.1	73.0
GEMP II PBL facilitator	1.1	70.5
Intern	36.0	16.9
Registrar	80.7	2.3
Senior doctor	60.7	3.4
Consultant	50.0	4.5
Pharmacology lecturer	13.6	47.7
Pharmacist	2.2	70.8
Nurse/ Midwife	6.7	48.3
Peers (students in your class)	18.0	24.7
GEMP students in a higher class	10.1	65.2
Myself (through self-study)	68.6	2.3

	%P	%N
17. Doctors are the most qualified health professionals to prescribe medication	47.7	26.1
18. There is an easily identifiable department which co-ordinates pharmacology deliveries in the GEMP course	41.6	58.4
19. There is an easily identifiable department which co-ordinates the therapeutics and prescribing aspects of the GEMP course	5.6	94.4

20. How much do you agree (or disagree) with the following		
	%P	%N
Patient counselling is part of rational prescribing	83.3	8.3
My handwriting is easy to read	94.1	1.2
Guidelines are available for rational prescribing for all patients	50.0	30.5
I expect to be contacted each time I make a prescribing mistake	76.2	9.5
Serious prescribing errors that may harm a patient are dealt with in a constructive manner on the wards	33.3	25.0
Students are blamed for making mistakes in prescribing, particularly if the patient is harmed	9.6	50.0
I have personally witnessed an ADR (adverse drug reaction) which lead to patient morbidity or mortality	39.3	41.7
I have personally witnessed a Drug interaction which lead to patient morbidity or mortality	23.8	48.8
I learn about safe prescribing by copying orders written by more experienced (qualified) doctors	72.6	15.4
Poor handwriting is a common cause of medication errors	66.7	13.1
It is the doctor's responsibility to choose a medicine which the patient can afford	53.6	23.8

23. I use the following resources to inform my prescribing choices		
	%P	%N
Pubmed	19.1	50.0
Google	37.3	39.8
Wikipedia	22.7	59.5
Online medical school resources (e.g. science direct/ electronic text books)	11.9	69.1
Textbooks in GEMP PBL rooms	7.3	79.2
My own copy of SAMF	80.5	12.2
My own copy of EDL (essential drugs list)	67.4	14.5
Koda-Kimble from the library (Applied Therapeutics)	0.0	97.6
DiPiro from the library (Pharmacotherapy)	1.2	94.0
Other books from the library	3.9	76.9

24. How much do you identify with the following opinions		
	%P	%N
Pharmacology involves learning lists of effects and adverse effects	67.9	27.4
A good knowledge of physiology can help you to figure out how drugs work	85.7	6.0
Pharmacology knowledge builds on itself (knowing one basic fact can help you to learn other related info)	69.9	14.5

QUALITATIVE ANALYSIS OF QUESTIONNAIRE DATA

The following themes predominated in the “free-text” responses to the listed questions:

TABLE C1: THEMES FROM FREE-TEXT RESPONSES		
Question		Themes
10	Relating to prescribing learning experiences. Comments:	Insufficient assessment Sequencing of basic pharmacology in the curriculum Transfer of pharmacology knowledge to prescribing (lack) Practising prescribing skills
13	Best learning experience in relation to prescribing?	Practice enables learning Integration of theory with practice Importance of senior guidance
14	Worst learning experience in relation to prescribing?	Lack of confidence to prescribe Fear of error Lack of supervision Identity- interprofessional interaction
17	Doctors are the most qualified health professionals to prescribe medication	Professional identity Modelling Experience Interprofessional- nurses, pharmacists Multidisciplinarity
21	What would you do if you thought that a qualified doctor had made a prescribing error for one of your patients?	Hospital hierarchy Non-confrontational approach Action / inaction
22	What would you do if you realised that you had made a prescribing error?	Ask advice Act asap Learn from mistake Query about telling the patient Affective responses
23	Other resources	Patient files (trends) Internet medical sites Senior doctors
25	Keeping up with evidence-based prescribing and new drugs after graduation?	Journals Internet / medical websites SAMF (NB!) Colleagues CDP meetings Pharmaceutical companies Negative responses
26	Other comments about learning how to prescribe.	Pre-clinical knowledge is easily forgotten Need more RPS training in GEMP 3 and 4 Need more assessment of RPS Student formulary Practical learning opportunities

Appendix D: Table D1: Classification of Prescribing Examination Questions according to the SOLO Taxonomy and Blooms's Revised Taxonomy.

TABLE D1: CLASSIFICATION OF PRESCRIBING EXAMINATION QUESTIONS ACCORDING TO THE SOLO TAXONOMY AND BLOOMS'S REVISED TAXONOMY.					
Exam Paper	Question Number	SOLO Classification	Bloom's Knowledge Dimension	Blooms Cognitive Dimension	Class % correct
P1	9	Relational	C: Procedural	5: Evaluate	81.58
P1	10	Relational	C: Procedural	5: Evaluate	84.21
P1	18	Multistructural	C: Procedural	4: Analyse	40.79
P1	19	Multistructural	C: Procedural	4: Analyse	58.55
P1	20	Unistructural	A: Factual	1: Remember	96.05
P1	21	Relational	B: Conceptual	2: Understand	98.68
P1	22	Unistructural	A: Factual	1: Remember	55.92
P1	23	Unistructural	A: Factual	1: Remember	92.76
P1	24	Unistructural	A: Factual	1: Remember	88.82
P1	25	Unistructural	A: Factual	1: Remember	80.26
P1	26	Relational	C: Procedural	3: Apply	93.42
P1	27	Relational	B: Conceptual	2: Understand	93.42
P1	28	Multistructural	B: Conceptual	2: Understand	57.24

TABLE D1: CLASSIFICATION OF PRESCRIBING EXAMINATION QUESTIONS ACCORDING TO THE SOLO TAXONOMY AND BLOOMS'S REVISED TAXONOMY.

Exam Paper	Question Number	SOLO Classification	Bloom's Knowledge Dimension	Blooms Cognitive Dimension	Class % correct
P1	29	Relational	C: Procedural	3: Apply	76.32
P1	30	Multistructural	A: Factual	1: Remember	19.74
P1	31	Multistructural	A: Factual	1: Remember	67.76
P1	32	Unistructural	A: Factual	1: Remember	79.61
P1	33	Unistructural	A: Factual	1: Remember	94.08
P1	34	Unistructural	A: Factual	1: Remember	99.34
P1	35	Multistructural	A: Factual	1: Remember	98.03
P1	36	Unistructural	A: Factual	1: Remember	95.39
P1	37	Unistructural	A: Factual	1: Remember	58.55
P1	38	Multistructural	A: Factual	1: Remember	85.53
P2	16	Relational	C: Procedural	4: Analyse	48.68
P2	17	Relational	A: Factual	1: Remember	67.76
P2	22	Unistructural	C: Procedural	5: Evaluate	90.79
P2	23	Unistructural	C: Procedural	4: Analyse	79.61

TABLE D1: CLASSIFICATION OF PRESCRIBING EXAMINATION QUESTIONS ACCORDING TO THE SOLO TAXONOMY AND BLOOMS'S REVISED TAXONOMY.

Exam Paper	Question Number	SOLO Classification	Bloom's Knowledge Dimension	Blooms Cognitive Dimension	Class % correct
P2	25	Multistructural	B: Conceptual	5: Evaluate	76.97
P2	33	Unistructural	B: Conceptual	5: Evaluate	50.66
P2	38	Relational	B: Conceptual	5: Evaluate	34.21
P2	39	Relational	B: Conceptual	5: Evaluate	37.5
P2	40	Multistructural	C: Procedural	5: Evaluate	78.95
P2	41	Unistructural	C: Procedural	5: Evaluate	14.47
P2	48	Relational	B: Conceptual	5: Evaluate	96.71

APPENDIX E:

TABLE E1: LEVELS APPLIED IN DESIGNATION OF THE RESPONSES REQUIRED ACCORDING TO THE SOLO TAXONOMY			
SOLO Level	Description of Response.	Requirements	Examples
Prestructural	Unorganized and unstructured –bears no relation to the question	Students use inappropriate, invented or incorrect data in their answers	No items in the exam matched this level
Unistructural	Simple and obvious connections between pieces of information	To answer the question, students need the knowledge of only one piece of information that they can get directly from the problem	Recognize the antidote to paracetamol poisoning from a given list of antidotes
Multistructural	A number of connections are made, but no implications are drawn	Students need to use more than one piece of given information to answer the question, but they do not integrate the ideas	Recognize a drug from a given list that is antidepressant and also reduces craving in smokers who are trying to stop
Relational	The significance of how the various pieces of information relate to one another is recognized	These questions require students to integrate more than one piece of given information. At least 2 separate ideas are required that, working together, will solve the problem	Choose the <u>most</u> appropriate therapy from a list of 5 options (which could all be true to some extent) on the basis of information supplied in a clinical vignette
Extended-Abstract	Connections are made beyond the scope of the problem – learning is transferred to new situations	The items require the student to go beyond the given information to deduce a more general rule	No items in the exam matched this level

TABLE E2: CRITERIA USED IN THE CODING OF EXAM QUESTIONS ACCORDING TO BLOOM'S TAXONOMY: THE KNOWLEDGE DIMENSION.

Knowledge Dimension	Requirements	General examples	Examples from the exam paper
Factual	For these items, the student is required to identify intrinsic (basic) information required to solve a problem in a discipline	- terminology - particular details	From the given list of antihypertensive drugs, identify which drug: i. increases the risk of an acute attack of gout
Conceptual	These questions require students to recognise the inter-relationships among the basic elements that enable them to function within a larger structure	- classification - principles and generalisations - theories, models and structures	Which group of drugs can cause respiratory depression in a neonate when given to the mother during labour?
Procedural	Usually this is practical knowledge where a student is required to demonstrate how to do something. In this context, students are required to apply criteria for using skills, algorithms or techniques	- subject-specific skills and algorithms - techniques and methods - criteria for determining when to use appropriate procedures	From information in a medicine package insert, choose an appropriate dose and dosage interval to treat a child (given his age and weight).
Metacognitive	Such questions require demonstration of self-awareness of personal cognitive processes and the learning process in general	self-knowledge	No items in the exam matched this level

TABLE E3: CRITERIA USED IN THE CODING OF EXAM QUESTIONS ACCORDING TO BLOOM'S TAXONOMY: THE COGNITIVE PROCESS DIMENSION.

Cognitive Process Dimension	Requirements	General examples	Examples from the exam paper
Remember	Questions require retrieval of knowledge from memory	• recognise • recall • list • identify • tabulate	Recognize a drug used in treatment of tuberculosis from a given list of drugs
Understand	These questions require students to determine the meaning of instructional messages, concepts or terms	• interpret • infer • explain • compare	Recognise that the instruction "4 divided doses" equates to the dosage frequency : 6 hourly
Apply	These questions require students to use information in a new context or predict an outcome using several pieces of information or concepts	• implement • execute • calculate • experiment	Calculate the volume of reconstituted injection that must be administered with each dose (when given the standard dose in mg/kg and the child's weight)
Analyse	These questions require students to break material into its constituents and detect how these components relate to each other and to the process as a whole	• differentiate • organise • attribute	Link the list of hormonal contraceptives with their most likely clinical uses: i. Emergency contraception
Evaluate	These questions require students to make judgements based on criteria and standards. (Information is assessed relative to its support of an argument)	• assess • check • critique • conclude	Select appropriate treatment on the basis of more than 3 pieces of information in a clinical vignette. (e.g. treatment of colic in a baby)
Create	Such questions require the combination of elements to generate an original product or coherent whole.	• generate • produce • compose	No items in the exam matched this cognitive process dimension