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# INTERNATIONAL JOURNAL OF CLINICAL SKILLS



**A Peer Reviewed International Journal for the Advancement of Clinical Skills**  
- *'docendo ac discendo'* - *'by teaching and learning'*



In this issue:

Should surgical training start with the medical student?

Lend me your watch and I'll tell you the time...

Effectiveness of online clinical skills education

Transferring hand hygiene skills to clinical practice

Examination of the gastrointestinal system

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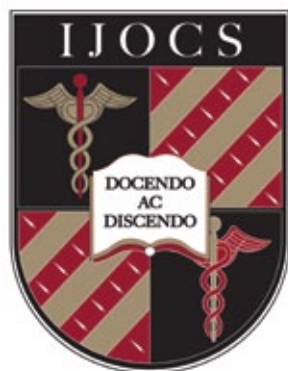
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The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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# Foreword

## Surviving the Global Economic Crisis in the World of Clinical Skills

After a tremendously successful beginning, the International Journal of Clinical Skills (IJOCS) has had the pleasure of bringing together the international clinical skills community. Throughout 2008 the extremely positive response from both students and teachers has demonstrated the need for this quality peer reviewed Journal, whose remit is not only to publish research, but also to provide a centre point in the world of clinical skills.

The variety of papers published in IJOCS to date is in itself unique, many of which have been changing the way all healthcare professionals practice within the clinical arena. Only time will tell whether such change does ultimately lead to improved patient outcomes and quality healthcare; however, the remarkable feedback received from the many doctors, nurses and other professionals who read the IJOCS, encourages us to continue developing this exceptional resource.

As 2009 begins, countries all over the globe face what may be the worst economic outlook since the 1950's, hence it is prudent not only to be conscious of our spending habits, but also to consider how this may impact the teaching and learning of clinical skills – a vital part of healthcare. Many healthcare institutions have had to significantly reduce their educational budgets, which no doubt has a detrimental impact on the training of all professionals. Moreover, it is important not to lose sight of the fact that quality healthcare delivery is required to maintain healthy nations, which, in turn, can reduce financial burden.

Following the global financial crisis, the in-house publishing company for the IJOCS (SkillsClinic Ltd) has decided to launch the website [www.clinitube.com](http://www.clinitube.com) in 2009. This will be a free website where professionals will not only be able to download clinical skills guidelines (the aim of the originally proposed Clinical Skills Lab – CSL), but also upload their own information and files onto [clinitube.com](http://clinitube.com) so that other professionals can share these materials for free. At a time when resources are limited, [clinitube.com](http://clinitube.com) will build an online community for the sharing of much needed resources.

In addition to our colleagues at [clinitube.com](http://clinitube.com), the IJOCS will continue to publish many articles which present novel research and offer readers comprehensive guidance on a variety of clinical skills subject areas, including effective teaching methodology. We hope our readers take advantage of this knowledge by disseminating the information, putting it into practice and benefiting from the numerous incentives.

We reflect with much enthusiasm, for what the IJOCS has achieved so far and look forward to what has begun.



**Dr Alison Anderson**  
**Executive Editor**  
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# Teaching and learning of electrocardiography (ECG) monitoring in an undergraduate nursing program

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## Keywords:

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Nursing student

## Abstract

**Introduction:** Electrocardiographic (ECG) monitoring is a complex but vital skill for nurses and other health professionals to be competent at. It involves being able to relate anatomical and physiological concepts, competently perform the monitoring, and interpret resulting traces.

**Objective:** This study explored the effectiveness of current teaching and learning approaches to ECG monitoring in one Australian School of Nursing, and sought to explore the skill components that students perceive to be the most difficult.

**Design:** A written questionnaire was used to explore a range of aspects relating to the teaching and learning of ECG monitoring.

**Setting:** The study was conducted at a School of Nursing at one campus of an Australian university.

**Students:** One hundred and twenty three second year nursing students volunteered to participate in the study.

**Main outcome measures:** Quantitative data was analysed using SPSS v. 14.0 using descriptive statistics and t-tests, while qualitative data was analysed thematically.

**Results:** These indicated that current teaching and learning approaches resulted in significant increases in students' knowledge and skill around ECG monitoring. Further practice was viewed as vital to development of confidence in performing the skill.

**Conclusion:** ECG monitoring is complex and requires different types of learning. Theoretical sessions, clinical skills laboratories and clinical practice all play a role in facilitating effective learning and confidence in competently performing this skill and interpreting findings.

## Introduction

The skill of performing electrocardiograph (ECG) monitoring is a complex one that requires sound knowledge of anatomical and physiological concepts and critical thinking and problem solving skills. Of particular importance are:

- Relating anatomical and physiological concepts to skill application
- Correctly and competently performing the skill
- Understanding and managing the function of the ECG machine
- Interpreting ECG findings, including identifying reportable outcomes

Hence, it can be a difficult skill for students to acquire. Undergraduate nursing students are expected to master this skill in their educational preparation and competently perform it in clinical practice.

## Background

Nurses are commonly responsible for ECG monitoring in clinical settings. Clear understanding of correct practice and interpretation skills are vital. Teaching of the skill in the

education setting traditionally involves both the delivery of theory through lecture delivery, and practice in clinical skills laboratories [1]. However, concepts surrounding this skill can be difficult to learn where explanations are unclear and opportunities for real practice are not available [2]. Jang et al [3] argue that nursing students have difficulty with ECG interpretation when this is delivered in a lecture format. Other methods have been reported as being used to facilitate ECG interpretation such as self-directed [4] and web based learning [3].

In a study to explore paramedic's approaches to ECG interpretation, O'Donnell and Lawson [5] found that students engaged in a range of cognitive, affective and practical applications. These included the use of visualization. The authors concluded that students could improve their knowledge around ECG if they increased their cognitive information processing. However, while research exists in the area of ECG interpretation, little exists around teaching and learning of the psychomotor and other cognitive aspects of ECG monitoring.

## Methods

This study sought to evaluate the teaching and learning of ECG monitoring for undergraduate nursing students at one Australian university. Being a complex skill for students to master, it was deemed important to understand whether existing teaching approaches work effectively. In doing so, it was anticipated that aspects that were found to be particularly difficult for students could be identified, and new or modified teaching approaches developed. Ethical approval to conduct the evaluation was obtained from the relevant university ethics committee.

A questionnaire was developed that identified the different components of required knowledge and skill for successful mastery of the skill and interpretation of readings. Students were asked to rate their perceived knowledge and skill level prior to, and following, the theory and practice sessions. In addition, students were asked to rate their confidence in performing the skill in clinical practice following the educational preparation. Opportunities were also provided for students to add qualitative comments that would enhance data interpretation. Students were invited to participate in the study during one of their scheduled classes. It was emphasized that participation in the study was voluntary and would not influence their final grade in the unit. Consent was implied by the completion of the questionnaire.

Quantitative data from the questionnaires was entered into SPSS Version 14.0. A combination of descriptive statistics and t-tests were performed. Qualitative data was analysed using thematic analysis to draw out relevant themes.

## Results

In total, 123 students undertaking the second year Bachelor of Nursing unit, in which ECG monitoring is taught, agreed to participate in the study. This represented 94.6% of the total available pool of students. In the first part of the questionnaire participants were asked to rate their knowledge and skill for

components prior to, and following, the teaching sessions on a series of Likert scales. Paired t-tests were performed to elicit whether the sessions led to significant change in each component. Table 1 demonstrates highly significant findings in all identified components of the ECG monitoring, indicating that participants perceived increased knowledge and skills following the sessions.

Table 1: Pre and post session perceived knowledge and skill

Component	t value	df	Sig. (2-tailed)
Identifying indications for ECG	-14.246	121	0.000
Explaining procedure to a patient	-12.371	121	0.000
Positioning the patient	-12.500	120	0.000
Understanding conduction system of the heart	-9.133	121	0.000
Understanding which parts of the heart each lead monitors	-16.989	121	0.000
Identifying anatomical landmarks	-10.416	121	0.000
Correctly placing ECG leads	-15.380	121	0.000
Attaching ECG leads to skin	-14.250	121	0.000
Checking paper speed	-15.220	121	0.000
Calibrating machine according to manufacturer's instructions	-10.653	120	0.000
Understanding how the machine works	-13.338	121	0.000
Problem solving machine issues	-12.704	120	0.000
Identifying components of the normal ECG wave	-15.580	121	0.000
Recognizing sinus rhythm	-13.887	121	0.000
Recognizing when a rhythm is not normal	-15.437	121	0.000

On a Likert scale, participants were also asked to rate how difficult they perceived each of the skill components following the teaching sessions. Table 2 presents the findings; it is particularly noteworthy those aspects that were perceived to be most difficult: either related to the machinery itself, or aspects requiring application of anatomical knowledge, such as correct lead placement. Of least perceived difficulty, were practical aspects such as patient positioning, explaining the procedure, attaching leads, and recognizing sinus rhythm.

Table 2: Perceived level of difficulty following theoretical and practice sessions

Component	Mean	SD
Identifying indications for ECG	1.9472	0.83424
Explaining procedure to a patient	1.7683	0.81994
Positioning the patient	1.5430	0.88180
Understanding conduction system of the heart	2.2684	0.83824
Understanding which parts of the heart each lead monitors	2.4736	0.90071
Identifying anatomical landmarks	2.2459	0.92383
Correctly placing ECG leads	2.0996	0.91141
Attaching ECG leads to skin	1.7033	0.90215
Checking paper speed	2.5430	0.95816
Calibrating machine according to manufacturer's instructions	2.8963	1.03322
Understanding how the machine works	2.3943	0.82047
Problem solving machine issues	2.9549	1.01640
Identifying components of the normal ECG wave	1.8760	0.86447
Recognizing sinus rhythm	1.6484	0.90016
Recognizing when a rhythm is not normal	1.7520	0.93075

Finally, participants were asked to rate their level of confidence in performing ECG monitoring in clinical practice. A Likert scale was used where 1 represented not confident to 5 very confident. The findings suggested that participants were only "fairly confident" (mean = 3.02, S.D = 0.802) prior to undertaking the skill in practice. Room for qualitative comment was provided with this question. Seventy students (57%) indicated in the qualitative section that they required more practice to increase their confidence levels.

## Discussion

ECG monitoring is a complex skill for nurses to master, requiring a set of different knowledge and skill components. Much of the existing literature around ECG monitoring and education relates to ECG interpretation [1, 2, 3, 4] however, as this study highlights, this is only one part of a much larger skill set. The current study used traditional approaches to teaching (lecture and clinical skills laboratory) but still resulted in significant knowledge and skill development. Supplementation with additional approaches, such as self-directed [4] and web based learning [3], may further enhance learning outcomes but has not been explored in this study.

There were differences in the perceived level of difficulty of skill components. Of most difficulty were those that required application of anatomical and physiological knowledge, or related to operation of the machinery such as correct lead placement.

Using strategies to promote visualization, as suggested by O'Donnell and Lawson [5], may be useful teaching strategies for promoting the former. With regard to the latter, more emphasis on operation of the machine during the clinical skills session may improve students' knowledge and skill in this area.

As may be expected, the participants rated their confidence level relatively low. While they may have been able to perform ECG monitoring on 'real' people, the skill was yet to be practiced in a clinical practice setting. It is expected that this would have a significant impact on confidence levels. Overall, the study findings imply that ECG monitoring is a skill that requires a range of different teaching and learning approaches for sound learning outcomes. However, while a complex set of knowledge and skill is required for successful learning of the skill, limited research has been done around this. More studies are required that explore factors influencing skill acquisition and effectiveness of different teaching and learning approaches.

## Conclusion

ECG monitoring is complex and requires different types of learning. There is certainly more to it than purely interpretation of findings. Some aspects are more difficult for students to master early than others. Theoretical sessions, clinical skills laboratories and clinical practice all play a role in facilitating effective learning and confidence in competently performing the skill of electrocardiography and interpreting findings.

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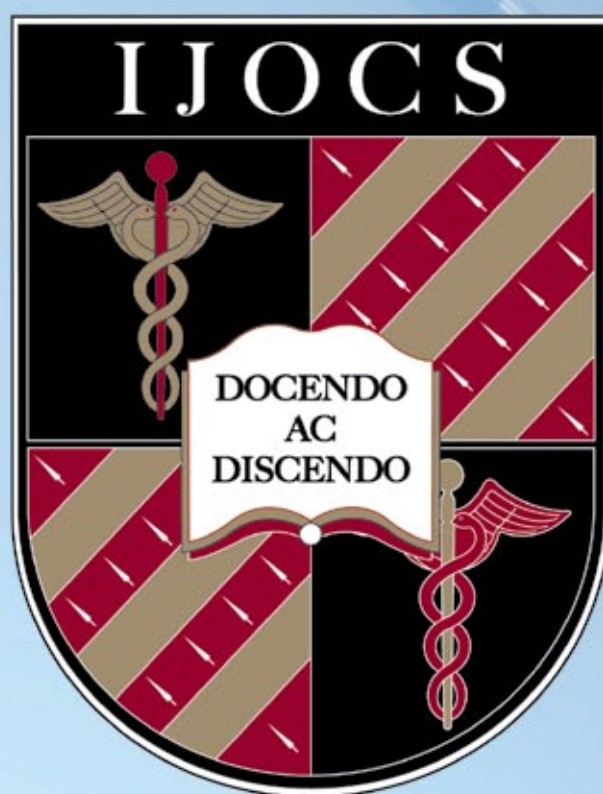
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# Clinical Skills Lab (CSL)



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- History taking skills
- Communication skills
- Clinical examination/interpretation skills
- Practical skills

Not only will this valuable resource provide material to students as a learning tool and revision aid, for example, OSCEs, it will also offer educational materials for teachers from all disciplines, allowing some standardisation of practice. The Clinical Skills community will also be encouraged to contribute, making this database interactive.

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