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*"The bird of paradise alights only upon the
hand that does not grasp."*

John Berry (1635 – 1689)
British soldier

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Emergency Medicine Residency Programme in Singapore—Where Are We at Since Inception?

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It has been 4.5 years since the Accreditation Council for Graduate Medical Education (ACGME-I) accredited competency-based emergency medicine residency programmes were started in July 2010 in Singapore.¹

The transit from a time-based curriculum to a competency-based curriculum, which centres on the 6 ACGME-I core competencies of 'medical knowledge', 'patient care', 'professionalism', 'interpersonal and communication skills', 'systems-based practice', and 'practice-based learning and improvement', has led to a significant change in the curriculum and evaluation. In addition to passing high stake summative professional exams (medical knowledge) and being competent in patient care, residents are taught the principles of patient safety and cost-effectiveness in the context of the entire healthcare delivery (systems-based practice) and they are involved in quality improvement projects (practice-based learning and improvement) with emphasis on evidence-based practice. Not only does the resident demonstrate his engagement in self-improvement through reflective logs, he is also taught how to facilitate the learning of others as teachers to junior learners (practice-based learning and improvement).

Concurrent with this change, the faculty have also seen and benefitted from a series of faculty development programmes since the introduction of ACGME-I accreditation.

The emergency medicine residency programme is a 5-year programme consisting of 3 years of junior residency followed by an intermediate exam before progression to another 2 years of senior residency. The intermediate exam for emergency medicine has historically been a conjoint exam with the British colleges. However, since 2014, the conjoint exam has been discontinued and the local MMed (A&E) will be the only recognised exam for progression to senior residency with effect from 2016.

The 3 sponsoring institutions are currently accredited by ACGME-I to take a combined total of 24 emergency medicine residents a year. From the launch of residency programme in 2010 to 2014, a total of 102 emergency

medicine residents have been matched to the 3 emergency medicine programmes, averaging about 20 residents per year over the last 5 years. Half of these matched positions were offered to fresh graduates from medical schools. This is a significant increase compared to the old training system where on average 10 trainees per year were selected to start emergency medicine training for the 5-year period prior to residency (2005 to 2009), and all of these positions were only offered to medical officers after their second postgraduate year onwards. For our country, the 2 times increase in the number of emergency medicine training positions offered augments well to meet the shortage of trained emergency physicians required to adequately manage the increasing workload and improve patient care. It was estimated in 2011 that the staffing in emergency departments by trained emergency physicians in Singapore needed to be increased by 3.3 times.²

Does the increase in number of emergency medicine training positions taken up reflect an increase in the popularity of emergency medicine as a career option for young doctors nowadays? Perhaps. Or perhaps, now that students can enter directly into emergency medicine residency upon graduation, their interest in emergency medicine as a student is allowed to be developed further and not lost as they rotate to various postings. Whether this interest is real or based on a naiveté of a medical student looking at the excitement of the emergency department through tinted glasses is always a concern and challenge for the selection panel in selecting students for entry into emergency medicine residency. The evaluation of the aptitude of the student for the emergency medicine specialty is also limited compared to a medical officer who has had the opportunity to work in the specialty for a full 6 months. The difference in the perspective towards the career choice of a student and that of a medical officer, who has transited to the working adult life, is often underestimated.

On the other hand, the early intake of students into residency offers the potential to shape their values in their

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first formative years. Unlike their counterparts in the old training system who did not belong to any hospital in the first 3 years of their Basic Specialist Training (BST), every emergency medicine resident is “owned” by a sponsoring institution and their respective emergency medicine programme from day 1. The opportunity to inculcate the values and ethos of the specialty as well as of the institution in which they will ultimately work in has significant positive implications in the training of a specialist.

The emergency medicine resident today is eligible for entry into training 2 years earlier than his counterpart under the old training system, and the training duration has also been shortened from 6 to 5 years compared to a decade ago. What this translates into is that a newly promoted associate consultant in emergency medicine today could be as young as in his 6th postgraduate year, compared to the old system where he would be at least in his 8th postgraduate year because of a later start, or in his 9th postgraduate year before the training was shortened to 5 years.

A difference of 3 years of clinical experience seems significantly huge and for a specialty like emergency medicine where knowledge in the breadth of medicine is required in your daily work and where clinical experience is a valued commodity, there is no doubt that it will have some bearing on the confidence in clinical judgment.

On the other hand, it is not to be assumed that the old system of putting the trainee through longer duration of training is necessarily superior because it was an opportunistic learning journey with a “hit and miss” outcome.

While there was a similar structure of log books and supervisory framework of named supervisors in the past, the weakness lies in its execution – the log books were reviewed without longitudinal accountability, deficiencies were not picked up in a timely manner and hence the trainee struggled to pass exams, remediation were often too little too late with no single department or person being accountable for the trainee. The Specialist Training Committee (STC) provided a distant oversight. Those who struggled to pass summative exams continued to “float” from posting to posting.

The emergency medicine resident today finds himself under the care of supervisors dedicated to help plan and navigate their learning journey. In return, the resident is held accountable to a tighter rein on their milestone progression, and it comes with timely feedback and early remediation of deficiencies, sometimes pre-emptively because of the benefits of a mentoring relationship. This rapid transformation in the postgraduate learning environment is in no small part attributable to a revamp of postgraduate training leadership in the hospitals as a result of the ACGME-I accreditation, as well as the funding support by

Ministry of Health which allow trainers to have protected time for the educational activities.¹ All the programme directors come under the leadership of the designated institutional official in each sponsoring institution, and this has created a community of educators who not only collaborate to support the teaching across programmes, but also of themselves as educators.

Our strive is to ensure that the selection of residents (substrate) is robust, the training programme (intervention) is structured in a way to ensure consistent quality of specialists produced, and that the safety nets are tight in picking up and remediating the weak residents (rescue) so as to decrease casualties in training (wastage). We, as a fraternity, must take the lead in evaluating the impact of these changes on the quality of training and the emergency medicine specialists we produce.

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Are Medical Students' Views of an Ideal Physician Eroding? A Study on Perceived Qualities of a "Role Model" Doctor Before and After Housemanship and between Two Cohorts Five Years Apart

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Abstract

Introduction: This study aimed to examine the impact of housemanship and cohort effect on the perceptions of what constitutes a "role model physician" between 2 cohorts of medical students. **Materials & Methods:** Final year medical students of the Yong Loo Lin School of Medicine, National University of Singapore, from the classes of 2005 (pre- and post-housemanship) and class of 2009 (pre-housemanship) responded to an anonymous 25-statement questionnaire reflecting Fones et al's 25-item characterisation of a "role model" doctor. Qualitative data was also collected on student's perceived qualities of a role model doctor. **Results:** For the 2005 cohort pre- and post-housemanship, only 3 of the 25 items had increased in importance post-housemanship. However, when comparing the 2005 and 2009 cohorts pre-housemanship, the latter cohort placed significantly greater importance on 12 of the 25 items. Willingness to teach was identified via qualitative analysis as a new important quality of a role model doctor for medical students. **Conclusion:** The importance placed on characteristics of "role model" physicians were relatively unchanged by housemanship within the same cohort but increased with time between 2 cohorts 5 years apart. This suggests that professional standards of an "ideal" doctor expected and aspired to by medical students may not be eroding as feared by the medical profession and society.

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Key words: Exemplar, Internship, Learning, Medical education, Teaching, Views

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Introduction

Role modeling has been reported as an increasingly prominent teaching need and strategy in the field of medical education.¹ This aspect of training helps novice doctors to imbibe key values, attitudes, behaviours and ethics that define the medical profession. With the primary goal of medical education being to train "ideal" physicians, it becomes most crucial to break down the concept of what actually constitutes a good "role model" physician. Numerous studies have documented the qualities that define these "role model physicians" through perceptions of the medical students,^{2,3} residents,⁴⁻⁷ faculty,^{1,6,7} physicians^{1,8,9} and the public.¹ However, there are fears that professionalism,

humanitarianism, empathy, enthusiasm and idealism among medical students may be declining during medical school and after graduation.¹⁰⁻¹⁷ This may result in a decline in the value medical students place on qualities of a role model physician and an increasing dearth of role model physicians for young doctors and medical students to emulate. Unfortunately, there is little research on the changes in perceptions of a "role model" doctor within the same cohort or between cohorts over time.

Role model characteristics highlighted in past research have been commonly consolidated into the areas of clinical competence, teaching skills, and personal qualities.¹⁸ Fones et al examined the concept of the good doctor in respect to

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the views of faculty, physicians and the public in Singapore and found that the 25 qualities examined could be classified into 5 major domains: cognitive, conative, emotional, interpersonal, and moral-ethical.¹

The purpose of this study was to determine whether and how novice doctors' perceptions of a "role model physician" changed with housemanship within the same cohort, and whether these perceptions were different between an earlier and later cohort which were 5 years apart, using Fones et al's model.

Materials and Methods

Final year medical students from the Yong Loo Lin School of Medicine, National University of Singapore, of the classes of 2005 and 2009, responded to an anonymous hard copy 25-item questionnaire that reflected characteristics commonly associated with a "role model" physician before housemanship during their end-of-medical-school graduation ceremony in 2005 and 2009 respectively. Students from the class of 2005 repeated the medical education survey after completion of 1 year of housemanship in 2006 during their end-of-housemanship ceremony. There were no subsequent reminders to do the survey after these ceremonies because the survey was anonymous and hence, it was not possible to specifically know who had completed the questionnaire at these occasions and avoid duplicate surveys done by the same person. The main stem in the questionnaire asked, "How important are the following qualities in a good clinical role model?" and was followed by a list of the 25-item questionnaire that was directly derived from qualities associated with a "good physician," as characterised through Fones et al's 5-domain model.¹ Examples of "quality" items and their respective domains included: "is intelligent and bright" (cognitive domain), "does not mind long working hours" (conative domain), "has a positive outlook on life" (emotional domain), "is able to work well in a team" (interpersonal domain), and "respects confidentiality" (moral-ethical domain). The cognitive domain examines 8 qualities, the conative domain examines 2 qualities, the emotional domain examines 4 qualities, the interpersonal domain examines 6 qualities and the moral domain examines 5 qualities. Fones et al's 25 qualities of a role model physician were derived from qualitative interviews with doctors and medical students which suggests that the model has face validity. Items were scored by participants on a 5-point Likert scale (0 = not important, 1 = useful, 2 = important, 3 = very important, 4 = absolutely essential). We also asked participants at all 3 time points to elaborate on any of examined or new qualities they viewed as important in a "role model" physician as free text. Exemption from full institutional board review was obtained from the Institutional Review

Board of the National University of Singapore as surveys were anonymous.

Due to non-normal distribution of the data, an independent samples Mann-Whitney U test was utilised for interpretation of the results. Statistical analyses for inter- and intra-cohort assessment were conducted using Statistical Package for Social Sciences (SPSS, Version 20) and *P* values <0.05 were deemed as significant. Thematic analysis of the students' qualitative free text responses was performed and qualities viewed as important in a "role model" physician were classified according to 25 qualities examined. If there were qualities that were not part of Fones et al's 5-domain model, these qualitative responses were identified as new qualities of a "role model" physician.

Results

Amongst the class of 2005 (*n* = 208), 181 students participated in the survey before housemanship (87%) and 85 students participated in the survey after housemanship (41%). Amongst the class of 2009 (*n* = 220), 187 students participated in the survey before housemanship (85%). For both cohorts, all 25 qualities were rated at least important or greater (score of 2 or more). For the class of 2005 before housemanship, the interquartile range (IQR) of scores for all 25 items ranged from 2 (important) to 4 (absolutely essential), whereas for the class of 2009 before housemanship, the IQR of scores ranged from 3 (very important) to 4 (absolutely essential).

Before and After Housemanship in Class of 2005

Overall, there was little difference in the responses of the 2005 cohort before and after housemanship with regards to defining a "role model" physician. Responses to only 3 of the 25 statements demonstrated significant differences before and after housemanship: able to explain things clearly (cognitive domain, *P* = 0.047), not minding long working hours (conative domain, *P* = 0.036), and able to communicate in a patient's language/dialect (interpersonal domain, *P* = 0.050), as shown in Table 1. All 3 qualities increased in importance and no quality decreased in importance after housemanship.

Class of 2005 versus Class of 2009 (Before Housemanship)

However, when comparing the pre-housemanship results between the 2005 and 2009 cohorts, the latter cohort placed significantly more importance on 12 out of the 25 qualities examined: 'is intelligent and bright' (*P* < 0.001), 'keeps up to date with medical advances' (*P* = 0.003), 'able to think independently' (*P* = 0.004), 'not minding long working hours' (*P* < 0.001), 'has a positive outlook on life' (*P* < 0.001), 'emotionally stable' (*P* = 0.002), 'understanding'

Table 1. Results of the Role Model Doctor Survey of Class of 2005 (Pre- and Post-housemanship) and Class of 2009 (Pre-housemanship)

Rate the Importance of the Following Quality for a “Role Model” Doctor*	Class of 2005			Class of 2009	
	Median (IQR Score)		P Value†	Median (IQR Score)	P Value§
	Pre-HO	Post-HO		Pre-HO	
A) Cognitive					
1. Is intelligent and bright	2 (2 – 3)	3 (2 – 3)	0.274	3 (2 – 3)	<0.001
2. Keeps up-to-date with medical advances	3 (2 – 3)	3 (2 – 3)	0.488	3 (3 – 4)	0.003
3. Is able to think independently	3 (2 – 3)	3 (2 – 3)	0.996	3 (3 – 4)	0.004
4. Has an orderly and logical mind	3 (3 – 4)	3 (2 – 4)	0.397	3 (3 – 4)	0.543
5. Is decisive	3 (3 – 4)	3 (3 – 4)	0.969	3 (3 – 4)	0.798
6. Is able to separate important points from details	3 (3 – 4)	3 (3 – 3.75)	0.182	3 (3 – 4)	0.782
7. Is knowledgeable about medical matters	3 (3 – 4)	3 (3 – 4)	0.897	3 (3 – 4)	0.397
8. Is able to explain things clearly	3 (3 – 4)	3 (3 – 4)	0.047	3 (3 – 4)	0.818
B) Conative					
1. Does not mind working long hours	2 (1 – 3)	2.5 (2 – 3)	0.036	3 (2 – 3)	<0.001
2. Inclined more towards helping people than making money	3 (3 – 4)	3 (3 – 4)	0.753	3 (3 – 4)	0.701
C) Emotional					
1. Has a positive outlook on life	3 (2 – 3)	3 (2 – 3)	0.432	3 (3 – 4)	<0.001
2. Is emotionally stable	3 (2 – 3)	3 (2.75 – 4)	0.116	3 (3 – 4)	0.002
3. Is an understanding sort of person	3 (3 – 4)	3 (3 – 4)	0.604	3 (3 – 4)	0.050
4. Able to remain calm under pressure	3 (3 – 4)	3 (3 – 4)	0.958	3 (3 – 4)	0.935
D) Interpersonal					
1. Able to communicate in a patient’s language/dialect	2 (2 – 3)	3 (2 – 3)	0.050	3 (2 – 3)	0.005
2. Tries to understand the cultural beliefs of the patient	3 (2 – 3)	2 (2 – 3)	0.515	3 (2 – 3)	<0.001
3. Has a likeable personality	3 (2 – 3)	3 (2 – 3)	0.253	3 (3 – 4)	<0.001
4. Is flexible and adaptable to change	3 (2 – 3)	3 (2 – 3)	0.179	3 (3 – 3)	0.271
5. Is able to work well in a team	3 (3 – 3)	3 (3 – 4)	0.268	3 (3 – 4)	0.021
6. Is comfortable dealing with people	3 (3 – 4)	3(3 – 4)	0.437	3 (3 – 4)	0.131
E) Moral					
1. Is considerate of others’ feelings	3 (3 – 4)	3 (3 – 4)	0.881	3 (3 – 4)	0.047
2. Is willing to take time to listen sympathetically	3 (3 – 4)	3 (3 – 4)	0.728	3 (3 – 4)	0.271
3. Respects confidentiality	3 (3 – 4)	3 (2 – 4)	0.194	3 (3 – 4)	0.064
4. Is an honest person	3.5 (3 – 4)	4 (3 – 4)	0.500	4 (3 – 4)	0.360
5. Is responsible and can be trusted	4 (3 – 4)	4 (3 – 4)	0.985	4 (3 – 4)	0.566

HO: Housemanship; IQR: Interquartile range

*Items were scored by participants on a 5-point Likert scale (0 = not important, 1 = useful, 2 = important, 3 = very important, 4 = absolutely essential).

†Before and after housemanship for class of 2005.

§Between classes of 2005 and 2008 before housemanship.

($P = 0.050$), ‘able to communicate in a patient’s language/dialect’ ($P = 0.005$), ‘tries to understand the cultural beliefs of patients’ ($P < 0.001$), ‘has a likeable personality’ ($P < 0.001$), ‘works well in a team’ ($P = 0.021$) and ‘is considerate of others’ feelings’ ($P = 0.047$), as shown in Table 1. All 12 qualities increased in importance and no quality showed decreased importance within the responses of the latter cohort. Amongst the 12 qualities, the first 3 belonged to the cognitive domain, the next one to the conative domain, the following 3 in the emotional domain, the subsequent 4 in the interpersonal domain, and last one in the moral domain.

Table 2 details the students’ elaboration on the qualities of a “role model” physician classified according to the 25 qualities examined. A new quality emerged from thematic analysis and this was the ‘willingness to teach’. As this quality reflected a natural tendency to share one’s knowledge with others, we classified this new quality under the conative domain.

Discussion

When considering the Yong Loo Lin School of Medicine class of 2005, the medical student cohort showed little change

Table 2. A Qualitative Analysis of Medical Student's Perceived Qualities of a Role Model Doctor

Qualities of a "Role Model" Doctor	Illustrative Quotations
A) Cognitive	
1. Is intelligent and bright	"Good clinical skills and acumen"
2. Keeps up-to-date with medical advances	"Current with his/her medical knowledge"
3. Is able to think independently	"Knows when to treat and when not to"
4. Has an orderly and logical mind	"Able to reason objectively and logically" "Logical and good approach to problems" "Able to make logical decisions"
5. Is decisive	"Considerate to others but assertive when sure of one's own decision"
6. Is able to separate important points from details	"Can sieve out important points from details" "Filters out important details"
7. Is knowledgeable about medical matters	"Able to communicate effectively with patients and team members"
8. Is able to explain things clearly	"Able to explain complicated facts in a simple manner to patients" "Able to transmit a clear perspective on the approaches to medical problems"
B) Conative	
1. Does not mind working long hours	"Willing to sacrifice one's spare time for the patient"
2. Inclined more towards helping people than making money	"Guided by ethics and not driven by personal gains" "Puts patient's interest before own self"
3. Willingness to teach*	"Passion for teaching" "Holistic, willing and enthusiastic in imparting knowledge and skills to others" "Cares deeply about student's learning" "Dedicated to teaching of fellow staff and students"
C) Emotional	
1. Has a positive outlook on life	"Not jaded", "Positive attitude [on] the job"
2. Is emotionally stable	"[Stays] positive despite heavy workload"
3. Is an understanding sort of person	"[Is] understanding with people"
4. Able to remain calm under pressure	"Able to keep calm and cool and work under pressure"
D) Interpersonal	
1. Able to communicate in a patient's language dialect	"Able to communicate with patients and [their] families" "Able to communicate and explain effectively to the patient"
2. Tries to understand the cultural beliefs of the patient	"Understands cultural beliefs"
3. Has a likeable personality	"Is cheerful and encouraging and makes patients happier after the consultation"
4. Is flexible and adaptable to change	-
5. Is able to work well in a team	"Excellent interpersonal skills with fellow colleagues, patients and students" "Develops rapport with patients, peers, colleagues and students"
6. Is comfortable dealing with people	"Good perception of patient's problems and needs" "Good social skills"
E) Moral	
1. Is considerate of others' feelings	"Concerned about patient" "Is concerned with the patient as a whole"
2. Is willing to take time to listen sympathetically	"Gives patients enough time" "Has patience with difficult patients" "Able to provide a listening ear"
3. Respects confidentiality	-
4. Is an honest person	"Honesty"
5. Is responsible and can be trusted	"Can be trusted" "Responsible in one's duties and diligent on one's work"

*Newly identified quality.

in their characterisations of “role model physicians” before and after housemanship. This suggests that housemanship training does not considerably change a newly graduated doctor’s overall perception of a “role model” physician. Interestingly, the 3 qualities that increased in importance after housemanship (i.e. ‘able to explain things clearly’, ‘not minding long working hours’ and ‘able to communicate in a patient’s language/dialect’) probably reflected qualities that became more desirable in a doctor who is viewed as a role model during the demanding period of housemanship which involves working closely and learning from senior members of the ward team, long working hours, and closer direct interactions with patients and their families, respectively.

Although cohort responses remained relatively stable over the course of housemanship, there were differences between the responses of the 2005 and 2009 cohorts pre-housemanship. The later cohort placed significantly more importance on 12 of the 25 statements, and amongst the remaining 13 statements, no sign of decreased importance was evident between the 2 cohorts. This suggests that the level of importance placed on certain qualities vary from cohort to cohort and may even be increasing with time. The increasing importance placed on these qualities of an ideal doctor could possibly be attributed to reforms in the curriculum at the Yong Loo Lin School of Medicine between 2005 and 2009, or a cohort effect with each subsequent generation of medical students placing greater emphasis on certain qualities of a role model doctor. During the period 2005 to 2009, Yong Loo Lin School of Medicine increased the emphasis on doctor-patient communication and patient-centred medicine by introducing patient communication teaching early in the first year of medical school, increasing the weightage of these components in clinical exams and actively selecting clinical mentors who were known for their excellent interpersonal and communication skills to be teaching faculty. We hypothesise that these curricular reforms increased the later cohort’s awareness of the importance of these attributes of a good doctor. Another possible ongoing phenomenon is that with medical knowledge and complexity constantly growing, younger generations of medical students increasingly appreciate a clinical mentor who keeps up-to-date with medical advances and is able to explain complex medical topics clearly and understandably.

Regardless of which hypothesis is correct, the increasing weight placed on these qualities suggests that the professional standards of an “ideal” doctor expected and aspired by newly graduated physicians may not be eroding as feared by the medical profession and society. There have been fears that professionalism, humanitarianism, empathy, enthusiasm and idealism among medical students decline during medical school and after graduation.¹⁰⁻¹⁵ It has also

been reported that the emphasis of modern medical education on the doctor’s emotional detachment and affective distance has contributed a decline in empathy within cohorts of medical students, and possibly doctors.^{9,19-21} Our results suggest that while the decline in the ideals of a good doctor may occur within a cohort, younger generations of doctors may be increasingly recognising the importance of interpersonal skills such as understanding the perspective of patients, communicating clearly with patients and being considerate of patients’ feelings. Despite the depersonalised environment of the Internet, electronic communication and isolating technology that younger generations of medical students are immersed in, it is reassuring that they possess a growing awareness of the need for a good doctor to have interpersonal skills, and be emotionally mature and sensitive to other people’s feelings. For instance, the use of online virtual learning platforms, such as online forums, is believed to help students reflect on their peer’s contributions. This allows them to participate in higher order processing of information which leads toward collaborative thinking, a product of the students’ interactions.²² Hence, through these reciprocal communications, critical analyses and reflections in the virtual platform, it may enhance student’s awareness of qualities needed in a “role model doctor”, and perhaps our fears that future generations of doctors will become detached, emotionally stunted and depersonalised are unfounded.

We discovered numerous student descriptions which point towards willingness to teaching as an important quality in a role model doctor. Indeed, reciprocity in terms of giving back by teaching, and the ability to inspire by example and bring out the best in students were of great relevance in defining a “role model doctor” by medical students. In a sense, the “role model doctor” is akin to a master whom the student as an apprentice tries to emulate or even surpass, apprenticeship being one of the educational theories which Kenny et al has identified as underpinning role modelling as an educational strategy.²³ However, the awareness of what makes a good role model doctor is not enough, and medical students need to actually acquire and assimilate these characteristics through situated and observational learning,^{24,25} and propagate them in future generations of doctors. Hence, to ensure the successful impartation of knowledge and professional values, it is imperative that we identify and support outstanding role model doctors through measures such as protected teaching time to allow them to carry out their mentoring.¹⁷

Our study has several limitations. Firstly, the response rate for the post-housemanship survey was low at 41%. However, we do not think that there were significant differences between responders and non-responders as the latter could not attend the end-of-housemanship graduation

ceremony due to work commitments rather than voluntary refusal to participate in the survey. Secondly, as data is not available on cohorts in between those of 2005 and 2009, it is uncertain whether these differences are captured as a result of these being 2 different cohorts or whether there truly was a year-by-year increase in the importance given to these qualities in a role model physician. Lastly, although Fones et al's concept of a role model physician has never been validated as a basis of a measurement tool, our finding that the importance placed on characteristics of "role model" physicians increased with time between 2 cohorts 5 years apart suggests that the scale we created was sufficiently sensitive to detect differences between groups of medical students.

Conclusion

Housemanship did not considerably change the perceptions of a role model physician within the same cohort of newly graduated doctors. However, the importance placed on these commonly identified role model physician characteristics increased in a later cohort of younger newly graduated doctors, suggesting that the level of importance placed by medical students on certain qualities of a "role model doctor" varies between cohorts and may even increase with time. The professional standards of an "ideal" doctor expected and aspired by newly graduated physicians may not be eroding as feared by the medical profession and society.

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An Analysis of Blinding Success in a Randomised Controlled Trial of Fish Oil Omega-3 Fatty Acids

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Abstract

Introduction: Incidental reports collected in clinical trials suggest that amongst participants, omega-3 fatty acids derived from fish oil ('omega-3') may be difficult to blind. **Materials and Methods:** We conducted a systematic evaluation of blinding success in a 24-week trial of omega-3 versus an oil-based placebo. Within 1 week of supplement commencement (Week 1), a blinding questionnaire was completed by 131 children enrolled in a trial of omega-3 for the treatment of disruptive behaviour disorders. A version of the questionnaire was also completed by their parents at Week 1, and by the children at the end of supplement administration (Week 24). **Results:** Participants were unable to differentiate omega-3 from placebo, and accuracy did not improve as a function of: the confidence of guesses, reason for guesses, notice of any change, beliefs about what should change, or time. Child and parent guesses also showed high concordance. **Conclusion:** Taken together, these data provide strong evidence that the identity of omega-3 can be blinded to participants.

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Key words: ADHD, Child, Clinical trials, Psychiatry

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Introduction

There has been growing interest in the use of dietary supplementation to treat psychiatric disorders. In particular, supplementation of omega-3 fatty acids has been researched as a potential means of preventing and managing psychopathology.^{1,2} These fatty acids are ingested through dietary sources (e.g. fish), with inadequate concentrations implicated in psychiatric morbidity.² This has given rise to clinical trials that evaluate the supplementation of omega-3 fatty acids.

However, one research challenge is blinding the identity of omega-3 to participants. To evaluate efficacy, clinical trials need to assess whether supplementation results in symptomatic improvements over and above the effects of time (spontaneous recovery) and of psychological expectations associated with receiving treatment (placebo

effects).^{3,4} This is possible in trials employing placebo-controlled designs,⁵ where participants receive either an omega-3 supplement or a matching placebo without a significant active component; if successful, participants would be blind to which substance they receive, allowing researchers to isolate pharmacological effects from those of spontaneous recovery and placebo effects. This design is of particular importance for psychiatric trials, where outcomes involve a high degree of rater subjectivity.⁶

At present, it is unclear as to what extent blinding can be carried out for omega-3 fatty acids derived from fish oil ('omega-3'), as these have a strong odour and a fishy taste that are difficult to mask.^{7,8} For example, in a clinical trial for the treatment of adult bipolar disorder, Stoll et al⁹ reported a higher incidence of fishy aftertaste experienced by omega-3 than by placebo participants. Similarly, Grenyer et al¹⁰ found

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that at the end of a trial for adult major depression, 90% of omega-3 and 64% of placebo participants identified which supplement they had received; participants cited taste as the reason for their guess. Whereas both of these studies used an oil-based placebo without a fishy taste, Lesperance et al¹¹ added a fish flavour to their placebo; even so, they found that omega-3 participants experienced a fishy aftertaste more frequently than the placebo participants did. Thus, incidental reports collected during clinical trials suggest that omega-3 may be difficult to blind.

Where blinding integrity cannot be established, conclusions about omega-3 efficacy are limited. Accordingly, Liu et al⁷ called for evidence that omega-3 can be disguised to participants. Studies of this nature have been conducted for zinc gluconate and for oral antibiotics, where taste likewise was implicated in possible blinding compromise.^{12,13}

In this paper, we report a systematic analysis of blinding success in a psychiatric trial of omega-3. This was assessed in a “best-case scenario”, where fish flavour was added to the placebo (to match the omega-3 supplements by taste; following Lesperance et al).¹¹ In this analysis, we measured accuracy—participants’ ability to distinguish omega-3 from placebo—as well as possible predictors of accuracy: participants’ confidence in their guesses, the reason for their guesses, whether they noticed any change, and whether they believed anything should change. We focused on blinding data collected within a week of supplement administration, after participants had consumed the supplements but during the latency period before behavioural effects are reported.¹⁴ This was to ensure participants’ guesses were not due to actual pharmaceutical effects observed or lack thereof;^{15,16} however, we also tracked whether accuracy changed over time. Finally, while we focused on child participants who consumed the supplements, we also examined whether their guesses related to those of their parents, who were additional outcome assessors in the trial.

Materials and Methods

Participants

Participants were 131 children aged between 7 and 16, enrolled in a stratified (by age and diagnosis, with equal randomisation [1:1]), placebo-controlled trial of omega-3 and social skills training for the treatment of disruptive behaviour disorders (ClinicalTrials.gov identifier: NCT00819429). Trial procedures were approved by both institutional and hospital group review boards (CRC 240/2008; DSRB A/08/410).

All participants had been attending an outpatient psychiatric clinic (the Child Guidance Clinic) during the recruitment period of September 2009 to July 2012, and had

been diagnosed with a disruptive behaviour disorder (attention deficit hyperactivity disorder (ADHD); oppositional defiant disorder (ODD); and/or conduct disorder (CD)) through the Computerized Diagnostic Interview Schedule for Children (C-DISC). Exclusion criteria were intelligence quotient score below 70, and pre-existing brain pathology (e.g. serious head injury, epilepsy).

Following screening procedures for inclusion criteria, participants were randomly allocated to receive either omega-3 or placebo: 63 participants received omega-3, whereas 68 participants received placebo. Table 1 shows the participants’ baseline demographic and clinical characteristics.

Supplements

Omega-3 supplements were 500 mg of white-coloured soft gelatine oval capsules filled primarily with marine fish oil concentrate and 5.6 mg vitamin E (fatty acid profile: 32.9% 20:5 (n-3); 22.4% 22:6 (n-3); 6.5% 18:1; 5.8% 22:5 (n-3); ≤5% other fatty acids; and 6.4% minor components); as participants consumed 4 supplements each day, the daily dosage was 2 g of the active supplements. Placebo capsules were matched for colour, size, and texture, and were filled primarily with high oleic sunflower oil and 5.7 mg vitamin E (fatty acid profile: 74.4% 18:1 (n-9); 11.7% 18:2 (n-6); ≤5% other fatty acids including 18:3 (n-3), 18:4 (n-3), 20:5 (n-3), 22:5 (n-3), 22:6 (n-3); and 0.2% minor components). Note that the placebo contained 1.3% marine fish oil (0.8% 20:5 (n-3), 0.5% 22:6 (n-3)); this was added to provide a fish odour and taste, but at trace levels was not expected to have significant physiological effects. Both omega-3 and placebo capsules were purchased from Efamol Limited (Surrey, United Kingdom), with capsules prepared in unlabelled, unit-dose blister packs.

Table 1. Baseline Demographic and Clinical Characteristics of Participants

Characteristic	Actual Supplement Received	
	Omega-3 (n = 63)	Placebo (n = 68)
Age in years*	10.65 (1.70)	10.76 (2.05)
Gender		
Male	56	54
Female	7	14
Disruptive behaviour disorder		
ADHD	23	26
ODD/CD	6	9
ADHD and ODD/CD	34	33

ADHD: Attention deficit hyperactivity disorder; CD: Conduct disorder; ODD: Oppositional defiant disorder

*Data reported as means (standard deviation).

Participants' supplements were pre-allocated by a study administrator based on a computer-generated randomisation list. The randomisation sequence was stratified by age (7 to 12 and 13 to 16 years) and diagnosis (ADHD only; ODD/CD only; ADHD and ODD/CD), with a 1:1 allocation and a block size of 10. Following randomisation, blister packs were labelled with participants' study identifiers.

Details of each participant's group allocation were kept in a locked facility by the study administrator who was not involved in data collection; all persons involved in data collection or outcome reporting were blind to this allocation.

Blinding Questionnaire

Based on research addressing the placebo effect,^{4,17} a 5-item blinding questionnaire was created. As a preamble, printed instructions reminded participants that they had been taking 4 beige-coloured capsules every day, and that "for some people, the capsule mainly contains fish oil" (omega-3) whereas "for other people, the capsule mainly contains sunflower oil" (placebo).

The first item was a forced-choice question asking participants to guess whether they had been taking omega-3 or placebo. The subsequent 2 items asked participants to rate the confidence of their guess (on a 5-point scale anchored on one end with "1: No idea at all" and on the other with "5: Absolutely sure it's the one"; Item 2), and to state the reason for this guess (Item 3). Finally, Items 4 and 5 asked participants to describe anything that changed or happened to them after they consumed the capsule ('notice of change'; Item 4), or anything they thought should change or happen to them ('belief about change'; Item 5).

The parent version of the questionnaire was identical, except that parents were asked to guess what they thought their child had been taking (Item 1), and to report notice of or belief about changes in their child (Items 4 and 5).

Procedure

Supplement Administration

As part of the trial, participants consumed 4 capsules daily for 6 months (Weeks 0 to 24). During the first visit, caregivers were instructed to give participants 4 capsules each day—2 in the morning and 2 in the evening (before or after food); caregivers were also advised to refrigerate the capsules to reduce odours. Compliance was verified through caregivers' reports, and by requesting for used blister packaging to be returned. No enquiry was made as to participants' swallowing ability.

Blinding Assessment

Within a week of supplement administration (Week 1),

participants returned to complete the blinding questionnaire. Participants were required to respond to the questions independently, without the assistance of caregivers.

At the end of supplement administration (Week 24), participants were asked again to complete the blinding questionnaire. Additionally, at both time-points (Weeks 1 and 24), parents were contacted over the phone or in person to complete the parent version of the questionnaire.

Data Analyses

Statistical analyses were conducted using SPSS & R, with Type 1 Decision Wise Error Rate controlled at $\alpha = 0.05$. Refer to Figure 1 for a flowchart indicating the number of participants included in each analysis.

Results

Measures of Blinding Integrity

To assess blinding success, a chi-square analysis was run with actual supplement received (omega-3 vs placebo) cross-tabulated against participants' Week 1 guesses about which supplement they had received (omega-3 vs placebo). As shown in Table 2, there was no significant difference in participants' guesses as a function of actual supplement received: $\chi^2(1, n = 121) = 0.66, P = 0.42$.

As blinding integrity requires evidence for equivalence (and not merely lack of evidence for a difference), an additional 2 one-sided test was run.^{18,19} With this test, the proportion of participants who guessed that they had received omega-3 was found to be statistically equivalent—defined as less than 20% difference—amongst both groups of participants (90% CI for difference in proportion = -0.07 to 0.19).

Degree of Blinding Success

The degree of blinding success was quantified by computing: overall accuracy (number of correct guesses divided by total number of guesses), and James'²⁰ and Bang's²¹ blinding indices. As James' and Bang's indices weights responses of participants who report they "don't know" what they received, those who answered "1: No idea at all" in Item 2 (when asked how sure they were

Table 2. Participants' Guesses at Week 1 as a Function of Actual Supplement Received

Supplement Guess	Actual Supplement Received		
	Omega-3	Placebo	Total
Omega-3	50	49	99
Placebo	9	13	22
Total	59	62	121

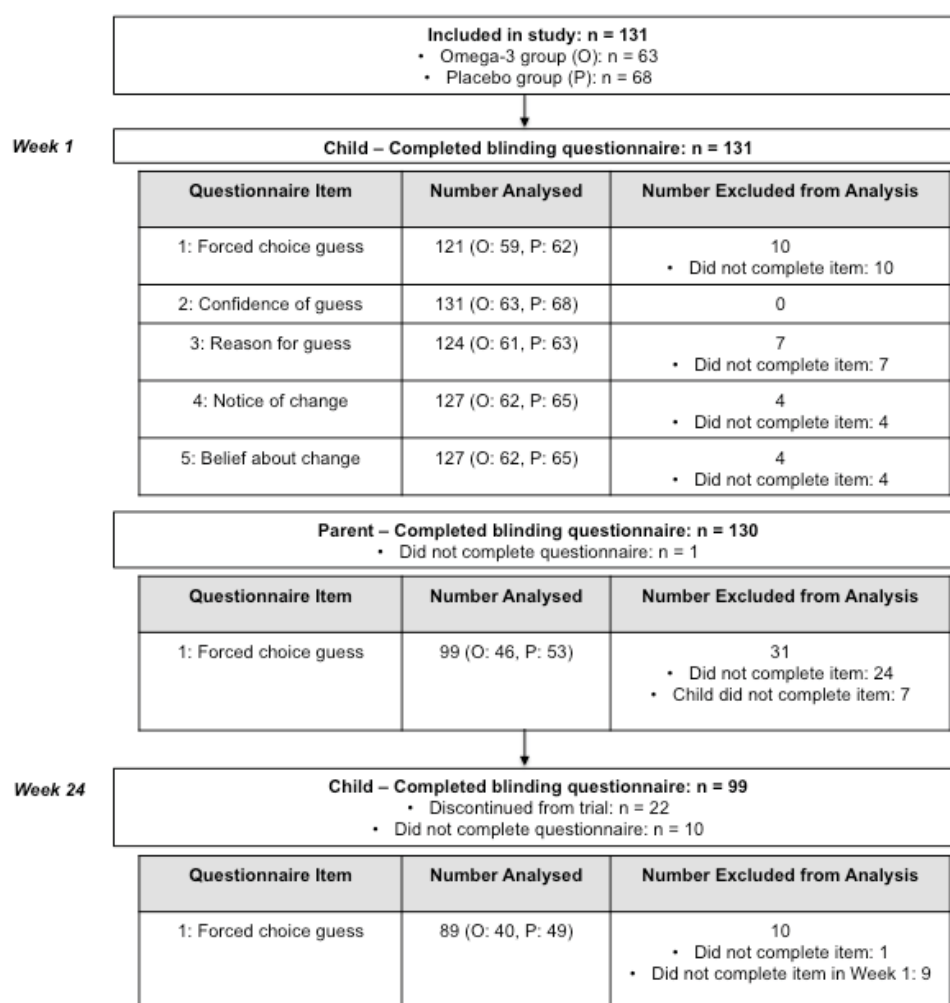


Fig. 1. Flowchart indicating the number of participants included in each analysis.

of their guesses) were scored as “don’t know”, in place of their original guess of having received omega-3 or placebo (Item 1). (Note: 10 participants did not respond to the forced-choice question (Item 1), and responded “1: No idea at all” to Item 2; these responses were scored as “don’t know” for this analysis.)

Overall, participants’ accuracy was 52.07% (95% CI, 42.84% to 61.16%)—no better than chance. James’s blinding index was 0.62 (95% CI, 0.56 to 0.69); this indicates a state between random guessing and perfect blindness.²⁰ Bang’s blinding index was 0.56 (95% CI, 0.40 to 0.71) amongst participants who received omega-3, and -0.51 (95% CI, -0.65 to -0.38) amongst participants who received placebo; as the sum of the 2 indices does not differ from 0, these highlight participants’ response bias²¹—that is, the majority of participants had guessed that they had received omega-3.

Predicting Accuracy

We further analysed whether participants’ accuracy in supplement guesses at Week 1 were related to these factors: the confidence of their guesses, the reason for their guesses, their notice of any change, and their beliefs about changes. For the open-ended questions (reason for their guesses, notice of change, beliefs about changes), a list of response categories was created for each question. Participants’ responses were then grouped into these categories by 2 independent raters—the first-named investigator (JL), and a rater blind to both study aims and participants’ supplement allocation. Inter-rater agreement was high ($\kappa = 0.80$, $P < 0.001$).

Participants’ confidence in their ratings did not differ as a function of which supplement they received: $F(1, 119) = 2.25$, $P = 0.14$; nor of whether they were wrong or correct

in their guesses: $F(1,119) = 0.61$, $P = 0.44$. Tables 3 to 5 indicate how many participants cited each response category when asked about: the reasons for their guess (Table 3), any change they noticed following supplement consumption (Table 4), and their beliefs about what should change (Table 5); for each of these factors, the distribution of response categories did not differ as a function of supplement received (largest $\chi^2 = 4.67$, $P = 0.32$).

Accordingly, a logistic regression model with participants' guesses and either one of confidence scores, reasons for guess, notice of change, or belief about change did not significantly predict the actual supplement participants were given (largest $\chi^2 = 1.07$, $P = 0.59$).

Accuracy Over Time

To track accuracy over time, we cross-tabulated participants' guesses at Week 1 versus those at Week 24 (Table 6). There was a significant relation between guesses at both time-points ($\chi^2(1, n = 89) = 13.03$, $P < 0.001$), with 83.1% of guesses unchanged; accuracy did not change as a function of time (McNemar's $\chi^2 = 0.27$, $(1, n = 89)$, $P = 0.61$).

Child-parent Guesses

Finally, Table 7 provides a count of participants who guessed that they received omega-3 versus placebo, as a function of what his or her parent guessed (both measured at Week 1). Again, there was a significant relation between the guesses of both respondents ($\chi^2(1, n = 99) = 4.77$, $P = 0.03$), with 75.8% of guesses identical.

Table 3. Reason for Participants' Guesses as a Function of Supplement Received

Reason for Guess*	Actual Supplement Received	
	Omega-3	Placebo
Odour or taste		
Smells or tastes fishy	17	21
Does not smell or taste fishy	4	5
Smell or taste (unspecified)	14	12
Appearance or texture	2	4
Behavioural differences		
Behavioural differences observed	0	1
No behavioural differences observed	2	0
Other comment about behavioural difference	1	1
Someone told them so	9	8
Unsure/guessing	11	9
Others	1	2

*Responses from participants who made a guess ($n = 121$).

Table 4. Participants' Notice of Change as a Function of Supplement Received

Nature of Change Noticed*	Actual Supplement Received	
	Omega-3	Placebo
Concentration- or academic-related	10	7
Behaviour-related	4	6
Physical change	5	3
Unsure/unable to explain	0	2
Others	3	1

*Responses from participants who reported noticing change ($n = 41$).

Table 5. Participants' Beliefs about Change as a Function of Supplement Received

Nature of Belief about Change*	Actual Supplement Received	
	Omega-3	Placebo
Concentration- or academic-related	11	15
Behaviour-related		
Social or emotional	3	3
Other behaviours	6	2
Unsure/unable to explain	1	4
Others	2	1

*Responses from participants who reported a belief that something should change ($n = 48$).

Table 6. Participants' Guesses at Weeks 1 versus 24

Supplement Guess at Week 1	Supplement Guess at Week 24		
	Omega-3	Placebo	Total
Omega-3	67	7	74
Placebo	8	7	15
Total	75	14	89

Table 7. Participants' Guesses versus Parents' Guesses (at Week 1)

Participants' Guess	Parents' Guess		
	Omega-3	Placebo	Total
Omega-3	68	13	81
Placebo	11	7	18
Total	79	20	99

Discussion

The current study was designed to examine blinding success in a psychiatric trial of omega-3. Using an oil-based placebo with a fish flavour, and assessing child participants within 1 week of trial commencement, we found strong evidence of blinding integrity. First, participants were unable to guess which supplement they had received; their accuracy was no better than chance, with most participants perceiving that they had received omega-3 regardless of actual supplement received. Parents' guesses also showed agreement with those of child participants, with a similar response bias for omega-3. Second, child participants' accuracy did not improve as a function of: the confidence of their guess, the reason for their guess, notice of any change, or beliefs about what should change. Finally, participants' guesses corresponded to those made 6 months into the trial; accuracy did not improve over time. Taken together, our findings suggest it is possible to blind the identity of omega-3 to participants. Symptomatic changes found in the trial can then be said to result from the pharmacological effects of omega-3.

Our data further highlight the importance of odour or taste in blinding omega-3, as this was the most cited reason when participants justified their guess. That many participants noticed a fishy taste—regardless of whether they actually received omega-3 or placebo—likely contributed to the observed response bias for omega-3. Nonetheless, further methodological studies are needed where blinding choices are systematically varied and participants' guesses examined; for example, it is still unclear which mode of delivery (e.g. capsule, liquid) or type of flavouring (e.g. adding fish odour to the placebo, or adding peppermint flavour to both omega-3 and placebo) best promotes blinding integrity.

Another novel feature of our data is that we assessed supplement guesses not only from participants who consumed the supplements, but also of parents, who were additional outcome assessors in the trial. We found correspondence between guesses, with parents likewise showing a response bias for omega-3.

Finally, although we report strong evidence of blinding success, it remains unclear whether our findings generalise to trials of other designs. We note that Lesperance et al¹¹ likewise added a fish flavour to their placebo, but still found that omega-3 participants experienced a fishy aftertaste more frequently than did placebo participants. (We note, however, that the supplement formulation in this trial differed from ours.) As the risk of unblinding is real, and outcomes—particularly those in psychiatric trials—may involve a high degree of subjectivity, we recommend that each trial administer our blinding questionnaire to accrue trial-level evidence.^{7,22}

Conclusion

To conclude, our study represents the first in-depth study of blinding integrity in a clinical trial of omega-3. Based on a questionnaire administered within 1 week of trial commencement, we found clear evidence that the identity of omega-3 can be blinded to participants.

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Assessment of Age in Ulcerative Colitis Patients with Ileal Pouch Creation—An Evaluation of Outcomes

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Abstract

Introduction: The aim of the study was to determine if age at the creation of an ileal pouch-anal anastomosis (IPAA) has an impact on the outcomes in patients with ulcerative colitis (UC). **Materials and Methods:** A retrospective review of all patients who underwent IPAA for UC from 1999 to 2011 was performed. Long-term functional outcome was assessed using both the Cleveland Clinic and St Mark's incontinence scores. **Results:** Eighty-nine patients, with a median age of 46 (range, 16 to 71) years, formed the study group. The median duration of disease prior to their pouch surgery was 7 (0.5 to 39) years. There were 57 (64%) patients who were aged ≤50 years old and 32 (36%) who were >50 years old. Fifty-seven (64%) patients developed perioperative complications of which 51 (89.5%) were minor. High ileostomy output (n = 21, 23.6%) and urinary symptoms (n = 13, 14.6%) were the most commonly encountered complications. The older patients were more likely to have an ASA score ≥3 and a longer length of stay. Although there was a higher incidence of complications in the older group of patients, the difference was not statistically significant. There were no significant differences in the incidence of severe complications. Forty-nine (55%) patients completed our questionnaire on the evaluation of their functional outcomes. There were no significant differences in the Cleveland Clinic and St Mark's incontinence scores between the older (n = 19, 38.8%) and younger (n = 30, 61.2%) patients. There were also no significant differences in the frequency of bowel movements during the day or overnight after sleep between the 2 groups. **Conclusion:** IPAA procedure for patients with UC can be safely performed. Long-term functional outcome is not significantly influenced by the age at which the IPAA was created.

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Key words: Continence, Function

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Introduction

A total proctocolectomy is considered the standard of care in patients with ulcerative colitis (UC). The indications for this operation in patients with UC include failure of medical treatment or dysplastic changes following endoscopic evaluation.¹⁻⁴ The timing of the surgery could hence be highly variable among patients.

An ileal pouch-anal anastomosis (IPAA) is increasingly performed following a total proctocolectomy or a completion proctectomy in these patients with the aim to preserve faecal continence and to avoid a permanent stoma.¹⁻⁴ In the past, this surgical option has largely been reserved

in younger patients due to their good health and better physiological reserves, which would then be translated to better perioperative outcomes.⁵⁻¹¹ Some surgeons also postulated that older patients' ileal pouches are less adaptable and could be associated with worse functional outcomes and quality of life over time.⁵⁻¹¹ However, several recent studies have supported the safety, feasibility and benefits of an IPAA in older patients as well.⁵⁻¹¹

With the above considerations in mind, this study was performed with the primary aim to determine if age at surgery had an impact on the perioperative outcomes in patients with UC who underwent an IPAA following a

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total proctocolectomy or a completion proctectomy. The secondary aim was to assess if age at surgery had any influence on the long-term functional outcomes in the same group of patients.

Materials and Methods

A retrospective review of all the patients who underwent an IPAA for a final diagnosis of UC from August 1999 to November 2011 in our institution was performed. Patients were identified from the hospital's operating records and all the diagnoses were confirmed histologically. The IPAA was performed following a total proctocolectomy or a completion proctectomy depending on the patients' surgical histories and clinical conditions and surgeons' preferences. Patients who were referred for pouch revision were excluded. In our institution, the pouches created were all J-shaped and all the patients had a covering ileostomy following the IPAA procedure. In this study, all the procedures were performed electively. The study protocol was approved by our Institutional Ethics Committee.

We recorded demographic information including age, gender, American Society of Anesthesiologists (ASA) score, duration of disease, indications of surgery and types of procedures. Patients who were ≤ 50 years old were defined as the "younger" group and those who were > 50 years old were defined as the "older" group. All perioperative complications were recorded and graded based on the classification proposed by Clavien et al (Table 1).¹²⁻¹⁴

Patients were then discharged to be followed up in the outpatient setting with the surgeons initially and some may choose to follow-up with their local surgeons subsequently due to the considerable distance from their home to the hospital. To assess their functional outcome following the closures of their ileostomies, a telephone interview to determine their continence status was performed between January 2012 and June 2012. After attaining their consent, the patients were asked to complete both the Cleveland Clinic and the St Mark's incontinence scores.¹⁵⁻¹⁸ Patients who had their pouch removed or had end ileostomies were excluded from this interview.

Data analysis was performed using the Fisher's exact test for categorical variables with their odds ratio (OR) and 95% confidence interval (CI) reported. Continuous variables were analysed using the Mann-Whitney U test. All analyses were performed using the SPSS 17.0 statistical package (Chicago, Illinois) and all *P* values reported are 2-sided, and *P* values of < 0.05 were considered statistically significant.

Results

During the study period, a total of 89 patients, with a

median age of 46 (range, 16 to 71) years, had an IPAA performed for UC. There were 55 (61.8%) males and 34 (38.2%) females in the study group. The median duration of disease prior to their pouch surgery was 7 (0.5 to 39) years (Table 2).

The indications for operation included failure of medical treatment and/or worsening symptoms ($n = 43$, 48.3%), dysplastic changes on endoscopic evaluation ($n = 19$, 21.3%) and referral for completion proctectomy ($n = 27$, 30.3%) following a previous subtotal colectomy. Sixty-two

Table 1. Classification of Surgical Complications¹²⁻¹⁴

Grade of Complications (GOC)	
Grade I	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions
Grade II	Requiring pharmacological treatment with drugs other than such allowed for Grade I complications. Blood transfusions and total parenteral nutrition are also included
Grade III	Requiring surgical, endoscopic or radiological intervention
Grade IV	Life-threatening complication(s) requiring ICU management (including organ dysfunction)
Grade V	Death of a patient

ICU: Intensive care unit

Table 2. Demographic Details of 89 Patients Who Underwent an IPAA Procedure for Ulcerative Colitis

	n (%)
Median age, range (years)	46 (16 – 71)
Gender	
Male	55 (61.8)
Female	34 (38.2)
Median duration of disease prior to pouch surgery, range (years)	7 (0.5 – 39)
Indication for IPAA	
Failure of medical treatment	43 (48.3)
Dysplastic changes on endoscopic evaluation	19 (21.3)
Referral for completion proctectomy	27 (30.3)
Median operating time, range (minutes)	220 (120 – 535)
Procedure performed	
Panproctocolectomy	62 (69.7)
Completion proctectomy	27 (30.3)
Technique of procedures performed	
Open	78 (87.6)
Laparoscopic	11 (12.4)
Creation of J-pouch	89 (100.0)
Creation of defunctioning ileostomy	89 (100.0)

IPAA: Ileal pouch-anal anastomosis

(69.7%) patients underwent a total proctocolectomy while 27 (30.3%) had completion proctectomy. All the patients had J-shaped ileal pouches and a covering loop ileostomy. Most of the anastomoses ($n = 87$, 97.8%) were performed using the double stapling technique and only 2 (2.2%) patients had a concurrent mucosectomy performed. Eleven (12.4%) patients had their procedures performed laparoscopically. The median operative time and length of stay were 220 (120 to 535) minutes and 10 (6 to 57) days respectively.

Although there was no mortality reported in our series, 57 (64%) patients developed perioperative complications of which 51 (89.5%) were minor in severity (GOC I and II). The details of the complications can be seen in Table 3. Notably, there were 4 patients who developed an intra-abdominal collection of which 2 of them required a radiological guided drainage. Another 3 patients underwent a relook laparotomy; 2 were for persistent small bowel obstruction, 1 due to early postoperative adhesions that was refractory to conservative management while the other had a kink just proximal to the ileostomy. The last patient underwent a relook laparotomy for suspected ischaemic gut which was normal when evaluated intraoperatively. One patient developed cardiac complications postoperatively and required an intensive care unit admission. High ileostomy output ($n = 21$, 23.6%) was the most frequently encountered complication, followed by urinary complications ($n = 13$, 14.6%).

Over a median follow-up of 7.5 (range 1 to 12) years, 5 (5.6%) patients developed pouch failure which necessitated excision of the pouch. Another 3 patients also had excision of their pouches. Two had malignancies involving the pouch that necessitated resection while the last patient opted for an end ileostomy rather than to reverse the stoma.

There were 57 (64%) patients who were ≤ 50 years old and 32 (36%) patients who were > 50 years old. When analysed between the 2 groups, the older patients were more likely to have an ASA score ≥ 3 (OR: 3.68, 95% CI, 1.31 to 10.34) and a longer length of stay (13 (6 to 57) days vs 10 (6 to 34) days) in the hospital ($P = 0.005$). Although there was a higher incidence of complications in the older group of patients (OR: 2.18, 95% CI, 0.84 to 5.68), the difference was not statistically significant. There were no significant differences in the incidence of pouch failure or the duration of the operations (Table 4).

Of the 89 patients who had an IPAA, only 49 (55%) completed our telephone interview with the aim to determine their functional outcomes. Seven (7.9%) were deceased at time of interview. The remaining 33 (37.1%) patients were either lost to follow-up, declined the interview or had a permanent stoma.

When compared with the various characteristics between

Table 3. Perioperative Outcomes of 89 Patients Who Underwent an IPAA Procedure for Ulcerative Colitis

	n (%)
Type of complication	
High ileostomy output	21 (23.6)
Urinary tract infection or acute retention of urine	13 (14.6)
Ileus	12 (13.5)
Atelectasis/pneumonia	5 (5.6)
Wound infection	4 (4.5)
Intra-abdominal collection	3 (3.4)
Relook laparotomy	2 (2.2)
Cardiac complication(s)	2 (2.2)
Septicaemia	2 (2.2)
Median length of stay following IPAA, range (days)	10 (6 – 57)
Median duration of follow-up, range (years)	7.5 (1 – 12)

IPAA: Ileal pouch-anal anastomosis

the younger ($n = 30$, 61.2%) and older ($n = 19$, 38.8%) patients, the Cleveland Clinic and St Mark's incontinence scores were comparable between the 2 groups. There were also no significant differences in the frequency of the bowel movement during the day or after sleep between the 2 groups. Table 5 describes the functional outcomes and the various components of the Cleveland Clinic incontinence scores between the 2 groups.

Discussion

Although the incidence of patients with UC requiring colectomy continues to decrease over the decades, a certain proportion of them will still require an operation.^{19,20} Complications following these operations are unavoidable in some patients, especially more so following a technically challenging procedure such as a proctectomy with an IPAA.²¹⁻²³ Even though over 64% of our patients developed perioperative complications, most of them were mild in severity with only 6 patients that have developed severe complications. Our rates were slightly higher than those reported in the literature.²¹⁻²⁴ Our series also demonstrated that the older group of patients that had higher ASA scores was more inclined to develop perioperative complications, although the difference was not statistically significant. This higher incidence could also have accounted for the lengthier hospital stay. Fortunately, the incidence of severe complications was not significantly higher in the older patients.

Our series was unable to add to the growing literature on the role of laparoscopy in restorative proctectomy as the number of patients who had their procedures performed

Table 4. Analysis of the Various Factors between the Patients Aged ≤50 Years Old against Those that Are >50 Years Old

Characteristics	Aged ≤50 Years Old (n = 57)	Aged >50 Years Old (n = 32)	OR (95% CI)	P Value
ASA score ≥ 3	8 (14%)	12 (37.5%)	3.68 (1.31 – 10.34)	0.017
Median length of stay, range (days)	10 (7 – 34)	13 (6 – 57)	NA	0.001
Duration of operation, range (minutes)	220 (120 – 535)	220 (165 – 460)	NA	>0.05
Presence of any complications	33 (57.9%)	24 (75%)	2.18 (0.84 – 5.68)	0.167
Presence of severe complications (GOC III – V)	3 (5.3%)	3 (9.4%)	1.86 (0.35 – 9.82)	0.663
Pouch failure	2 (3.5%)	3 (9.4%)	2.85 (0.45 – 18.00)	>0.05

GOC: Grade of Complications; NA: Not available

Table 5. Analysis of the Functional Outcomes between the Patients Aged ≤50 Years Old against Those that Are >50 Years Old

Characteristics	Aged ≤50 Years Old (n = 30)	Aged >50 Years Old (n = 19)	P Value
Median number of bowel movement during day time, range	5 (2 – 15)	6 (1 – 10)	>0.05
Median number of bowel movement overnight after sleep, range	2 (0 – 5)	2 (0 – 5)	>0.05
Median St Mark's incontinence score, range	2 (0 – 7)	1 (0 – 11)	>0.05
Median Cleveland Clinic incontinence score, range	0 (0 – 7)	1 (0 – 15)	>0.05
Incontinent to solid	0	1 (4.3%)	>0.05
Incontinent to liquid	9 (30%)	4 (21.1%)	>0.05
Incontinent to flatus	2 (6.7%)	1 (5.3%)	>0.05
Usage of pad due to incontinence	5 (16.7%)	5 (26.3%)	>0.05
Lifestyle modification due to incontinence	2 (6.7%)	1 (5.3%)	>0.05

laparoscopically was too small. It remains debatable as to whether a laparoscopic approach would considerably improve the short-term outcomes. Several studies have supported the role of laparoscopy by demonstrating faster recovery and better postoperative outcomes, but other reports did not show any no additional benefits conferred by performing the procedure laparoscopically.^{25–29}

While the usage of ASA score may not be accepted by all, it has withstood the test of time and has demonstrated that it is very predictive of outcomes following colectomy.^{30–33} However, we do acknowledge that it does not take into account the impact of various other comorbidities. In elderly patients, some have advocated other scoring systems such as the Charlson Comorbidity Index which takes into account the impact of the various other co-existing conditions.^{34–35} This was perhaps not applicable in our study as the majority of our patients were not even over 60 years old.

Similar to other series, gastrointestinal complications such as high stoma output and ileus were most frequently seen in our patients.^{22,36,37} The need to create a proximal defunctioning stoma after additional resection of a segment of small bowel to ensure a tension-free IPAA would easily lead to a high stoma output. In the absence of any precipitating causations such as intra-abdominal sepsis, this can frequently be managed with oral medications.

On the other hand, ileus can be a result of considerable manipulation of the intestines and compounded by the underlying disease and the long operative times. Urinary complications were also fairly common in our patients due to various reasons. The extensive dissection deep into the pelvis risks could injure the autonomic nerves and could lead to urinary retention, while the presence of a urinary catheter would predispose to any infection.

It is interesting to note that the median number of bowel movement during the day and after sleep were identical in the 2 groups. There were also no statistical differences in the proportion of patients who developed incontinence. Our findings were similar to several other recent reports that also reinforced that older patients can undergo an IPAA procedure with comparable outcomes with younger patients.^{38–42} However, these studies have also gone on to highlight that the function of the pouch and continence often deteriorate over time due to continual weakness in the sphincters, especially in the older group of patients. Although this was not seen in our study, the small number of patients and the wide variation in the duration of follow-up from the timing of the IPAA procedure to the conduct of the questionnaire were considerable limitations. Moreover, the Cleveland Clinic and St Mark's incontinence scores were comparable between the 2 groups.

Some of the other limitations of our study include the retrospective nature of the study and the possibility of selection bias as patients in whom the surgeons believed would do poorly following an IPAA may not be offered this option and would have undergone an end ileostomy instead. The decision to opt for an IPAA is not an easy one. This is often influenced by various patient-related factors and the clinical judgment of the surgeon. The low number of patients in our study and a rather low response rate to our telephone interview are also significant drawbacks.

Although we did not attain validated quality of life scores, most of our patients were satisfied with the outcome of their pouches when interviewed. Several studies have reported excellent quality of life in these patients who had undergone an IPAA procedure.⁴²⁻⁴⁷ However, it would be erroneous to assume that patients who opted for an end ileostomy have worse quality of life. After proper counseling, patients who opted for an end ileostomy can achieve comparable quality of life as patients who underwent an IPAA procedure, but without the associated complications of having an ileal pouch.⁴²⁻⁴⁷

Conclusion

IPAA procedure for patients with UC can be safely performed with acceptable outcomes. Long-term functional outcome is not significantly influenced by the age at which the IPAA was created. Age alone should not be a contraindication for an IPAA procedure.

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Competency-based Radiology Residency: A Survey of Expectations from Singapore's Perspective

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Abstract

In response to the demands of an ageing nation, the postgraduate medical education in Singapore is currently in the early stage of transition into the American-styled residency programme. This study assessed the expectations of both radiology trainees and faculty on their ideal clinical learning environment (CLE) which facilitates the programme development. A modified 23-item questionnaire was administered to both trainees and faculty at a local training hospital. All items were scored according to their envisioned level of importance and categorised into 5 main CLE domains—supervision, formal training programme, work-based learning, social atmosphere and workload. ‘Supervision’ was identified as the most important domain of the CLE by both trainees and faculty, followed by ‘formal training programmes’, ‘work-based learning’ and ‘social atmosphere’. ‘Workload’ was rated as the least important domain. For all domains, the reported expectation between both trainees and faculty respondents did not differ significantly. Intragroup comparison also showed no significant difference within each group of respondents. This study has provided valuable insights on both respondents’ expectations on their ideal CLE that can best train competency in future radiologists. Various approaches to address these concerns were also discussed. The similarities in findings between ours and previous studies suggest that the ‘supervision’, ‘formal training programmes’ and ‘work-based learning’ domains are crucial for the success of a postgraduate medical training and should be emphasised in future curriculum. ‘Workload’ remains a challenge in postgraduate medical training, but attempts to address this will have an impact in future radiology training.

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Key words: Apprenticeship, Clinical learning environment, Curriculum, Radiologists, Training programme

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Introduction

Postgraduate medical education in Singapore is currently in a state of transition from a British “apprenticeship” model, to an American-styled residency programme accredited by the Accreditation Council for Graduate Medical Education-International (ACGME-I). This is in response to the healthcare demands of an ageing and increasing population, where it is hoped that the structured competency-based programme will help to produce more specialists within a fixed period of time, without compromising the quality of training provided.¹

The prior apprenticeship specialist training model had served the nation’s healthcare industry well historically. However, concerns were raised on the final competency of the exiting trainees. A “years-in-training” approach, whereby competency was arbitrarily derived by time spent

in specific institutions/postings,² resulted in a diversity in clinical experience and skill set even for trainees with similar rotation cycles. Compounded by the lack of standardised measures for assessing trainees’ proficiency, it was inevitable that a small percentage of specialists with questionable competency would exit from the system.² A structured programme emphasising regular and standardised competency assessment would address several of these issues.

The newly introduced ACGME-I residency programme focuses on achieving competency in a step-wise progression from that of a basic practitioner, to an intermediate and subsequently expert practitioner, specific to the chosen discipline.² In contrast to the “years-in-training” approach, which assumes that all trainees progress at the same speed and attain the required skills within a specific time frame,

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the acquisition and application of skills and knowledge to medical practice under the new residency programme is tailored to the individual's learning capability and is not dependent on the simple duration of clinical experience.² Under the new ACGME-I curriculum, specialist trainees will be trained and evaluated for 6 “core” competencies achieved, namely ‘patient care’, ‘medical knowledge’, ‘professionalism’, ‘interpersonal communication’, ‘practice-based learning’ and ‘system-based learning’. Trainees, now designated as ‘residents’, are required to complete between 3 to 6 years of training under a sponsoring healthcare institution such as SingHealth or the National Healthcare Group. The overall training duration has been shortened in general, with greater involvement of more established specialists designated as faculty.

The clinical learning environment (CLE), as described by Mulrooney,³ describes the psychosocial experience that residents undergo throughout their course of training. This has been known to influence training outcomes. The CLE inventory refers to a survey questionnaire that has often been used to assess the quality of learning experience and teaching curriculum in various clinical settings.³⁻⁸ This tool has also been utilised by Bloomfield and Subramaniam⁸ in their practice to gain insights specific to radiology residents' actual training experiences to facilitate programme improvement.

In contrast, we aim to utilise this tool to assess attitudes and expectations of both residents and faculty towards the “ideal” CLE. Little is known about the trainees' and faculty members' attitudes towards the new format of radiology training, and the ACGME-I programme is still in its infancy (i.e. 2 years into the programme). Our sponsoring institution also has trainees from the prior apprenticeship programme, who can lend a contrasting perspective to the envisioned ideal. The information obtained can be applied immediately to improve our current programme.

Materials and Methods

An institutional review board waiver was obtained prior to this study. We adopted the 24-item questionnaire that had been previously validated and developed for assessments on radiology trainees under radiology training centres in Australia, New Zealand and Singapore⁸ by Bloomfield et al. Minor modifications to the wordings were made to the original questionnaire to be used for faculty member assessment. Minimal modifications were made for the trainees. These modified questionnaires were then distributed among faculty members who volunteered to participate in an iterative process to check for relevance. Based on their responses, 23 items were selected and reviewed by a sub-sample of the faculty members. One item was removed due to the complex and ambiguous nature of the question, “I am aware of whom I should report,

in a variety of circumstances”. The finalised Diagnostic Radiology (DR)-CLE questionnaire contained questions about the CLE, which were to be answered as most to least important to the ideal, as well as demographic information, including undergraduate medical school, gender, traineeship and appointment (see Appendices 1 and 2).

The modified 23 item DR-CLE was administered to all radiology trainees and faculty members of the Department of Diagnostic Radiology at a local hospital during a research meeting in February 2013. The 23 items were scored on a 10-point forced choice Likert scale (1-2, least important; 3-4, not so important; 5-6, neutral; 7-8, important; and 9-10, most important), categorised under 5 CLE domains namely ‘supervision’, ‘social atmosphere’, ‘work-based learning’, ‘formal training programme’ and ‘workload’.⁸ The Mann-Whitney rank sum test and unpaired t-test were used to analyse the survey findings on SPSS Statistics 17.0 (SPSS Inc., Chicago, IL).

Results

Demographics

All 22 trainees currently undergoing radiology training at the department responded to the survey, with 100% response rate. Among these 22 trainees, 7 were from the new ACGME-I residency programme; 15 were from the prior apprenticeship-style programme, with 7 designated as Basic Specialist Trainees (BSTs), and 8 designated Advanced Specialist Trainees (ASTs), reflecting different phases in seniority under the old programme.

Out of a total of 43 staff radiologists, 21 teaching faculty members responded to the survey, with a response rate of 48%. Of these 21 faculty members, 5 were associate consultants, 8 were consultants and 8 were senior consultants, in order of increasing seniority and number of years in radiology practice. The rest of the faculty members were either unavailable (on leave) for survey or were excluded as they are part time faculty. A summary of the demographic information for both groups of respondents is shown in Table 1.

Expectations on the Ideal CLE for Training Competency in Future Radiologists

Amongst all 5 CLE domains studied, ‘supervision’ was identified as the most important domain with regards to the ideal CLE, with the highest overall mean score of 8.0⁴ given by the faculty members, and 8.20 by the trainees out of a maximum of 10. In contrast, the domain ‘workload’ was scored as the least important among all CLE domains by both groups, with overall mean scores of 6.56 and 7.12 given by the faculty members and trainees respectively. No

statistically significant difference was found between both groups of respondents in all CLE domains studied (Table 2).

More than 70% of both faculty members and trainees indicated all items classified under the domain ‘supervision’ as important (Table 3). Both groups of respondents agreed that emphasis on teaching and training (item 2) is crucial for radiology training in future programme (85.7% faculty; 90.9% trainees). There were significantly more faculty members than trainees (100% compared to 86.4%) who indicated the provision of ‘direct supervision and feedback from an experienced colleague when doing a task for the first time’ (item 11, $P = 0.030$) as an important factor for training competency in future radiologists. Similarly, more than 90% of the trainees expected ‘supervision and feedback

from experienced colleagues to be provided to trainees at all times’ (item 17). In short, training factors involving supervision and feedback were indicated as important factors for instilling competency in future radiologists by both groups of respondents.

‘Social atmosphere’ and ‘work-based learning’ were also identified as important CLE domains by both groups. In both domains, trainees awarded a slightly higher mean score as compared to the faculty (overall mean score of 7.80 compared to 7.22). Under the ‘social atmosphere’ domain, both agreed that being ‘part of the team’ (item 12) is important for training competent radiologists. In terms of interpersonal relationship within the department, more trainees than faculties (95.5% compared to 66.7%) indicated a ‘sense of cooperation and mutual respect in the department’ (item 18, $P = 0.038$) as important in an ideal CLE for competency training.

For ‘work-based learning’, both groups of respondents scored the ‘access to a variety of patients and presenting problems’ (item 4) and ‘opportunities to acquire the skills’ (item 13) appropriate to the trainee’s level of training as important for the training of competency in future radiologists. Interestingly, expectations on allowing trainees to have ‘the freedom to set their own work priorities’ (item 1, $P < 0.001$) differs significantly between the faculty members and trainees (28.6% and 72.7%, respectively).

With regard to the domain ‘formal training programmes’, more than 80% of both respondents indicated that future trainees need to be given relief from duties to participate in formal educational programmes (item 6). A smaller number of trainees and faculty indicated ‘access to valuable social support through formal educational programmes’ (item 20) as important for training competency in future radiologists.

Among all the domains described, ‘workload’ was identified as the least important, with the lowest mean scores given among all 5 CLE domains studied i.e. 6.56

Table 1. Demographics for Faculty and Trainees

	Frequency	
	Faculty (n = 21)	Trainees (n = 22)
Medical school		
Local	12	9
Overseas	9	13
Gender		
Male	18	17
Female	3	5
Traineeship		
Residency	NA	7
BST	NA	7
AST	NA	8
Appointment		
Associate consultant	5	NA
Consultant	8	NA
Senior consultant	8	NA

AST: Advanced Specialist Trainee; BST: Basic Specialist Trainee; NA: Not applicable

Table 2. Comparison of Expectations between Trainees and Faculties Across the Various Domains of CLE

Domain	Items	Faculty		Trainees		Confidence Interval
		Overall Mean Score	Overall SD	Overall Mean Score	Overall SD	
1. Supervision	2, 7, 11, 17, 19, 23	8.04	0.49	8.20	0.33	(-3.83, 0.71)
2. Social Atmosphere	5, 12, 16, 18, 22	7.22	0.38	7.80	0.66	(-0.24, 1.41)
3. Work-based learning	1, 4, 9, 13, 15, 21	7.22	1.20	7.80	0.59	(-0.71, 1.86)
4. Formal training programmes	6, 10, 20	7.44	0.80	7.27	1.31	(-2.84, 2.51)
5. Workload	3, 8, 14	6.56	0.26	7.12	0.68	(-0.89, 2.02)

CLE: Clinical learning environment; SD: Standard deviation

Note: No significant difference was found in either domains of the CLE between both groups of respondents.

Table 3. Comparison of Clinical Learning Environment Expectation from Both Trainees and Faculty (Most Important + Important Cumulative Percentage, i.e. Score ≥ 7)

	Faculty Score ≥ 7 , n (%) (n = 21)	Trainees Score ≥ 7 , n (%) (n = 22)
Work-based Learning		
1. The trainees have freedom to set their own work priorities*	6 (28.6)	16 (72.7)
4. The trainees have access to a variety of patients and presenting problems appropriate to their level of training	18 (85.7)	20 (90.9)
9. The trainees have a level of autonomy appropriate to their level of training	13 (61.9)	17 (77.3)
13. The trainees have opportunities to acquire the skills appropriate to their level of training	20 (95.2)	20 (90.9)
15. The time at work is utilised productively by the trainees	13 (61.9)	15 (68.2)
21. The trainees have access to up-to-date learning resources at work when they need them	17 (81.0)	20 (90.9)
Social Atmosphere		
†5. The trainees do not receive mixed messages about duties and responsibilities	13 (61.9)	15 (68.2)
†12. The trainees feel they are part of the team	16 (76.2)	17 (77.3)
16. The trainees have a good sense of rapport with senior people in the department	13 (61.9)	18 (81.8)
18. There is sense of cooperation and mutual respect in the department‡	14 (66.7)	21 (95.5)
22. The trainees are clear of the work relationships with staff in the department	15 (71.4)	18 (81.8)
Formal Training Programmes		
6. The trainees are given relief from duties to participate in formal educational programmes	17 (81.0)	19 (86.4)
10. The formal educational programmes targeted to trainee's learning needs are provided	17 (81.0)	15 (68.2)
20. The trainees are given access to valuable social support through formal educational programmes (e.g. communication and ethics courses)	13 (61.9)	10 (45.5)
Supervision		
2. Teaching and training are emphasised in this department	18 (85.7)	20 (90.9)
7. Job teaching in specialty areas targeted at specific learning needs is provided to trainees	15 (71.4)	19 (86.4)
11. Direct supervision and feedback from an experienced colleague are provided to trainees when doing a task for the first time‡	21 (100)	19 (86.4)
17. Advice and back up from more experienced colleagues is readily available to trainees at all times	18 (85.7)	21 (95.5)
19. Direct supervision and feedback are sufficiently provided to trainees according to their level of training	18 (85.7)	19 (86.4)
23. The supervision and feedback given to trainees are clear, specific and supportive	16 (76.2)	18 (81.8)
Workload		
3. Sufficient time is provided for trainees to reflect on their learning experiences‡	15 (71.4)	20 (90.9)
†8. A trainee's work is not routine and repetitious	10 (47.6)	11 (50.0)
†14. The trainees do not often feel swamped with work	11 (52.4)	13 (59.1)

*Indicates $P < 0.01$ by Mann-Whitney rank sum test for items with significant difference between both trainees and faculty

†Items 5,8,12 and 14 were worded negatively in the original questionnaires. Since the scoring is based on the level of importance, these items are expressed in positive and the scores are reversed.

‡Indicates $P < 0.05$ for items with significant difference between both trainees and faculty.

Note: Item, 'I am aware to whom I should report, in a variety of circumstances (Social)' is excluded.

from the faculty members and 7.12 from the trainees out of maximum score of 10. Only ~50% of both trainees and faculty members expected workload in radiology training not to be 'routine and repetitious' (item 8) as important for training competency in radiology. Both groups of respondents also expected training not to involve 'swamping trainees with work' (item 14), with slightly more trainees

indicating this as an important training factor than faculty members (52.4% faculty, 59.1% trainees). Consistent with these findings, there were significantly more trainees than faculty members who placed importance on the expected provision of time for trainees to reflect on their learning experience (item 3, $P = 0.028$).

Intragroup comparisons within the trainee and faculty

respondents such as different traineeships (i.e. between residents, BSTs and ASTs) and undergraduate medical schools attended indicated no significant ($P > 0.05$) cultural differences in expectations on the level of importance of training factors involved in the CLE as a whole or in any domains. The study involved more male than female respondents i.e. 86% male faculty members and 77% male trainees, hence the numbers are too small for a statistically robust analysis on gender differences.

Discussion

Clinical supervision plays a vital role in radiology training. Kilminster and Jolly¹ described supervision as “a process of professional support and learning which enables individual practitioners to develop knowledge and competence, assume responsibility for their own practice, and enhance safety of care in complex situations”. Without adequate supervision, the clinical training standards of trainees are likely to be lowered as proper practices were not imparted to them from senior clinicians, leading to reduced standards of care.¹

In our present study, the CLE domain ‘supervision’, which includes training factors such as the provision of ‘direct supervision and feedback by experienced colleagues’ (item 11), was deemed the most important contributing factor to the success of competency training in radiology by both trainees and faculty members. The roles and responsibilities of the senior radiologist as a clinical teacher to the trainee is deeply rooted in the apprenticeship traditions of clinical medicine in Singapore. With the establishment of a formal curriculum structure under the ACGME-I competency-based residency programme, faculty members can now better supervise and assess trainees’ performance, provide regular feedback and gradually increase the trainees’ responsibilities according to their level of competency. Learning and assessment tool such as the 360° evaluation, direct observed procedural skills (DOPS) and mini clinical evaluation exercise (mini-CEX) have been introduced to enhance direct supervision and allow for greater feedback (both formal and informal) between faculty and trainees. A structured curriculum with sequential progression allows trainees to better cope and plan their own learning. In recognition of the need to ‘train the trainers’ for optimised clinical supervision, our sponsoring institution has also created a Centre for Resident and Faculty Development (CRAFD). This support centre facilitates training for faculty in several aspects of clinical teaching, in addition to organising courses to educate residents in important non-medical aspects of clinical training (e.g. medico-legal issues, communication skills).

Formal training programmes are recognised to play an important role in medical education by raising standards of residents’ performance and improving knowledge.

Consistent with earlier studies, our results also showed ‘formal training programmes’ as an important domain recognised by both trainees and faculty members.^{9,10} In our programme, the core faculties in charge of the various radiology subspecialties have devised specific syllabus and milestones, catered for the trainees’ step-wise progression throughout all 5 years. The new programme also ensures that trainees are given mandatory protected time to be ‘given relief from duties to participate in formal educational programmes’ (item 6) such as didactic lectures. Various online training tools such as RADPrimer (RADPrimer, Utah, US) and STATdx (STATdx, Utah, US) are also provided. Past didactic lectures recordings, notes, and sample self-assessment multiple choice question (MCQ) tests, are also available online through service like Blackboard (Blackboard Inc., Washington, US). These measures ensure that residents have adequate time and abundant resources to facilitate learning.

In medical training, the level of independence and autonomy trainees receive during their course of training are often not well defined. In our present study, there was a significant difference in opinions between both trainees and faculty with regard to the extent of autonomy given to trainees in setting their own work priorities (item 1). This result can likely be attributed to faculty having been trained in a past setting where independence and autonomy was historically limited in this country. With their subsequent success in becoming medical specialists, they may not see these factors as prerequisites for an ideal training situation, unlike the young trainee. However, Li et al¹¹ previously described that residents were generally less confident and do not have the appropriate knowledge and skills required for planning self-directed learning as compared to the faculty members. Therefore, it remains to be seen if greater independence for residents will result in better training outcomes, and further study is required.

Heavy workload is a common problem in medical practice. Similar to Bloomfield and Subramaniam,⁸ the domain ‘workload’ was also identified as one of the main challenges in designing an ideal programme. Despite the split in opinions (~50% of the respondents identified the item as important) within both trainees and faculty members on the importance of ‘routine and repetitious work’ (item 8), we feel that routine work is still key in postgraduate training. Postgraduate training encompasses an element of apprenticeship, on-job training and learning.¹² The budding radiologist needs to have adequate clinical exposure to a large number of cases, including “normal” studies, before he can readily recognise what is out of the ordinary. This can only be provided by reading large numbers of routine cases. However, a balance must be struck and this must not cause excessive resident fatigue or take away valuable

teaching time. Our programme manages this by closely monitoring residents' duty hours via the New Innovations Residency Management Suite (New Innovations, Ohio, US). Excessive workloads resulting in duty hour violations are electronically flagged for immediate corrective action.

Self-reflection is also an integral part of clinical learning.¹³ A large percentage of trainees and faculty from our present study emphasised the importance of 'having sufficient time for self-reflection' (item 3) in training a competent radiologist. In a review by Mann et al,¹⁴ the authors described reflective practice as an important attribute of competent health care professionals. Reflection is not only a learning strategy that allows one to identify their learning needs, but also prepares the trainees for their participation in a multidisciplinary team through feedback and discussion amongst the members.¹⁴ Given its importance in clinical learning, we believe that reflective practice would be beneficial in training competent radiologist and should be encouraged in future curriculum. With protected time for learning allocated in the new programme, residents have an opportunity to self-reflect which is crucial for their learning.¹³

Consistent with Bloomfield and Subramaniam,⁸ the CLE domain 'social atmosphere' has also been identified as important for good clinical learning by trainees. However, a lower percentage of faculty members as compared to trainees indicated having 'a sense of good rapport and cooperation within the department' (item 16) as important for training competency in future radiologists. A potential reason for this disparity in attitudes towards trainee-supervisor relationship could be due to the cultural and generational differences between faculty members and trainees.¹⁵ At present, a hierarchy still exists within the department, with trainees at the bottom of the ladder. The local culture of respect for seniority and reluctance to "lose face" by more senior members as previously described by Tan et al¹⁵ instils a certain degree of isolation and hierarchy within the social framework. The Asian concept of "face" is an abstract term that encompasses descriptors of honour, prestige, and reputation. This may be a significant barrier in a new training programme that requires deep interpersonal interaction in teaching and feedback sessions, and requires a paradigm shift in mindset of senior faculty. In a recent review on local diagnostic radiology education by Tan et al,¹⁵ an interview with trainees indicated unfamiliarity with the new residency programme and absence of protected time for supervisors due to heavy routine clinical duties. This results in further inability for faculty to maximise the trainee-supervisor relationship. More protected time for teaching and mentoring of trainees is probably the main solution to improve the quality of trainee-supervisor relationship.

Although our study is limited by small sample size, as a

major centre/sponsoring institution in the local fraternity, we feel that the data is generally representative of the attitudes of the Singapore radiological community at the current point in time towards the ideal training programme. Our institution has adopted several of these insights as points for improvement. Future longitudinal study will help to assess the impact of these interventions to our training programme.

Conclusion

Our present study has provided valuable insights towards trainees' and faculty members' expectations on the ideal CLE to best train competent future radiologists. Among all 5 CLE domains surveyed, supervision was identified as the most important factor and should be emphasised in all future curriculums. Other domains such as formal training programmes, social atmosphere and work-based learning were also important for the success of the training programme, although several barriers were observed. Heavy workload is a double-edged sword and only a fine balance between sufficient clinical exposure and protected time will lead to a successful training programme in the future.

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Appendix 1

Faculty Survey Form

DIAGNOSTIC RADIOLOGY RESIDENCY PROGRAMME

Thank you for participating in this survey. Your responses will remain anonymous. Neither the department nor your supervisor will have access to your identified information. The purpose of this study is to determine your expectation on the level of importance of each training factor in helping trainees to become competent radiologists. The outcome from this survey will assist in the development of future radiology specialist training programme. Please tick the appropriate box to indicate the score of each factor on the 10 point scale, i.e. the least important factor -1 to the most important -10.

Medical School (i.e. Local/Overseas)	
Gender	
Appointment (Please Circle)	Assoc Consultant/Consultant/Senior Consultant

	Least Important 1	2	3	4	5	6	7	8	9	Most Important 10
1. The trainees have the freedom to set their work priorities.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Teaching and training are emphasised in this department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Sufficient time is provided for trainees to reflect on their learning experiences.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. The trainees have access to a variety of patients and presenting problems appropriate to their level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. The trainees received mixed messages about their duties and responsibilities.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. The trainees are given relief from duties to participate in formal education programmes.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Job teaching in specialty areas targeted at specific learning needs is provided to trainees.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Least Important 1	2	3	4	5	6	7	8	9	Most Important 10
8. A trainee's work is routine and repetitious.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. The trainees have a level of autonomy appropriate to their level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. The formal educational programmes targeted to trainee's learning needs are provided.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Direct supervision and feedback from an experienced colleague are provided to trainees when doing a task for the first time.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. The trainee feels that they are not part of the team.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. The trainees have the opportunities to acquire the skills appropriate to their level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. The trainees often feel swamped with work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. The time at work is utilised productively by the trainees.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. The trainees have a good sense of rapport with senior people in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. Advice and back up from more experienced colleagues is readily available to trainees at all times.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

18. There is sense of cooperation and mutual respect in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19. Direct supervision and feedback are sufficiently provided to trainees according to their level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. The trainees are given access to valuable social support through formal educational programmes (e.g. communication and ethics courses).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. The trainees have access to up-to-date learning resources at work when they need them.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. The trainees are clear about their work relationship with staff in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23. The supervision and feedback given to trainees are clear, specific and supportive.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments

Please give us your thoughts as to how the specialist training programme can be improved in the future.

Appendix 2

Trainee Survey Form

DIAGNOSTIC RADIOLOGY RESIDENCY PROGRAMME

Thank you for participating in this survey. Your responses will remain anonymous. Neither the department nor your supervisor will have access to your identified information. The purpose of this study is to determine your expectation on the level of importance of each training factor in helping trainees to become competent radiologists. The outcome from this survey will assist in the development of future radiology specialist training programme. Please tick the appropriate box to indicate the score of each factor on the 10 point scale, i.e. the least important factor -1 to the most important -10.

Medical School (i.e. Local/Overseas)	
Gender	
Traineeship (Please Circle)	Residency/Basic Specialist Training/Advanced Specialist Training

	Least Important 1	2	3	4	5	6	7	8	9	Most Important 10
1. I have freedom to set my own work priorities.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Teaching and training are emphasised in this department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I have sufficient time to reflect on my learning experiences.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I have access to a variety of patients and presenting problems appropriate to my level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. I get mixed messages about duties and responsibilities.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. I am given relief from duties to participate in formal educational programmes.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. I receive on the job teaching in specialty areas targeted at my learning needs.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Least Important 1	2	3	4	5	6	7	8	9	Most Important 10
8. My work is routine and repetitious.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. I have a level of autonomy appropriate to my level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. The formal educational programmes are targeted to my learning needs.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. I receive direct supervision and feedback from an experienced colleague when doing a task for the first time.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. I do not feel part of the team.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. I have opportunities to acquire the skills appropriate to my level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. I often feel swamped with work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. My time at work is utilised productively.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. I have a good sense of rapport with senior people in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. Advice and back up from more experienced colleagues is readily available to me at all times.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. There is a sense of cooperation and mutual respect in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

19. I receive direct supervision and feedback that is sufficient for my level of training.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. The formal educational programmes give me access to valuable social support (e.g. communication & ethics courses).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. I have access to up-to-date learning resources at work when I need them.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. I am clear about my work relationships with staff in the department.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23. The supervision and feedback given to me is clear, specific and supportive.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments

Please give us your thoughts as to how the specialist training programme can be improved in the future.

Severe Vitamin B12 Deficiency in a 7-Month-Old Boy

Dear Editor,

Infantile vitamin B12 deficiency often affects children born to mothers whose nutritional intake is inadequate. We describe a 7-month-old boy with a 2-month history of recurrent vomiting, neurodevelopmental regression, failure to thrive (FTT) and macrocytic anaemia, who was diagnosed to have vitamin B12 deficiency.

Introduction

Vitamin B12 deficiency in infants can result in profound and permanent health consequences. Prevention, early diagnosis and early treatment are crucial to ensure a better outcome for those affected.¹ However, the symptoms of vitamin B12 deficiency in infants can be non-specific, leading to delayed or missed diagnosis.

Vitamin B12 (cobalamin) is a water-soluble vitamin found naturally only in animal products. It is a cofactor for the reaction that converts methylmalonyl-CoA to succinyl-CoA. It is also a cofactor for the enzyme methionine synthase which catalyses the methylation of homocysteine to methionine, an essential amino acid. Additionally, cobalamin is involved in the reaction that demethylates methyl-tetrahydrofolate (CH₃-THF) to THF, a substrate essential in DNA synthesis.

In infants, vitamin B12 deficiency is associated with a wide spectrum of clinical manifestations. These include macrocytic anaemia, failure to thrive, irritability, lethargy, hypotonia, developmental delay, psychomotor delay, regression, tremor, convulsions and coma.¹ Less specific manifestations include pallor, vomiting, diarrhoea, oedema and apathy.^{1,2} Cerebral atrophy is usually also seen on magnetic resonance imaging (MRI).¹ Biochemically, vitamin B12 deficiency is associated with elevated methylmalonate acid (MMA) blood and urine levels, elevated blood folate (due to the folate trap) and elevated plasma homocysteine level. Unfortunately, the vast array of non-specific signs and symptoms pose a challenge for diagnosis of vitamin B12 deficiency.

Patient Case Presentation

A 7-month-old boy was referred for persistent vomiting and FTT. He was the second child of non-consanguineous

Caucasian parents. He was born full term after a normal pregnancy. His birth weight was 3.2 kg (25th percentile), length 54 cm (50th percentile) and head circumference was 35 cm (50th percentile). Guthrie test done at birth was normal. He had neonatal jaundice which required phototherapy. His health and growth were normal up to 4 months of age, with weight, length and head circumferences at the 50th centiles.

At 5 months old, he developed coughing and vomiting. This was diagnosed to be due to a viral illness. Initially, his vomiting was post-tussive but this persisted despite resolution of his cough. The vomitus was non-bloody and non-bilious. The child also appeared to be more “floppy” and was babbling less than usual. He had been exclusively breastfed since birth. Attempts to wean to solids at 6 months were unsuccessful as he would refuse any solid that was offered. The child was still exclusively breastfed at the time of presentation.

On physical examination, the child was thin and had the following growth parameters; 5.6 kg (<3rd percentile), height 66 cm (10th percentile) and head circumference 42 cm (10th percentile). He was pale and apathetic. There was hypotonia, but he had normal power and reflexes. He was observed to have isolated gross motor delay consistent with a developmental age of 5 months. The rest of the examination was unremarkable.

Investigations showed that he had macrocytic anaemia (haemoglobin 8.7 g/dL, mean corpuscular volume (MCV) 92.5 fL). His other cell lines were not suppressed, white cell count was normal ($8.07 \times 10^9/L$) and platelet count was slightly elevated ($557 \times 10^9/L$). As such, there was no indication of pancytopenia. Vitamin B12 level was low at 57 pmol/L (179 pmol/L to 660 pmol/L). Folate level was increased at 92.9 nmol/L (7 pmol/L to 39.7 nmol/L). Plasma homocysteine was also increased at 93.9 umol/L (5 pmol/L to 15 umol/L). Urine organic acid revealed an elevated MMA of 0.6043 mmol/mmol creatinine (normal <0.008 mmol/mmol creatinine). Plasma acylcarnitine profile showed raised propionylcarnitine (C3) of 2.86 umol/L (0.11 pmol/L to 1.02 umol/L). MRI brain revealed myelination pattern that was appropriate for his age but there was mild diffuse cerebral atrophy. These findings were consistent with significant, prolonged vitamin B12 deficiency.

His mother had a past history of vitamin B12 deficiency.

Fifteen years ago, she was diagnosed to have vitamin B12 deficiency after she was symptomatic from it. The cause was thought to be dietary as she was a vegan then. She was treated and her symptoms resolved. After her diagnosis, she stopped being a vegan and was taking a normal diet that included meat and dairy products. Her current dietary intake appeared to be adequate. Her vitamin B12 status had not been checked in the last decade. In the last decade, she was not taking any B12 supplement and she did not have any symptoms suggestive of B12 deficiency. On examination, she was not pale. Investigations showed that her haemoglobin and MCV were normal at 13.1 g/dL and 93.3 fL respectively. Her vitamin B12 level was, however, low at 97 pmol/L. Anti-intrinsic factor antibodies and anti-parietal cell antibodies were absent.

The patient was diagnosed with vitamin B12 deficiency, most likely due to inadequate intake (i.e. his mother's breast milk was most likely deficient in vitamin B12 given that she was vitamin B12 deficient). The mother was also diagnosed to have vitamin B12 deficiency and treated for it.

The patient was treated with daily 0.1 mg intramuscular (IM) vitamin B12 injections. The clinical improvement in this child was dramatic. After the first vitamin B12 injection, his parents reported that he was more active and less apathetic. The vomiting ceased within a few days and his appetite improved. His parents decided against breastfeeding and switched to formula milk. He also became receptive of solids. There were no side effects from the treatment.

A week after treatment, his weight increased from 5.6 kg to 5.8 kg. His haemoglobin increased from 8.7 g/dL to 9.5 g/dL, vitamin B12 level increased to 1301 pmol/L (179 pmol/L to 660 pmol/L), folate level decreased to normal (due to removal of the folate trap), plasma homocysteine level decreased to normal and urine MMA levels became undetectable. The frequency of IM vitamin B12 injections was adjusted to weekly for 3 weeks then monthly thereafter.

After 2 weeks of treatment, his neurological status improved significantly, including resolution of hypotonia and achievement of new developmental milestones. Brain imaging was not performed post-treatment due to cost consideration. His growth continued to improve. At 8 months, his weight was 7.3 kg (10th percentile), height was 67 cm (10th percentile) and head circumference was 43.2 cm (10th percentile).

Discussion

In a recent study by Demir et al where 41 infants with severe vitamin B12 deficiency were reviewed, all patients had motor retardation, hypotonia and pallor. Seventy-eight percent of patients in the study also had skin hyperpigmentation, apathy and anorexia.¹ Long-term

neurological sequelae such as low intelligence quotient (IQ) and developmental delay have been described in patients with delayed diagnosis.^{3,4} Of note, while biochemical and MRI abnormalities often resolve shortly after treatment, their resolution may not predict the child's long-term outcome.⁴ What is important is early diagnosis and early treatment. Schenck et al noted that there was complete neurological recovery when the affected were diagnosed and treated at an earlier age.⁴

Infantile vitamin B12 deficiency is often due to maternal deficiency secondary to pernicious anaemia, strict vegan or vegetarian diet, malabsorption or low socioeconomic status.^{3,5} Infants who are exclusively breastfed are particularly at risk, as they have limited hepatic vitamin B12 reserves and require adequate dietary vitamin B12 intake to maintain good health.³ Our patient's mother was vitamin B12 deficient and yet she was asymptomatic, did not have anaemia or macrocytosis. This highlights the importance of testing for vitamin B12 when one is suspicious of it as symptoms and macrocytosis may not occur when the deficiency is mild or in the early stages. Our patient's mother's vitamin B12 deficiency is possibly due to inadequate intake of vitamin B12-rich foods coupled with increased requirement during pregnancy and lactation.⁶ The possibility of non-immune mediated malabsorption of vitamin B12 is still a possibility in her case.

There are currently no existing guidelines for the treatment of childhood vitamin B12 deficiency. Vitamin B12 intake exceeding the recommended daily allowance is not known to be toxic and has been associated with lower MMA values. IM vitamin B12 injection is the common mode of treatment. High dose oral vitamin B12 is an alternative treatment modality used in adults. Intravenous dosing of vitamin B12 is not recommended as it can result in excessive vitamin loss in the urine as well as trigger an anaphylactic reaction. Vitamin B12 treatment may be associated with the risk of some side effects. In adults with severe B12 deficiency, hypokalaemia has been observed during treatment initiation with vitamin B12. Hence, low initial doses have been recommended.⁷ Treatment of vitamin B12 deficiency will result in an increase in red cell production. This increases the demand for iron and it is essential to monitor and correct for iron deficiency. In addition, folate deficiency may also be unmasked by vitamin B12 treatment.

Prevention of infantile vitamin B12 deficiency is possible. Pregnant women should be screened for a history of vegan diet, vegetarian diet or pernicious anaemia. For those at risk, effort should be made to ensure that they have adequate vitamin B12 intake and are not vitamin B12 deficient. If these at-risk women chose to breastfeed, one may consider closely monitoring them and/or supplement the mothers and/or infants with vitamin B12.⁸

Conclusion

Individuals with vitamin B12 deficiency may be asymptomatic or present with non-specific symptoms. Delayed diagnosis or delayed treatment in infants may result in permanent long-term neurological consequences. It is essential to be alert, to diagnose and treat these babies early. The best way to ascertain for vitamin B12 deficiency is to check its level, not by looking for anaemia or macrocytosis. Prevention of vitamin B12 deficiency is possible if care is given to those who are at risk of it.

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Acute Onset Polyarthritis with Pitting Edema: Is it RS3PE?

Dear Editor,

A 48-year-old female presented with pain and swelling in the bilateral proximal interphalangeal (PIP), metacarpophalangeal (MCP) and wrist joints for the past 20 days. It was acute in onset, severe in intensity to such an extent that she was unable to make a fist. It was associated with acute onset of diffuse painful swelling over the dorsum of hands. History of morning stiffness was present, lasting up to 1 hour, and eases only slightly with the consumption of painkillers prescribed by a local general practitioner.

On local examination, there was diffuse pitting and tender edema over both hands extending up to wrist, showing a 'boxing glove' appearance (Fig. 1A). A clinical provisional diagnosis of remitting seronegative symmetrical synovitis with pitting edema (RS3PE) was made.

On investigation, it was found that the patient's erythrocyte sedimentation rate (ESR) = 41 mm (>20 mm), C-reactive protein (CRP) = 24 (>5), rheumatoid factor (RF) = 85 (+ve) and anti-cyclic citrullinated peptide (anti-CCP) = 3.25 (-ve). X-ray of bilateral hands was normal without showing any evidence of erosions. Ultrasonography of hands reveals extensor tenosynovitis of bilateral hands. These gave a confused picture between rheumatoid arthritis (RA) and RS3PE. A diagnosis of RA was initially preferred, it being a more common disease and the patient had a positive RF.

The patient was managed with disease-modifying antirheumatic drug (DMARDs) and low-dose prednisolone (20 mg daily). After 10 days, all her symptoms were completely resolved (Fig. 1B) and she stopped taking her medications. For the past 6 months, she had been completely asymptomatic without taking any medication. She had been

continuously evaluated for any symptoms and signs of underlying malignancy and none have been reported so far.

Discussion

Ever since McCarty described the first case of RS3PE, clinicians have been puzzled over whether it should be considered as a syndrome or as a separate disease entity. McCarty's original diagnostic criteria¹ for RS3PE included seronegative symmetrical synovitis with pitting edema of hands, male predominance, old age, good response to corticosteroids and long-term remission after withdrawal of steroids. Since McCarty's original description, over 150 cases of RS3PE have been reported with its varied manifestations. The original diagnostic criteria have been challenged by unilateral,² female sex,³ young² and positive anti-CCP⁴ cases. The knowledge on the nature of RS3PE is still evolving and its clinical spectrum is still unpredictable.

RA is also known for its heterogeneous manifestations, remitting-relapsing clinical course and variable response to therapy. RF may be detected in 1% to 5% of the healthy population but anti-CCP antibodies, rather than RF, are more specific for the diagnosis of RA. Response to DMARDs takes 6 to 12 weeks to appear. Patients' response to glucocorticoids is faster but it is transient and does not provide a sustained response in RA patients. However, patients with RS3PE are known to respond to low-dose steroids with sustained remissions.⁵

The spectrum of RA and RS3PE has always overlapped. Even in McCarty's RS3PE series of 150 patients, 3 men were later classified to have definite RA.⁵ Various immunological

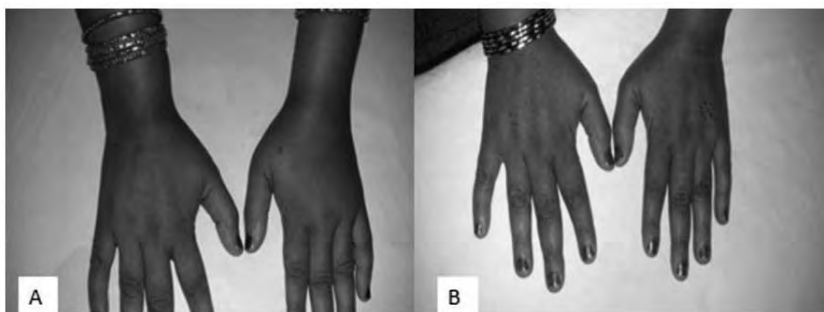


Fig. 1. Patient at initial presentation with edema in both hands (A). After 10 days, the swelling had completely subsided (B).

studies have underlined the similarities and differences between the immune-pathogenesis of both RA and RS3PE. While the role of interleukin-6 (IL-6) has been identified as equally important in both disease groups,^{3,6} vascular endothelial growth factor (VEGF) have been found to be more pronounced in the RS3PE than the RA group.⁷ Also, serum matrix metalloproteinase-3 (MMP-3) has been reported to be significantly elevated in RS3PE that is associated with underlying malignancy.⁸

Conclusion

RS3PE has always puzzled rheumatologists as it is a mimicker to RA. Although it is now recognised as a distinct clinical entity with definite clinical and radiological characteristics, the real nature of the disease is still unknown. In this present case, a positive RA factor in a patient with symmetrical polyarthritis with dramatic onset of pitting edema and who showed an excellent response to corticosteroids meant that a diagnosis of RS3PE was preferred over RA.

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Chest Pain, Something is Not Right...Or Left

A 46-year-old female was referred for evaluation of central chest pain unrelated to exertion. She was known to have diabetes mellitus, hypertension, and dyslipidaemia. Physical examination, routine blood investigations, electrocardiogram and chest radiograph were unremarkable. Stress myocardial perfusion imaging demonstrated normal perfusion of the left ventricle (LV) with no ischaemia detected. However, because of her cardiovascular risk factor profile and recurrent episodes of chest pain, computed tomography coronary angiography (CTA) was performed to further evaluate the cause of chest pain (Figs. 1A, 1B and 1C).

What is the most likely diagnosis?

- Left anterior descending artery occlusion with collateralisation from right coronary artery
- Anomalous origin of left anterior descending artery from the right cusp
- Single coronary artery from the right and absent left anterior descending artery
- Right coronary artery fistula to the right ventricular outflow tract
- Myocardial bridging over the left anterior descending artery

Discussion

CTA revealed a solitary right coronary artery (RCA) giving rise to an anomalous obtuse marginal (OM) artery and a large diagonal branch to the lateral LV wall that continued to supply the apex (Figs. 1A and 1B). No left anterior descending (LAD) artery was visualised in the inter-ventricular groove (Fig. 1C). On the invasive coronary angiogram, there was no LAD or left circumflex (LCX) artery from the left coronary cusp either (Fig. 1F).

Single coronary artery (SCA) is an uncommon congenital anomaly. SCA with an absent LAD is even more rare, with only a few cases reported to have been detected by invasive coronary angiography, but not previously with CTA.^{1,2} Patients with SCA may be asymptomatic or present with acute coronary syndrome, syncope or sudden death. Concomitant atherosclerosis and ischaemia may be present, the mechanism of which is uncertain. Besides traditional risk factors, the lack of side branches and arterial bends has been postulated to decrease protection against atheroma formation; and endothelial dysfunction and coronary spasm have been implicated in ischaemia.³

In this middle-aged female, absence of significant

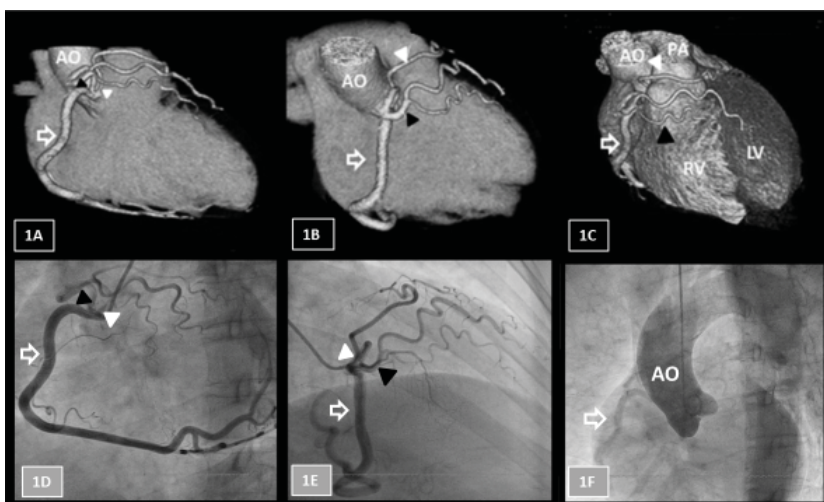


Fig. 1. Comparison between CT coronary angiogram and invasive coronary angiogram in the left anterior oblique (1A and 1D), right anterior oblique (1B and 1E), and straight anterior posterior (1C and 1F) views. Hollow white arrow: right coronary artery; Black triangle: anomalous obtuse marginal artery; White triangle: first diagonal branch to the lateral LV wall that continued to supply the apex; AO: aortic root; PA: pulmonary artery; LV: left ventricle, RV: right ventricle. No left anterior descending artery (LAD) was visualised in the inter-ventricular groove (1C). Aortogram highlighting the aortic root (AO) showed absence of both LAD and left circumflex artery from the left coronary cusp (1F).

Answer: C

myocardial ischaemia on myocardial perfusion imaging and luminal stenosis on coronary angiography (Figs. 1D and 1E) suggest that this singular coronary abnormality is likely to have been a fortuitous finding. The patient's chest pain resolved quickly with analgesics. She has since remained well after 6 years' follow-up.

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