A pilot randomised controlled trial of medical versus nurse clerking for minor surgery

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Abstract

Background—Nurse led clerking is currently practiced in a growing number of UK centres, but there is a paucity of evidence to underpin the safety of this innovation.

Aim—To assess the safety of nurse led clerking in paediatric day case and minor surgery.

Methods—Children aged 3 months to 15 years were randomly assigned to clerking by either a nurse or a senior house officer (SHO) (resident). All children were then independently reassessed by a specialist registrar anaesthetist to provide a “gold standard” against which practitioner performance could be judged.

Results—In 60 children studied, nurses identified a significantly greater proportion of the detectable abnormalities present in the sample ($p = 0.16$). This difference is attributable to nurses’ greater accuracy in history taking ($p = 0.04$); no conclusions regarding the comparability of nurses’ and SHOs’ skills in physical examination can be derived from the current study.

Conclusion—Evidence attests to the likelihood of nursing having superior skills in history taking to SHOs. Exploration of nursing safety in undertaking physical examination, however, requires the conduct of a large scale equivalence study. Only then can conclusions be drawn as to whether nurse led physical assessment offers children a standard of care equivalent to that which they currently receive from SHOs.

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Traditionally, children presenting for surgery have their preoperative history taking and physical assessment carried out by a senior house officer (SHO). However, recent initiatives to reduce junior doctors’ hours of work and workload,¹ and to enhance their education,² have resulted in proposals to transfer some traditionally medical roles to nurses.

While it is rare for UK nurses to be involved in history taking and physical assessment, in North America and Australia such skills are increasingly becoming key components of practice. Perceived benefits include staff stability, children encountering fewer unfamiliar practitioners, and a more holistic approach to care.^{3–5} To date there is limited evidence to

support these perceptions. Some US studies have suggested that nurses may have comparable or superior skills in history taking^{6–8}; discrete evidence of comparable performance in physical examination is confined to a single study of just one nurse practitioner.⁹ Although many more North American studies exist within the broader arena of nurse–physician role transfer,¹⁰ the usefulness of this evidence is constrained by a number of methodological flaws,¹¹ and an almost exclusively primary care focus. Extrapolation of discrete evidence pertaining to client assessment is seldom feasible.

In the UK a study by Greenhalgh *et al* listed tasks which could “safely” be transferred from doctors to nurses, including history taking, yet the paucity of outcome measures used renders such conclusions unsafe.¹² However, Greenhalgh *et al* state that history taking and physical examination comprise the biggest single component of junior doctors’ workload, while Read and Graves¹³ noted that “preoperative assessment nurses” made a considerable impact on reducing junior doctor work.

To date, most studies of nurse led care have failed to show conclusively the safety of nurse–doctor role transfer. Exceptionally, Latimer *et al* produced robust evidence pertaining to the safety and efficacy of nurse led care in a large scale randomised controlled trial of nurse led telephone triage in out of hours primary care.¹⁴

Most research in this field has also failed to study children as a discrete client group. Assessment of children, with their physiological, cognitive, and verbal immaturity, poses particular challenges for practitioners. Extrapolation of findings from adult studies to child health settings is inappropriate. Yet nurse clerking of patients, including children, is already established in some UK centres despite the lack of evidence that it is safe. In 1984, Spitzer¹⁵ argued that new nursing initiatives should be: “subject to the same degree of scrutiny as any new clinical method or drug”.

It was on this basis, and in the absence of such evidence, that our study was conceived, to determine whether clerking of children for day case and minor surgery could be performed equally well by nurses as by doctors.

Methods

The research question was as follows: “To explore whether the history taking and physical assessment of children before day case or minor surgery could be carried out as safely by nurses as by SHOs”.

Of key importance to this question is the definition of “safety”. Absolute safety in this context would denote a clerking process which

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identified all abnormalities of potential perioperative significance, and an absence of any false positives. However, the key concept here is one of “relative safety” which recognises that to be an acceptable change in practice, clerking performed by the nurses must be to at least the same standard of safety as that currently performed by the SHOs. Consequently, from the outset we defined the inquiry as an “equivalence study”, which seeks to show that two phenomena are “similar”, in contrast to the more usual approach of seeking a significant difference. This methodology is normally used in drug trials, but is also appropriate in health services research.^{14–16} The nurses’ role is to distinguish “normality” and “abnormality”, with the latter referred to a medical practitioner. It is not intended that the nurse should take a diagnostic role.

This type of study requires a sample size several times greater than that required for a significant difference trial.¹⁷ Thus we originally viewed the current study of 60 subjects as a pilot, undertaken to assess the feasibility of the inquiry, and to glean early indicators of nurse–physician performance. We also needed to gain an approximation of the detectable abnormality rate to aid sample size calculations. Unexpectedly, this preliminary work yielded findings which have significance in their own right, as well as major implications for ongoing research in the field of nurse led care. It is for this reason that we report the findings of the initial 60 subject enquiry.

Two clinical areas were chosen for the study: a general paediatric day surgery facility and a “preclerking clinic” which assessed children before minor orthopaedic surgery. Five nurses participated in the study, including two staff nurses, a ward sister, and two clinical nurse specialists. Since nurses do not routinely have the skills of history taking and physical assessment they undertook a 30 hour training programme, taught by the first three authors (HR, AB, and DB), based on established programmes from Canada and other parts of the UK.^{18–19} All six senior house officers working within the study settings also agreed to participate; they had no additional training, as their clerking skills were already established, and our aim was to compare nurse led care with the “status quo”.

Our choice of 60 subjects was based on statistical advice that this would provide reasonable numbers to inform future planning. Ethical approval was confirmed before patient recruitment. All children attending the two study settings were aged between 3 months and 15 years, and had previously been deemed at outpatient assessment to be provisionally ASA (American Society of Anaesthesiologists) status 1 or 2 in their outpatient consultation. The only exclusion criterion was concurrent involvement in another study.

Participants were randomised for assessment either by an SHO (control group) or by one of the specifically trained nurses (experimental group.) Randomisation was carried out using “alternate group” allocation, as limited practitioner availability (usually only one nurse and

one SHO for each session) meant that balancing the number of nurse and SHO patients within each session was essential. All but four families approached ($n = 64$) agreed to participate in the study.

Following randomisation each child was preoperatively assessed according to their allocated group. Within the “nurse assessment group”, the nurse carried out both the “medical” and “nursing” assessment using an integrated approach. The “SHO” group had a separate nursing assessment carried out as usual. The history and physical examination (“clerking”) was carried out and documented using a standardised assessment proforma. This was developed by the research team in consultation with anaesthetic, surgical, and nursing colleagues. Its development was informed by previously validated paediatric proformas developed by the Hospitals for Sick Children, Toronto, Canada; the John Radcliffe Hospital, Oxford, UK; and the Queen Alexandra Children’s Hospital, Brighton, UK.

Following nurse or SHO assessment all children were independently reassessed by an “expert verifier”, a specialist registrar paediatric anaesthetist (AB), utilising an identical proforma. She was blind to the earlier assessment by the nurse or SHO, and also blind as far as possible to the child’s randomisation. This assessment provided a “gold standard” with which to compare the earlier performance by the nurse or SHO.

Measures included the demographic details of the experimental and control groups, the number of children within each group who presented with a detectable abnormality in their history and/or their physical examination, and the number and percentage of abnormalities correctly identified by each practitioner group. In history taking, far more information is gleaned from consultation than is of “perioperative significance”. Therefore we used a panel of seven consultant and specialist registrar anaesthetists to determine the relative importance of the historical observations documented. Only those with likely or possible perioperative significance were included in the final analysis.

Results

DETECTABLE ABNORMALITY RATES

Of the 60 children, 30 had their initial assessment undertaken by a nurse, and 30 by an SHO. Of these, 20 children in the nurse led group, and 15 in the SHO group had at least one potentially significant finding in their history and/or their physical examination, yielding an overall significant finding rate of 58%. When history and physical examination are considered separately, 28 children had at least one significant finding in their history (47%), while only 12 (20%) had a significant finding in their physical examination. Five children (9%) had at least one finding in both groups.

Various abnormalities were noted, but physical findings were most frequently associated with upper respiratory tract infections. The

Table 1 Specificity: correct identification of situations where no abnormality exists

	Nurse assessment	SHO assessment
Correct	10	15
False positive: identification of non-existent concern	0	0

Table 2 Sensitivity: proportion of abnormalities in each group that were/were not detected

	Nurse assessment	SHO assessment
False negative: failure to detect abnormality (–ve)	3	8
Correct identification of significant finding (+ve)	17	7
% abnormalities correctly identified	85%	47%

Table 3 Sensitivity—history and physical examination

	Nurse assessment	SHO assessment
False negative: failure to identify abnormality		
History	1	7
Examination	2	1
Correct identification of significant finding		
History	15	5
Examination	6	3
% abnormalities detected		
History	94%	42%
Examination	75%	75%

Table 4 Specificity—detail of undetected abnormalities

History: nurse led group	
• recent febrile convulsion	
History: SHO group	
• possible transfusion reaction	
• penicillin allergy	
• recent breath holding episode	
• recent asthma related admissions	
• three missed or incomplete histories of recent or current cardiac problems	
Physical examination: nurse led group	
• missed splenic enlargement	
• missed abdominal tenderness	
Physical examination: SHO group	
• missed grade one heart murmur	

Only those omissions identified by the anaesthetic panel to be of potential perioperative significance were included in the final analysis.

most common significant findings within the history included allergies, recent infections, and perioperative sequelae from previous anaesthesia.

More children in the nurse led group had a discernible abnormality (20:15) despite randomisation. This was an artefact of the relatively small sample size and is accounted for in the inferential statistical analysis.

PRACTITIONER PERFORMANCE

We analysed comparative performance between nurses and SHOs according to both specificity and sensitivity.²⁰ As table 1 (specificity) shows, both groups were 100% accurate. No false positives occurred, despite speculation prior to the study that nurses might “err on the side of caution” if they were unsure regarding the existence of a finding. In contrast, as table 2 (sensitivity) shows, the nurses correctly identified 85% of the detectable abnormalities in contrast to 47% by the SHOs. A χ^2 analysis using SPSS revealed a significant difference between the two groups ($p = 0.016$; relative risk 1.8, 95% confidence interval (CI) 1.029 to 3.226).

Table 3 considers the history taking and physical examination components of the data

in table 2 as separate entities. It shows that within the history taking component of the assessment, nurses correctly identified 94% of the detectable abnormalities, in contrast to 42% by the SHOs. This difference is also significant (Fisher's exact test, $p = 0.04$). With respect to physical examination it can be seen that both practitioner groups correctly identified 75% of the small number of physical abnormalities present within the sample. Table 4 lists the nature of the omissions which occurred in both the nurse and SHO groups.

Discussion

We found that nurses and SHOs carrying out preoperative assessment of children before day case or minor surgery both performed equally well in terms of specificity, correctly identifying all the children with no detectable abnormalities. However, it is arguably the sensitivity of the practitioners' performance which is of greater importance in determining the safety and appropriateness of the nursing role. We found that nurses performed significantly better than SHOs in correctly identifying findings with potential perioperative significance. However, these findings are only applicable to the providers under investigation. A much larger sample size is required, preferably in a multisite study, to explore whether these findings are generalisable to all UK practitioners.

Furthermore, although we initially considered “history taking and physical examination” as co-dependent and inseparable activities which should be researched as a whole, our findings challenge this supposition. When history taking and physical examination were analysed as two separate entities, we showed nursing superiority only in the history taking component of the assessment. No meaningful conclusions regarding nurses' and SHOs' relative performance in detecting physical abnormalities can be derived from the current study.

These findings have considerable implications for future research, as our original intention for our proposed main study was to look for equivalence between nurse and SHO performance. Clearly though, equivalence or nurse superiority are both acceptable outcomes with which to underpin a change in practice. It would appear that in respect of history taking, a standard significant difference trial may be the most appropriate way forward. In contrast, in respect of physical examination, it would appear that our original intention of conducting a large scale equivalence trial is congruent with the findings to date. The relative performance of nurses' and SHOs' physical assessment abilities can be shown only from a study of this size.

As previously noted, the methodological challenges of discerning equivalence are considerable. Extrapolation from our data (together with other local audit work on detectable abnormality rates to take account of seasonal variation) suggests a sample size of 1000–3000 patients (precise numbers dependent on the maximum performance difference used to determine clinically acceptable

equivalence), would be required to generate meaningful evidence regarding the safety of nurse led physical examination.²¹

Yet despite the methodological challenges, such data are needed in order to ensure that innovations maintain or enhance standards of care. From a legal perspective, nurses carrying out roles more traditionally associated with medical practice are judged by the standards of a "typical doctor", not a "typical nurse".²² Evidence of performance equivalence in physical assessment could be a crucial dimension of future legal or professional judgements in this domain.

We have also considered the nature of the detectable abnormalities missed by both nurses and SHOs in the clerking process, as highlighted in table 4. Due to our small sample size we cannot draw meaningful conclusions from the pattern of these omissions. Analysis of the raw data suggests to us that SHO omissions in the history may be due the brevity of the clerking process. In contrast nurses tended to gather more data, so were more likely to detect significant abnormalities. However, the amount of "accurate but non-significant" information they gathered was also greater, and although not included in our final analysis, there are time implications which need to be explored in a subsequent study. It may also be that factors such as the enjoyment and perceived value of the clerking process differ between the two practitioner groups, perhaps contributing to the performance difference observed; this possibility is currently being explored via a national survey of practitioner views of the clerking process. The number of detectable physical abnormalities was too few to draw conclusions about the nature of the physical examination omissions.

In summary, although we showed nursing superiority over SHOs in paediatric preoperative assessment, our findings should be viewed with caution. Larger studies are needed before generalisable conclusions regarding the safety and efficacy of nurse led paediatric preoperative assessment can be ascertained. However,

our findings offer a preliminary indication that transferring preoperative assessment from SHOs to nurses may be appropriate in maintaining or enhancing the quality of care delivery.

- 1 National Health Service Management Executive. *Junior doctors: the New Deal*. London: NHSME, 1991.
- 2 Department of Health. *Hospital doctors: training for the future. Report on the Working Group on Specialist Medical Training (The Calman Report)*. London: DOH, 1993.
- 3 Sony S. Baccalaureate nurse graduates' perceptions of barriers to the use of physical assessment skills in the clinical setting. *J Contin Educ Nurs* 1992;23:83-7.
- 4 Reaby L. The effectiveness of an education program to teach Australian nurses comprehensive physical assessment skills. *Nurse Education Today* 1992;10:206-14.
- 5 Dillon A, George S. Advanced neonatal nurse practitioners in the United Kingdom: where are they and what do they do? *J Adv Nurs* 1997;25:257-64.
- 6 Merenstein J, Wolfe H, Barker K. The use of nurse practitioners in general practice. *Med Care* 1974;12:445-52.
- 7 Russo R, Gururaj V, Bunye A, et al. Triage abilities of nurse practitioner vs pediatrician. *Am J Dis Child* 1975;129:673-5.
- 8 Perrin E, Goodman H. Telephone management of acute pediatric illness. *N Engl J Med* 1978;298:130-5.
- 9 Duncan B, Smith A, Silver M. Comparison of the physical assessment of children by pediatric nurse practitioners and pediatricians. *Am J Public Health* 1971;61:1170-6.
- 10 Brown S, Grimes D. *Nurse practitioners and certified nurse midwives: a meta-analysis of studies on nurses in primary care roles*. Washington: American Nurses Publishing, 1993.
- 11 Richardson G, Maynard A. *Fewer doctors? More nurses? A review of the knowledge base of doctor-nurse substitution*. Discussion Paper 135. University of York: Centre for Health Economics, 1995.
- 12 Greenhalgh C, Roberts J, Hill I. *The interface between junior doctors and nurses: a research study for the Department of Health*. Macclesfield: Greenhalgh and Co. Ltd, 1994.
- 13 Read S, Graves K. *Reduction in junior doctors hours in the Trent region: the nursing contribution*. Sheffield: Centre for Health and Related Research, NHSE, Trent, 1994.
- 14 Lattimer V, George S, Thompson F, et al. Safety and effectiveness of nurse telephone consultation in out of hours primary care: randomised controlled trial. *BMJ* 1998;317:1054-9.
- 15 Spitzer W. Slow death of a good idea. *N Engl J Med* 1984;310:1049-51.
- 16 Dunnett C, Gent M. Significance testing to establish equivalence between treatments, with special reference to data in the form of 2x2 tables. *Biometrics* 1977;33:593-602.
- 17 Jones B, Jarvis P, Lewis J, et al. Trials to assess equivalence: the importance of rigorous methods. *BMJ* 1996;313:36-9.
- 18 Jarvis C. *Physical examination and health assessment*. Philadelphia: WB Saunders and Co., 1996.
- 19 Orzel M-N. A collaborative generic curriculum development to support practitioners functioning within enhanced roles. *Accid Emerg Nurs* 1998;6:149-54.
- 20 Altman D, Bland J. Diagnostic tests 1: sensitivity and specificity. *BMJ* 1994;308:1552.
- 21 Machin D, Campbell M, Fayers P, et al. *Sample size tables for clinical studies*, 2nd edition. Oxford: Blackwell Science, 1997.
- 22 Dimond B. When the nurse wields the scalpel? *Br J Nurs* 1995;4:65-6.