Effect of nurse colposcopists on a hospital-based service

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The number of colposcopies performed annually in the UK is increasing. Nurse colposcopists have been introduced by many units to cope with this workload. The small amount of evidence to support the introduction of nurse colposcopists suggests that nurses are viable alternative providers of colposcopy. This study compares the performance of nurse colposcopists with that of doctors.

More than 3000 women develop cervical cancer (Office for National Statistics, 1999a) and 1150 women die from the disease each year in England and Wales (Office of National Statistics, 1999b). The 5-year survival rate for women diagnosed with cervical cancer is approximately 65% (Coleman et al, 1999). Survival rates are significantly associated with stage at diagnosis; advanced (stage IV) disease has a survival rate of about 7%, whereas survival is about 80% for women with early cancer (stage 1) (Cancer Research Campaign, 1994). The marked difference in survival provides an incentive to detect disease at an early stage when treatment is likely to be successful. There is also evidence to suggest that cervical cancer survival rates in the UK are below those observed in many other European countries and the USA and furthermore that survival rates vary within the UK (Coleman et al, 1999; Gatta et al, 1999).

There are several initiatives currently underway in the UK which aim to erode the observed survival differentials. The Calman–Hine report made recommendations for the improvement of cancer services (Department of Health, 1995). The need to improve services has also been emphasized in the document *Saving Lives: Our Healthier Nation* (Department of Health, 1999a). This includes a target to reduce death rates from cancer in those under 75 years of age by 20% by the year 2010; cervical cancer being one of the five cancers specifically mentioned. A NHS access target for all patients with suspected cancer to be seen by a specialist within 2 weeks of referral by their GP has also been set (Department of Health, 2000a).

The purpose of screening is to reduce mortality through the identification of cytological abnormalities before they reach the stage of clinically invasive carcinoma. The Papanicolaou smear is the primary screening method for cervical cancer and is used to detect the early dysplastic cell changes that may be precursors to invasive disease. Women in whom such abnormalities are detected can then have diagnostic testing and treatment which aims to prevent further progression of the disease. Cervical cancer is a suitable disease for a screening programme because it has a long pre-invasive stage during which the disease can be detected and cured. According to the Department of Health (1999b), 3.9 million women undergo cervical screening each year, with 4.4 million smears performed annually (because of repeat smears). Almost 10% of smears will be reported as abnormal, generating fear and anxiety for many patients and the need for referral to colposcopy (Lauver and Rubin, 1990; Marteau et al, 1990; Gath et al, 1995).

Colposcopy is an essential tool in the assessment, management and follow-up of women who have had an abnormal smear. Inspection of the cervix enables abnormal areas of the transformation zone to be identified by utilizing several characteristics, including changes in appearance after staining with acetic acid or iodine and appearance of specific blood vessel patterns. These variables allow the trained colposcopist to recognize dysplastic areas through a process of pattern recognition. Approximately 54 000 colposcopies are performed each year (Sherlaw-Johnson et al, 1999), leading to the registration of 18 500 new cases of cervical intraepithelial neoplasia (CIN) 3 (Office for National Statistics, 1998). The number of colpo-

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scopies performed is rising, as more women are referred to and retained by a system which, under current guidelines, encourages the investigation and follow-up of women with minor (borderline and mildly dyskaryotic) cytological abnormalities.

Colposcopy has been traditionally performed in hospital outpatient clinics by gynaecologists. The rising numbers of patients have placed increasing pressure on colposcopy services, with prolongation of waiting times and high-default rates in many clinics (Lester and Wilson, 1999). In order to address this issue, some centres, including the colposcopy department at City Hospital, Birmingham, have trained nurse colposcopists to cope with the increasing demand. The nurse colposcopists complete a defined training programme leading to British Society of Colposcopy and Cervical Pathology (BSCCP) accreditation. Nurses and doctors have the same training requirements. The necessary qualifications for nurses and the training programme are summarized in *Figure 1*.

The majority of the medical colposcopy staff are in either training or research posts and therefore are on short-term contracts. Nurse colposcopists have been employed in the colposcopy department of City Hospital, Birmingham, since 1993. The perceived advantages of employing nurse colposcopists are the provision of greater continuity of care and greater patient choice; the benefits of increased staffing levels include opportunities to reduce waiting times and improved flexibility of clinic times. The aim of this retrospective audit was to study the effects of introducing nurse colposcopists on service provision as defined by standards outlined by the BSCCP (Luesley, 1996).

METHODS

Details of all colposcopies performed in the department since August 1993 are stored on a computerized database. Cases seen between 1993 and 1998 were reviewed. The information stored is shown in *Table 1*.

TABLE 1.
Information routinely recorded in database

Patient name	Hospital unit no.
Visit status (i.e. new or revisit)	Date of visit
Referral smear	Colposcopy opinion
Histology	Colposcopist status
Action plan	Default history

Essential qualifications

1. Registered general nurse – first level registration
2. Over 18 months nursing experience in women's health
3. An ability to demonstrate an in-depth knowledge of the colposcopy service and to identify the needs of the woman
4. Have evidence of good organizational, communication and leadership skills
5. Demonstrate a supportive, sensitive and approachable manner
6. Have current membership of a professional organization for indemnity

Training

1. Formal courses: basic colposcopy course, counselling course, advanced colposcopy course, family planning course
2. Attendance at family health services authority to learn about call/recall system
3. Experience of genitourinary medicine
4. Clinical training (phase 1): should be complete within 4 months
   - Cytology experience
   - Histology experience
   - 50 supervised colposcopies
5. Clinical training (phase 2): completed within 3–4 months
   - Data management and audit
   - 10 case commentaries
   - 100 unsupervised colposcopic assessments, discussed with trainer
6. Clinical training (phase 3): optional after completing stage 1 and 2
   - 20 supervised treatment cases

Figure 1. Nurse qualifications and training programme.

The NHS Cervical Screening Programme document *Standards and Quality in Colposcopy* outlines a number of standards required of a colposcopy service (Luesley, 1996). For the purpose of this audit, six measures of quality were taken. These are shown in *Table 2* together with the audit targets.

Statistical analyses comprised tests of association and the chi-squared (χ^2) test for linear trend. Using EpiCalc 2000 Version 1.02 (Fleiss, 1981), the 95% confidence intervals (CI) and a critical ratio (Z) test on the difference between two independent proportions were calculated, given the proportion (expressed as a percentage) and sample size in each sample.

TABLE 2.
Measures of quality with audit target

Measure	Target
Minimal default (new and revisit)	<15% women fail to attend
Waiting time for assessment	>90% seen within <8 weeks
Women with moderately or severely dyskaryotic smear having a biopsy	>90%
Evidence of CIN on histology	>85%
Proportion of adequate biopsies	>90%
Accuracy of predicting high-grade disease	>70 %

CIN = cervical intraepithelial neoplasia.

TABLE 3.
Workload by year

		1993	1994	1995	1996	1997	1998	Total
Staff in post	Nurses	1	3	3	3	3	2	
	Doctors	9	10	9	6	7	6	
	Total	10	13	12	9	10	8	
Category of colposcopy visit	New	188	496	572	451	427	475	2609
	Revisit	224	545	1017	1021	1478	1986	6271
	Total	412	1041	1589	1472	1905	2461	8880
Workload breakdown	Doctor (new)	187	488	494	146	87	203	1605
	Doctor (revisit)	190	522	701	228	324	596	2561
	Doctor (total)	377	1010	1195	374	411	799	4166
	Nurse (new)	1	8	78	305	340	272	1004
	Nurse (revisit)	34	23	316	793	1154	1390	3710
	Nurse (total)	35	31	394	1098	1494	1662	4714
	Total	412	1041	1589	1472	1905	2461	8880

RESULTS

Workload

The number of staff performing colposcopies from the start of data collection in 1993 to 1998 is shown in *Table 3*. During this period, 8880 colposcopies were performed. Of these, 2609 (29.4%, 95% CI 28.4–30.3%) were new referrals and the remaining 6271 (70.6%, 95% CI 69.7–71.6%) were revisits (*Table 3*). The number of new referrals did not change significantly over this time period. However, revisit numbers rose sharply, the proportion of revisits increasing from 54.4% in 1993 to 77.6% in 1998 (χ^2 for linear trend=400.8, $P<0.0001$) (*Figure 1*, *Table 3*).

A total of 4714 (53.1%, 95% CI 52.0–54.1%) colposcopies were performed by nurses and 4166 (46.9%, 95% CI 45.9–48.0%) by doctors. The proportion of colposcopies performed by nurses rose from 8.5% in 1993 to 67.5% in 1998 (χ^2 for linear trend=2024.0, $P<0.0001$) (*Figure 2*, *Table 3*).

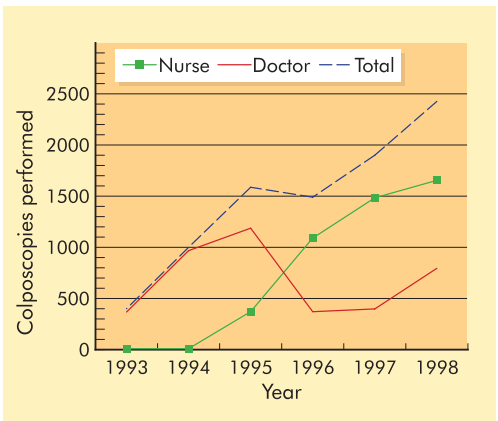

Figure 1. Visit category.

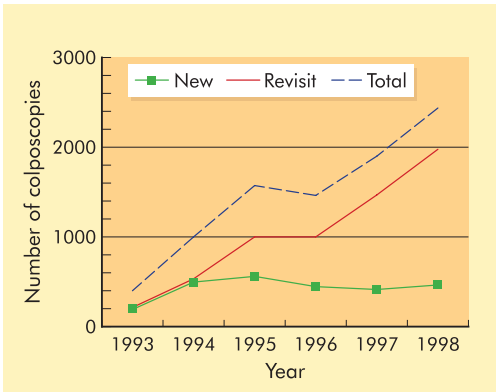

Figure 2. Workload breakdown.

Waiting time

Data on time waiting to be seen (time from referral to being seen) for new referrals were incomplete, particularly for 1993 and 1994 (*Table 4*). The available data suggest that the proportion of patients seen within 8 weeks increased from 19.4% (7/36) in 1993 to 96.0% (380/396) in 1998 (χ^2 for linear trend=299.0, $P<0.0001$). In 1993, the mean time waiting to be seen for all new referrals, regardless of the grade of smear abnormality, was 14 weeks (standard deviation 5.3), and by 1998 it had fallen to 4 weeks (standard deviation 2.9). Data on the grade of the smear were available for 83.2% (2170/2609) of these new referrals. Comparable reductions in mean waiting times were observed for low-grade (borderline and mildly dyskaryotic) and high-grade (moderately or severely dyskaryotic or worse) smear referrals.

TABLE 4.
Waiting times by year

		1993	1994	1995	1996	1997	1998	Total
All new referrals	Number	188	496	572	451	427	475	2609
	Waiting time recorded (%)	36 (19.1)	101 (20.4)	419 (73.3)	358 (79.4)	422 (98.8)	396 (83.4)	1735 (66.5)
	Seen in <8 weeks (%)	7 (19.4)	17 (16.8)	167 (39.9)	306 (85.5)	228 (54.0)	380 (96.0)	1105 (63.7)
	Mean time to be seen in weeks (SD)	13.5 (5.3)	15.8 (8.3)	10.2 (6.6)	5.1 (3.5)	9.3 (7.0)	4.0 (2.9)	7.9 (6.5)
Low grade	Number	135	317	326	239	178	173	1368
	Mean time to be seen in weeks (SD)	14.1 (5.4)	16.9 (7.2)	10.8 (7.2)	5.7 (3.5)	9.7 (7.3)	4.4 (2.9)	8.9 (7.0)
High grade	Number	45	148	181	156	141	131	802
	Mean time to be seen in weeks (SD)	11.5 (5.3)	14.4 (10.3)	9.6 (5.9)	5.1 (3.7)	8.6 (6.3)	3.5 (2.2)	7.5 (6.1)

SD=standard deviation

Default rates

Default rates were determined for all new referrals. Default status was available for 73.2% (1909/2609) of all new referrals, and the overall default rate was 14.6% (95% CI 13.0–16.2%) (*n*=278). Default rates increased over the study period from 11.8% (95% CI 3.8–28.4%) in 1993 to 16.4% (95% CI 13.3–20.1%) in 1998 (χ^2 for trend=2.96, *P*=0.085). Complete data on default status for new referrals were only available for the last 3 years of the study (1996–8). During this period, the default rates increased by 18% (from 14.0% in 1996 to 16.4% in 1998) (χ^2 for trend=1.06, *P*=0.3029). Default rates were higher for cases scheduled to be seen by nurses than for those to be seen by doctors (17.0% *vs* 11.9%, χ^2=9.96, *P*=0.0016).

Biopsy rates and histological findings

Of those patients referred with high-grade (moderately or severely dyskaryotic or worse) smears, histological material was obtained for 236 of 298 cases (79.2%) seen by nurses and 371 of 504 (73.6%) assessed by doctors (χ^2=3.19, *P*=0.0740). Of those patients referred with high-grade smear abnormalities, 84.0% (110/131) were biopsied in 1998 compared with only 66.7% (30/45) in 1993 (*Table 5*) (χ^2 for linear trend=20.00, *P*=0.00001). An increasing linear trend in the biopsy rate was observed for both doctors and nurses over the 6-year period.

Less than 1% of all histological specimens obtained were deemed inadequate, with no difference in inadequate rates between biopsies obtained by doctors (8/1290=0.6%) or nurses (7/766=0.9%) (χ^2=0.61, *P*=0.4340). The proportion of histological specimens that had CIN evident was comparable between doctor and nurse colposcopists. CIN was evident on 70.6% (541/766) of specimens obtained by nurses and 70.2% (905/1290) of those taken by doctors (χ^2=0.04, *P*=0.8477).

Of the cases assessed by doctors (new patients and revisits), 592 were felt to have high-grade disease (CIN 2, 3 or worse). Of these, histology was recorded on 511 (86.3%). High-grade disease was confirmed on 346 of these (67.7%). Of those seen by nurses, high-grade disease was thought to be present in 420 cases, a histological diagnosis was recorded in 329 cases (78.3%) and high-grade disease confirmed in 245 (74.5%). The accuracy of predicting high-grade disease was greater for cases seen by nurses than for those seen by doctors (74.5% *vs* 67.7%, χ^2=4.44, *P*=0.0351).

Departmental performance against national audit standards, using 1998 data, is detailed in *Table 6*.

TABLE 5.
Biopsy rate of high-grade smear referrals (new referrals)

	Nurses		Doctors		Total
	Number seen	Histology available (%)	Number seen	Histology available (%)	Histology available (%)
1993	1	0 (0)	44	30 (68.2)	30 (66.7)
1994	1	0 (0)	147	95 (64.6)	95 (64.2)
1995	19	14 (73.7)	162	118 (72.8)	132 (72.9)
1996	97	74 (76.3)	59	51 (86.4)	125 (80.1)
1997	109	86 (78.9)	32	29 (90.6)	115 (81.6)
1998	71	62 (87.3)	60	48 (80.0)	110 (84.0)
Total	298	236 (79.2)	504	371 (73.6)	607 (75.7)

DISCUSSION

Currently, the authors' department fails to meet all the existing audit standards. Failure to obtain histological material on >90% of patients referred with high-grade smear abnormalities would suggest conservatism among the colposcopists. Assuming adequate cytological and colposcopic follow-up, this would not pose a significant clinical risk to patients. Unfortunately, it is not possible to comment on default rates for revisits, as this information was not recorded in the database. The default rate for new patients is currently 16% and would appear to be rising. This is of concern, and measures to address default rates are being explored. Default rates appear to be higher among those patients scheduled to be seen by nurses. Given the retrospective nature of this review, it is not possible to exclude a systematic selection bias in the allocation of new patients to either doctor or nurse colposcopists.

CIN was present in only 70.3% of histological specimens. This may partly reflect the current recommendation to obtain a histological diagnosis on patients with persistent low-grade smear abnormalities within 2 years of presentation. Inevitably, a proportion of these patients will have no cervical disease. National guidelines are currently being reviewed, and it may be appropriate for the audit standards to be revised.

A high-quality colposcopy service depends on many factors other than those included in the current audit standards. Adequate counselling, communication with patients, suitable and comfortable environment, good equipment and appropriate follow-up are vital components of a high-quality service. Although limited, this study does show that the introduction of nurse colposcopists is associated with a significant reduction in waiting times and provision of a service that is as good as, if not better than, that provided by doctors.

The evidence base to support the introduction of nurse colposcopists is very limited. No randomized controlled trials were identified by searches of MEDLINE (1966–2000), the Cochrane Trials Register (2000, Issue 2) and the Database of Reviews of Effectiveness (DARE) using the terms 'colposcopist', 'colposcopy', 'cervical intraepithelial neoplasia' or 'cervix dysplasia'. This study supports the findings of small retrospective reviews that have suggested that nurse colposcopists are as capable as gynaecologists at identifying dysplastic lesions (Shackelford et al, 1999; Department of Health, 2000b).

The only other published study identified was a retrospective review of medical records of women treated by 11 gynaecologists and 6 nurse practitioners (Gifford and Stone, 1993). This reported that nurses were less likely to have discrepancies between smears and biopsies and more likely to perform endocervical curettage and to document visualization of transformation zone. Patients treated by nurses were less likely to undergo localized surgical procedures and had fewer abnormal smears on follow-up and a lower loss to follow-up rate. The conclusion of this review was that nurse practitioners showed less variation in performance, were more likely to adhere to guidelines and are viable alternative providers of colposcopy.

Successful colposcopy relies on the operator's ability to recognize patterns associated with high-grade CIN and to confirm that diagnosis with histology where appropriate. This retrospective observational study suggests that nurses were better at recognizing high-grade disease and able to perform appropriate biopsy and treatment confirming that these skills can be taught to health-care professionals with different training backgrounds.

The effectiveness of the cervical screening programme relies on asymptomatic women attending for smears as a preventative measure.

TABLE 6.
Performance against audit standards, 1998 data

		Departmental performance (%)		
Measure	Target	Overall	Doctor	Nurse
Default	<15%	16.4	12.3	19.5
Waiting time <8 weeks	>90%	96.0	98.2	94.3
High-grade smear referrals having biopsy	>90%	84.0	80.0	87.3
Cervical intraepithelial neoplasia on histology	>85%	70.3	70.2	70.6
Proportion of adequate biopsies	>90%	99.3	99.4	99.1
Accuracy of predicting high-grade disease	>70%	70.4	67.7	74.5

Treatment of premalignant disease is 98–99% effective (Luesley, 1996). Good compliance is therefore essential to the success of the screening programme. It was not possible to calculate default rates for revisits, as this information was not recorded in the database. If nurses are associated with more acceptability and reduced anxiety, it is possible that patients seeing nurses at their initial visit are less likely to default than those seeing doctors.

CONCLUSION

Traditional demarcations between staff in the NHS are gradually disappearing. *A Health Service of all the Talents: Developing the NHS Workforce* (Department of Health, 2000b) suggests that tasks should be performed depending on skills and abilities rather than job title. Until more specific screening tests are available to allow those women with 'significant' minor smear abnormalities to be separated from those with 'insignificant' abnormalities, the colposcopy workload will remain at its current level. Increased pressure on diagnostic and treatment services requires the identification and evaluation of alternative strategies for the provision of care. This study suggests that nurse colposcopists are capable of easing the manpower problem and delivering a service at least as good as as that provided by doctors alone.

Factors not addressed by this study include cost effectiveness and the strength of consumer preference associated with whether colposcopy is performed by doctors or nurses. A randomized trial is urgently needed to address these issues, as the widespread introduction of nurse colposcopists may mean that the opportunity for formal evaluation is lost. HM

The authors would like to thank Helen Lester for her valuable and constructive comments on this manuscript.
Conflict of interest: none.

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KEY POINTS

- The number of colposcopies performed in the UK annually is increasing.
- Many units have introduced nurse colposcopists to cope with the increasing workload.
- No formal evaluation of this action has been carried out.
- The small amount of existing evidence to support the introduction of nurse colposcopists suggests that nurses are viable alternative providers of colposcopy.
- This retrospective audit suggests that appropriately trained nurse colposcopists are capable of easing a growing manpower problem and that the quality of service provided by nurses (as measured by the chosen standards) is at least as good as that provided by doctors alone.
- Further work is needed to study the cost effectiveness of nurse colposcopists and the strength of consumer preference associated with whether colposcopy is performed by doctors or nurses.