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NHS Direct versus general practice based triage for same day appointments in primary care: cluster randomised controlled trial

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Abstract

Objective To assess the relative effects on consultation workload and costs of off-site triage by NHS Direct for patients requesting same day appointments compared with usual on-site nurse telephone triage in general practice.
Design Cluster randomised controlled trial.
Setting Three primary care sites in York, England.
Participants 4703 patients: 2452 with practice based triage, 2251 with NHS Direct triage. All consecutive patients making requests for same day appointments during study weeks were eligible for the trial.
Main outcome measures Type of consultation after request for same day appointment (telephone, appointment, or visit); time taken for consultation; service use during the month after same day contact; costs of same day, follow up, and emergency care.
Results Patients in the NHS Direct group were less likely to have their call resolved by a nurse and were more likely to have an appointment with a general practitioner. Mean total time per patient in the NHS Direct group was 7.62 minutes longer than in the practice based group. Costs were greater in the NHS Direct group—£2.88 (£0.88 to £4.87) per patient triaged—as a result of the difference between the groups in proportions of patients at each final point contact after triage.
Conclusions External management of requests for same day appointments by nurse telephone triage through NHS Direct is possible but comes at a higher cost than practice nurse delivered triage in primary care. If NHS Direct could achieve the same proportions of consultation types as practice based triage, costs would be comparable.

Introduction

Use of nurses to manage requests for same day appointments in primary care over the telephone is a popular system for managing general practitioners' workload.[1] Triage has been shown to be safe in out of hours services[2] and to reduce general practitioners' same day appointment workload by up to 49% in routine practice.[3–6] Triage is not cheaper than standard appointment systems,[6] and many general practices may be unable to employ the critical mass of nurses needed to deliver a comprehensive service. One solution may be for an external agency such as NHS Direct to provide triage services to practices.[7]

NHS Direct is a direct access health advice line. Nurse advisers use computerised decision support systems to advise callers. Having previously shown that telephone triage by practice nurses within general practice reduces same day appointments with general practitioners,[6] we wanted to investigate the effectiveness and costs of delivering an off-site telephone triage service in order to determine if off-site triage is a feasible option for primary care. Our aim was to determine the relative effects on consultation workload and costs by conducting a randomised controlled trial of NHS Direct delivered telephone triage for patients requesting same day appointments compared with usual practice based triage.

Methods

The study took place in a general practice in York with six surgery sites, a list size of 32 000 patients, 15 general practitioners (12.5 whole time equivalents), four assistants (three whole time equivalents), and a nursing team of one full time nurse team leader and nine practice nurses (4.5 whole time equivalents). The practice population had a slightly poorer standardised mortality ratio, higher unemployment, and more pensionable residents than the regional average. Three of the practice's surgery sites participated in the study, giving a study population of 17 000. The practice operated a nurse telephone triage system as part of its usual care of patients requesting same day appointments.

Assignment

We randomised patients to practice based or NHS Direct triage by using an independently determined two week block randomisation procedure over 26 weeks, 13 weeks for each condition, to ensure that no more than two weeks of triage in one condition occurred together. We collected data on all patients requesting same day appointments between 8.30 am and 5.00 pm, Monday to Friday.

Protocol

Patients were informed about the trial when calling for a same day appointment, and reception staff sought their consent. Consent from patients randomised to NHS Direct was further confirmed by nurse advisers. Patients not consenting to be triaged by NHS Direct were triaged by practice nurses in accordance with the practice's usual clinical procedures. It was not possible to blind patients and clinical staff to group allocation, as triage was provided by different nurses in each condition.

Interventions

Usual care: practice based triage—Patients calling for same day appointments were identified on the electronic patient record by use of a predetermined code. An experienced and trained practice nurse telephoned the patient and used clinical judgment to triage the patient, supported by several clinical protocols on the patient record system. Computerised algorithms were not used. Nurses could manage patients through telephone support alone or could refer them for a telephone call from a general practitioner, same day appointment with a nurse or general

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Table 1 Demographic information and presenting complaints of patients requesting same day appointments, by NHS Direct or practice triage. Values are numbers (percentages) of patients unless stated otherwise

Characteristic	NHS Direct (n=2260)	Practice (n=2458)
Age (years):		
0-4	386 (17.1)	423 (17.2)
5-16	261 (11.5)	322 (13.1)
17-24	205 (9.1)	225 (9.2)
25-44	599 (26.5)	656 (26.7)
45-64	323 (14.3)	311 (12.7)
65-74	182 (8.1)	186 (7.6)
≥75	304 (13.5)	335 (13.6)
Sex:		
Male	859 (38.0)	899 (36.6)
Female	1401 (62.0)	1559 (63.4)
Presenting complaint*:		
Respiratory system	886 (39.2)	932 (37.9)
Dermatological	300 (13.3)	330 (13.4)
Musculoskeletal	324 (14.3)	307 (12.5)
Digestive system	335 (14.8)	348 (14.2)
Genitourinary system	241 (10.7)	321 (13.1)
Nervous system	145 (6.4)	132 (5.4)
Mental health	99 (4.4)	111 (4.5)
Cardiovascular system	100 (4.4)	97 (3.9)
Eyes	108 (4.8)	103 (4.2)
Other infectious disease	150 (6.6)	155 (6.3)
Other	154 (6.8)	197 (8.0)
Mean No (SD) complaints	1.26 (0.56)	1.23 (0.54)

*Percentages do not add up to 100%, as some patients had more than one presenting complaint.

practitioner, home visit, or routine appointment with a nurse or general practitioner. Individual nurses triaged patients across all three sites. Nurses did not prescribe drugs.

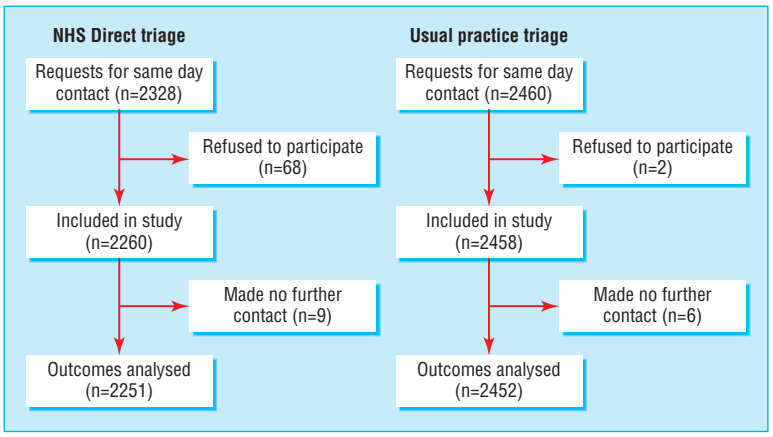
NHS Direct triage—NHS Direct nurse advisers had access to the practice's electronic appointment system but did not access the patients' personal or medical histories. Nurse advisers, all trained to triage, retrieved same day requests and, using NHS Direct computerised decision making algorithms, telephoned the patient and triaged them to one of the same management options as above.

We conducted a six week pilot project before the trial to test the information technology systems and data collection processes for the trial.

Participant flow and follow up

We collected demographic information from the electronic patient record on patients requesting same day appointments. Nurses and doctors involved in the same day care of each patient recorded in diaries a maximum of three presenting problems from a list of 10 (table 1). NHS Direct nurse advisers completed a standard report containing the same information printed automatically from the decision support software. Consultation time was recorded automatically by the NHS Direct system and with stopwatches by the practice based nurses and doctors. We subtracted one minute from the recorded time of the NHS Direct nurse adviser to account for additional time needed to reconfirm consent. We validated diaries and records against the electronic patient record and NHS Direct consultation printouts.

We calculated costs at the level of the patient, including the direct costs of all staff, drugs, tests, and out of hours and emergency department contacts (collected automatically from hospital returns) for one month after the index consultation. We calculated staff costs by using current salary scales multiplied by consultation time. We calculated nurse costs on mid-range salary scales operating at 1 April 2001 to reflect a 37 hour week, 42 weeks a year. NHS Direct nurse advisers are employed on UK nurse salary grade F and practice nurses on grade G. We calculated follow up costs by using average consultation times, as follow up activity was not timed. We calculated drug costs from the *British National Formulary* and obtained costs of tests and emergency care from the local service provider.



Flowchart of patients through study

Analysis

We analysed data on all patients on an intention to treat basis, excluding only patients who could not be contacted by nurses after a call and for whom we had no data. As patients were randomised at the cluster level of the week rather than individually, we aggregated across weeks to create two groups containing 13 weeks each. We determined the effect of the different methods of triage by calculating the percentage of patients at each final point of contact and using repeated measures analysis of variance, incorporating group as a between subjects variable, to examine the interaction effect of group and destination. We entered week as a covariate to control for any trend in change over time. We calculated 95% confidence intervals for mean differences between the groups. We used a multilevel Poisson regression, with weeks defining the level 2 clusters, to analyse the number of additional consultations. We calculated cost data for individual patients by summating all healthcare costs on the day of the index consultation and for one month after. We then aggregated these by using the mean, to the week level. We calculated sample means and standard deviations to compare mean differences for each cost category between the groups, controlling for week number alone, and then again for the percentage of patients ending at each final point of contact in that week. If the first test is statistically significant and the second is not, this would suggest that the difference in costs between the groups is entirely mediated by the final destination.[8]

Results

A total of 4788 patients requested same day appointments during the trial period (fig). Seventy patients declined to participate, 68 in the NHS Direct arm and two in the usual care arm. Fifteen patients could not be contacted after their request for an appointment, leaving 4703 patients for whom we have data in the study, 2452 in the usual care group and 2251 in the NHS Direct group. The groups were equivalent in terms of age, sex, and number and type of presenting complaints, apart from more patients in the practice group with genitourinary complaints (table 1).

In the NHS Direct weeks the mean number of patients was 173.8 (SD 26.2, minimum 119, maximum 220); in the practice

Table 2 Final point of contact for patients requesting same day appointments triaged by NHS Direct or practice. Values are numbers (percentages) unless stated otherwise

Type of final point of contact	NHS Direct (n=2260)	Practice (n=2458)	Difference in percentage: NHS Direct–practice (95% CI)	P value
Nurse: phone	599 (26.52)	739 (30.07)	–3.55 (–6.83 to –0.31)	0.033
Nurse: appointment	242 (10.71)	341 (13.87)	–3.16 (–5.11 to –1.18)	0.003
General practitioner: phone	72 (3.19)	72 (2.93)	0.26 (–1.04 to 1.55)	0.689
General practitioner: appointment	1083 (47.92)	1033 (42.03)	5.89 (2.28 to 9.46)	0.003
Home visit	255 (11.28)	267 (10.86)	0.42 (–1.89 to 2.73)	0.709
No further contact	9 (0.40)	6 (0.24)	0.16 (–0.29 to 0.63)	0.450

weeks the mean was 189.0 (SD 32.1, minimum 140, maximum 250). A repeated measures analysis of variance gave a Greenhouse-Geisser corrected F of 7.1 (df = 2.7, 62.3; P = 0.001) for the interaction effect of group and final point of contact. Patients in the NHS Direct group were less likely to have their call resolved by a telephone contact or appointment with a nurse and were more likely to have an appointment with a general practitioner (table 2).

Time taken to manage same day requests

We found a significant difference in average nursing time between NHS Direct and practice triage; NHS Direct took 6.9 minutes longer to triage patients (table 3). When we controlled statistically for final destinations, the difference remained significant at 7.5 minutes. The average amount of general practitioner's time per patient was greater for NHS Direct patients (0.7 minutes), but when we controlled for final destinations the difference was no longer significant (0.2 minutes). The total time needed to manage patients' requests was dominated by nursing time, which is reflected in the average total time difference of 7.6 minutes, or 7.7 minutes when we controlled for final destination.

Follow up care one month after same day appointment

We found no differences between the groups in the number of patients receiving further practice based care, out of hours care, or emergency services within one month of the index consultation (table 4).

Costs

Same day costs for general practitioners and nurses were greater in the NHS Direct group, leading to an overall mean cost difference of £2.88 ($5.16; €4.23) per patient triaged (table 5). We found no differences in other practice based costs (general practitioner and nurse follow up time, drugs, and tests), out of hours costs, or emergency department costs. When we controlled for final point of contact, the difference in nurse costs remained greater for NHS Direct but the total cost (£1.50) was no longer significantly different. When we increased the unit costs of gen-

Table 3 Mean (SD) nursing time, general practitioners' time, and total time per patient after triage by NHS Direct or practice

	Time (minutes)		Not controlled for final point of contact		Controlled for final point of contact	
Time	NHS Direct	Practice	Difference: NHS Direct–practice (95% CI)	P value	Difference: NHS Direct–practice (95% CI)	P value
Nurse	11.16 (1.34)	4.26 (0.45)	6.90 (6.07 to 7.72)	<0.001	7.49 (6.42 to 8.57)	<0.001
General practitioner	6.53 (0.75)	5.81 (0.61)	0.72 (0.27 to 1.17)	0.003	0.19 (–0.25 to 0.62)	0.377
Total	17.69 (1.63)	10.07 (0.55)	7.62 (6.66 to 8.58)	<0.001	7.68 (6.53 to 8.83)	<0.001

Table 4 Results of Poisson regression of number of practice based, emergency department, and out of hours consultations within one month for patients managed by NHS Direct or practice triage

	Mean No of consultations/patient		Not controlled for final point of contact		Controlled for final point of contact	
Consultations	NHS Direct	Practice	Ratio: NHS Direct/practice (95% CI)*	P value	Ratio: NHS Direct/practice (95% CI)*	P value
Practice	1.43	1.37	1.04 (0.94 to 1.15)	0.46	1.04 (0.94 to 1.15)	0.49
Emergency department	0.053	0.047	1.13 (0.80 to 1.59)	0.49	1.10 (0.79 to 1.54)	0.58
Out of hours	0.082	0.077	1.07 (0.73 to 1.55)	0.74	1.05 (0.72 to 1.52)	0.81

*Poisson regression change estimates are multiplicative, rather than additive; an estimate of 1.00 is equal to no change.

Table 5 Difference in costs of care for NHS Direct and practice triage—costs on day plus total costs incurred one month after request for same day appointment

	Costs (£)		Not controlled for final point of contact		Controlled for final point of contact	
Activity or resource	NHS Direct	Practice	Difference in cost: NHS Direct–practice (95% CI)	P value	Difference in cost: NHS Direct–practice (95% CI)	P value
Nurse: same day	2.69	1.18	1.51 (1.31 to 1.71)	<0.001	1.66 (1.40 to 1.93)	<0.001
General practitioner: same day	5.71	5.08	0.63 (0.23 to 1.71)	0.003	0.16 (–0.21 to 0.54)	0.377
Nurse: follow up	0.53	0.55	–0.02 (–0.05 to 0.08)	0.736	–0.04 (–0.21 to 0.13)	0.656
General practitioner: follow up	6.21	5.71	0.50 (–0.2 to 1.19)	0.151	0.35 (–0.68 to 1.38)	0.481
Drugs	3.31	3.29	0.02 (–0.69 to 0.72)	0.962	0.39 (–0.75 to 1.52)	0.484
Tests and radiography	0.24	0.21	0.03 (–0.003 to 0.11)	0.609	–0.11 (–0.24 to 0.03)	0.123
Out of hours	2.54	2.45	0.09 (–0.95 to 1.12)	0.867	–0.42 (–1.98 to 1.15)	0.583
Emergency department	2.42	2.24	0.18 (–0.68 to 1.04)	0.668	–0.42 (–1.57 to 0.73)	0.451
Total	23.61	20.73	2.88 (0.88 to 4.87)	0.007	1.50 (–1.58 to 4.58)	0.320

eral practitioners' and nurses' salaries by including training costs as well as salary costs, the total costs remained different (mean difference £4.15, 95% confidence interval £2.00 to £6.36; P = 0.001), but this was not the case once we had controlled for final point of contact (£2.71, −£0.66 to £6.08; P = 0.108). In a final sensitivity analysis, we reduced NHS Direct nurse time by half a standard deviation, which left nurse costs still significantly different (£0.49, £0.35 to £0.63; P < 0.001) but reduced the overall cost difference to just under the 0.05 significance level (£1.86, −£0.86 to £3.87; P = 0.07). Using these reduced figures and controlling for final point of contact resulted in nurse costs remaining greater for NHS Direct (£0.61, £0.43 to £0.79; P < 0.001) but no difference in the total costs (£0.44, −£2.66 to £3.54; P = 0.77).

Discussion

This study's findings, that telephone triage by NHS Direct took longer and was more costly than the usual practice based triage procedure, are accounted for by two factors. Firstly, NHS Direct nurse advisers managed fewer calls by telephone care by nurses alone, made fewer referrals to appointments with nurses, and referred more patients to general practitioners. Secondly, nurse time was more than 2.5 times greater for the NHS Direct group, leading to a greater overall patient management time. Despite nurses being employed at a lower grade, same day costs of nursing care in the NHS Direct group were about 11% of total costs compared with 6% in the practice group. Costs were more sensitive to the proportions of patients at each final point of contact than to nursing costs.

Several possible explanations for these results exist. Unlike practice nurses, NHS Direct advisers were not able to use previous knowledge of patients to speed decision making. However, the practice nurses rotate around our sites and also may not have had knowledge of patients. Although they do have access to patients' records and reported sometimes using these to assist decision making, this is unlikely to be the sole reason for our results. Other explanations include the fact that NHS Direct uses sophisticated but lengthy algorithm based decision support software that nurse advisers must work through fully; that most nurse advisers have never worked in general practice and will be unfamiliar with practice nursing; and that practice nurses delivering triage are the same nurses who subsequently see patients face to face and will have a greater sense of their own competence in consultations.

If NHS Direct were to increase the number of patients who receive nurse only care up to the levels achieved by the practice, costs would not be different from practice based triage, despite the longer time taken by nurse advisers to work through clinical algorithms. In contrast, nurse time in NHS Direct would need to be reduced by almost 40% before costs would become barely comparable. Although the algorithm approach may be more likely to lead to safer decision making, we found no evidence that patients used more out of hours, emergency department, or practice based follow up resources in either group. Previous research has found that telephone triage by nurses is a safe system of managing requests for primary care,[2] and our own work has shown low levels of potentially unsafe decision making in triage.[9]

Limitations

The measurement of time in the usual care group was not as robust as the electronic system used in NHS Direct and may have affected the results. Generalisability of our results is limited by the study being done in a single multisite practice that was experienced in using triage and had an interest in new methods of arranging appointments.

What is already known on this topic

Nurse telephone triage is a popular system of managing requests for same day appointments in general practice

Triage is not cheaper than standard appointment systems, and general practices may be unable to deliver a comprehensive service themselves

What this study adds

Triage by NHS Direct does not achieve equivalent outcomes to practice based triage

NHS Direct triage costs more than practice based triage

If NHS Direct could achieve the same patient disposal proportions as practice based triage, costs would be comparable

Conclusions

We have shown that external management of requests for same day appointments through NHS Direct is feasible but comes at a higher cost than practice nurse delivered triage. Outcomes for patients on the day of the request were more likely to involve an appointment with a general practitioner in the NHS Direct group. If NHS Direct could achieve the same patient disposal proportions as practice based triage, costs would be comparable. External triage of same day appointment requests is, therefore, possible, although no economies of scale are possible. Nonetheless, the flexibility of an organisation the size of NHS Direct could ensure coverage of all the triage needed. An external triage service might be feasible for smaller practices with fewer resources to organise their own systems.

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