

# A systematic review of the effect of different models of after-hours primary medical care services on clinical outcome, medical workload, and patient and GP satisfaction

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**Background.** The organization of after-hours primary medical care services is changing in many countries. Increasing demand, economic considerations and changes in doctors' attitudes are fuelling these changes. Information for policy makers in this field is needed. However, a comprehensive review of the international literature that compares the effects of one model of after-hours care with another is lacking.

**Objective.** The aim of this study was to carry out a systematic review of the international literature to determine what evidence exists about the effect of different models of out-of-hours primary medical care service on outcome.

**Methods.** Original studies and systematic reviews written since 1976 on the subject of 'after-hours primary medical care services' were identified. Databases searched were Medline/Premedline, CINAHL, HealthSTAR, Current Contents, Cochrane Reviews, DARE, EBM Reviews and EconLit. For each paper where the optimal design would have been an interventional study, the 'level' of evidence was assessed as described in the *National Health and Medical Research Council Handbook*. 'Comparative' studies (levels I, II, III and IV pre-/post-test studies) were included in this review.

**Results.** Six main models of after-hours primary care services (not mutually exclusive) were identified: practice-based services, deputizing services, emergency departments, co-operatives, primary care centres, and telephone triage and advice services. Outcomes were divided into the following categories: clinical outcomes, medical workload, and patient and GP satisfaction. The results indicate that the introduction of a telephone triage and advice service for after-hours primary medical care may reduce the immediate medical workload. Deputizing services increase immediate medical workload because of the low use of telephone advice and the high home visiting rate. Co-operatives, which use telephone triage and primary care centres and have a low home visiting rate, reduce immediate medical workload. There is little evidence on the effect of different service models on subsequent medical workload apart from the finding that GPs working in emergency departments may reduce the subsequent medical workload. There was very little evidence about the advantages of one service model compared with another in relation to clinical outcome. Studies consistently showed patient dissatisfaction with telephone consultations.

**Conclusions.** The rapid growth in telephone triage and advice services appears to have the advantage of reducing immediate medical workload through the substitution of telephone consultations for in-person consultations, and this has the potential to reduce costs. However, this has to be balanced with the finding of reduced patient satisfaction when in-person consultations are replaced by telephone consultations. These findings should be borne in mind by policy makers deciding on the shape of future services.

**Keywords.** Family practice, house calls, night care, primary health care, telecommunications.

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## Introduction

The organization of after-hours primary medical care services is changing in many countries.<sup>1–3</sup> These changes are due in part to changes in GPs' attitudes,<sup>4</sup> in part to increasing demand for after-hours care,<sup>5</sup> and in part to an attempt to reduce costs.<sup>2</sup> Information for policy makers in the field of after-hours medical care is needed. However, a comprehensive review of the international literature that compares the effects of one model of after-hours care with another is lacking.

The trend away from GPs looking after their own patients at home after hours started with the use of deputizing services, and in the UK and Australia the use of deputizing services after hours is now widespread in urban areas. In many countries, there has also been increased use of telephone triage and advice services in primary care.<sup>2</sup> The USA was the first country to use these services extensively in primary care, and their use is continuing to grow. In the UK, there has been a mushrooming of GP co-operatives that offer a combination of telephone triage and advice services, primary care centres and home visits.<sup>3</sup> There has also been the recent launch of 'NHS Direct', a national UK telephone advice service. In Australia, there has been a growth in the number of telephone advice services. One of the largest is HealthDirect in Perth, which operates 24 h a day and provides telephone triage coverage to all of Western Australia.

This article is based on the findings of the literature review undertaken as part of the national evaluation of the After Hours Primary Medical Care Trial that was run recently by the Department of Health and Aged Care (DHAC) in Australia.

## Methods

Original studies and systematic reviews written since 1976 on the subject of 'after hours primary medical care services' were identified. Sources used were database searches (Medline/Premedline, CINAHL, HealthSTAR, Current Contents, Cochrane Reviews, DARE, EBM Reviews, EconLit), snowballing and colleagues. Searches were restricted to English language papers using combinations of the terms 'primary health care', 'family practice' and text words 'after hours', 'out of hours', 'general practice', 'telephone' and 'telephone triage'.

For each paper where the optimal design would have been an interventional study, the 'level' of evidence was assessed as described in the *National Health and Medical Research Council Handbook*.<sup>6</sup> 'Comparative' studies (levels I, II, III and IV pre-/post-test studies) were included in the review. The majority of studies identified in the search process were studies that investigated outcomes within one service model with no comparison group (i.e. level IV, post only studies). These studies were not included in the review.

Categorizing studies according to their 'level' was a useful way of identifying studies that were best designed to answer the question posed by this review (i.e. the effect of different service models on outcome). However, aspects of a study other than the study design can also bias the results. Comments on other possible sources of bias in the studies are included on an individual basis.

For a few of the comparative studies (specifically those investigating the quality of telephone consultations), the grading system was inappropriate and they were not assigned a 'level'. These types of studies are best assessed in the same way as studies investigating a diagnostic test—the ideal study design is a representative sample of people in whom the test is compared with an appropriate 'gold standard'.<sup>6</sup>

Outcome categories were chosen which would cover all the outcomes measured in the studies selected in this review.

## Search Results

Six main models of after-hours primary care services (non-mutually exclusive) were identified:

- (i) practice-based services (GPs within a practice looking after their own patients after hours);
- (ii) deputizing services (commercial companies employing doctors to provide an after-hours service);
- (iii) emergency departments (primary care patients using the emergency department after hours);
- (iv) co-operatives (GPs from different practices forming a non-profit making organization to provide care for their own patients after hours);
- (v) primary care centres (patients attending a centre rather than being seen in their own home or in the emergency department after hours); and
- (vi) telephone triage and advice services (the use of telephone consultations for primary care patients seeking medical help after hours).

Outcomes were divided into the following categories: medical workload (where possible divided into immediate and subsequent medical workload), clinical outcomes, and patient and doctor satisfaction.

Our search revealed few studies that compared these different models, and fewer still had strong study designs. Table 1 shows the 'level' ascribed to each comparative study and the outcomes that were measured in each study. The studies using a 'gold standard' comparison are shown in Table 2.

### *Impact on medical workload*

*Deputizing service versus practice-based service.* A randomized controlled trial (RCT) from the UK by Cragg and McKinley compared out-of-hours care provided by

TABLE 1 'Level' ascribed to and outcomes measured for each comparative study

Comparison	Studies	Level of evidence	Outcome			
			Medical workload	Clinical outcomes	Doctor satisfaction	Patient satisfaction
Deputizing service versus practice-based service	Cragg <i>et al.</i> <sup>7</sup>	III-1	x	x		x
	McKinley <i>et al.</i> <sup>8</sup>	III-1	x	x		x
	McKinley and Roberts <sup>9</sup>					x
	Bollam <i>et al.</i> <sup>10</sup>	III-2				x
Co-operative service versus deputizing service	Salisbury <sup>11</sup>	III-2	x			
	Salisbury <sup>12</sup>	III-2				x
	Salisbury <sup>13</sup>	III-2			x	
Effect of telephone triage and advice service	Lattimer <i>et al.</i> <sup>14</sup>	II	x	x		
	Thompson <i>et al.</i> <sup>15</sup>	II	x			
	O'Connell and Johnson <sup>16</sup>	IV pre-post	x			
	Christensen and Olesen <sup>17</sup>	IV pre-post	x			x
	Hansen and Munck <sup>18</sup>	IV pre-post	x			x
	Munro <i>et al.</i> <sup>19</sup>	IV pre-post	x			
	Darnell <i>et al.</i> <sup>20</sup>	II	x			
Effect of GPs working in Emergency Departments	Murphy <i>et al.</i> <sup>21</sup>	II	x	x		
	Dale <i>et al.</i> <sup>22</sup>	III-2	x	x		
Practice-based service versus deputizing service versus co-operative service	Shipman <i>et al.</i> <sup>23</sup>	III-2				x
Practice-based service versus primary care centre	Chesteen <i>et al.</i> <sup>24</sup>	III-2				x
Co-operative service versus practice-based service	Fletcher <i>et al.</i> <sup>25</sup>	IV pre-post			x	

TABLE 2 Studies using a 'gold standard' comparator

Comparison	Studies
Telephone advice given to simulated patients compared with 'gold standard'	Widger, <sup>26</sup> Verdile <i>et al.</i> , <sup>27</sup> Aitken, <sup>28</sup> Goodman and Perrin, <sup>29</sup> Evans <i>et al.</i> , <sup>30</sup> Isaacman <i>et al.</i> , <sup>31</sup> Wachter <sup>32</sup>
Telephone advice given to real patients compared with 'gold standard'	Fatovitch <i>et al.</i> , <sup>33</sup> Eggleston <i>et al.</i> , <sup>34</sup> Crouch and Dale <sup>35</sup>

patients' own GPs and commercial deputizing services.<sup>7,8</sup> The results indicated that for:

- *immediate medical workload*: practice doctors were more likely to give telephone advice (20% versus 0.7% of calls) and visited more quickly than deputizing doctors (median delay 35 min versus 52 min).
- *subsequent medical workload*: there was no significant difference in the number of hospital admissions, or subsequent use of the health services between the two groups measured 24–120 h after the out-of-hours call.

However, bias may have been introduced into this study as it seems likely from the study design that the GPs would realize that they were participating in a study while the deputizing doctors may have been unaware of this.

*Deputizing service versus co-operative.* A prospective cohort study carried out in an area of London compared two services with overlapping geographical areas, one a deputizing service and one a co-operative.<sup>11</sup> Data were collected on 5812 patient contacts, and the results indicated that for:

- *immediate medical workload*: doctors from the co-operative visited 32.0% of patients, offered telephone advice to 57.8%, and saw 7.1% of patients at the primary care centre. In contrast, the deputizing service visited 76.3% of patients and gave telephone advice to 19.3%. Response times for the deputizing service were faster than for the co-operative (median time to visit 65 min versus 75 min) but the time to first contact with a doctor was shorter for the

co-operative because most people initially received telephone advice.

- *subsequent medical workload:* doctors from the co-operative admitted fewer patients to hospital compared with doctors from the deputizing service [6.8% versus 8.7%, odds ratio 1.30 (1.05–1.61) adjusted for age and sex].

*Telephone triage and advice service.* A well-designed RCT by Lattimer<sup>14</sup> from the UK compared a nurse telephone consultation service (experienced, specially trained nurses using the help of decision support software) integrated within a general practice co-operative, with the usual practice of the co-operative (receptionist taking call details and then passing them on to a doctor). The results indicated that for:

- *immediate medical workload:* nurses managed 49.8% of calls without referral to a GP. There was a 69% reduction in telephone advice from a GP, together with a 38% reduction in patient attendance at primary care centres and a 23% reduction in home visits during the intervention.
- *subsequent medical workload:* there was no difference in the number of emergency hospital admissions (within 24 h and within 3 days of contact), and in the number of attendances at Accident and Emergency (A&E) departments within 3 days of contact.

An RCT from the USA<sup>20</sup> examined the effect of after-hours telephone access to physicians on hospitalizations and emergency room (ER) visits in an inner city, adult, general medicine clinic. Patients in the study group had after-hours telephone access to physicians.

- *Immediate and subsequent medical workload:* the study found no significant differences in hospitalizations or ER visits among the control and study group. However, the uptake of the service was low, which may have affected the ability of the study to detect a difference.

A study from the USA used a pre-post design to evaluate changes in medical service utilization associated with implementation of a telephone-based nurse triage service.<sup>16</sup>

- *Immediate and subsequent medical workload:* the results indicated that implementation of the new system significantly lowered utilization of hospital emergency department (15% decrease) and out-patient physician services (11% decrease).

In 1992 in Denmark, locally organized GP after-hours services were replaced with centrally organized services that included telephone triage and advice services. Two large studies from Denmark compared data before and after the reform. Christensen,<sup>17</sup> looking at retrospectively collected national data, found that:

- *immediate medical workload:* the percentage of phone consultations (problems managed over the

phone) had almost doubled to 48%; the number of consultations in doctors' surgeries were relatively unchanged, but home visits were much reduced from 46 to 18%.

Hansen<sup>18</sup> carried out a study in the county of Funen. Three years after the change, he found the following:

- *immediate medical workload:* there were more than twice as many telephone consultations as before the change, and there were only a third as many home visits.

A before/after study looked at trends in the use of other immediate care services over the 24 months following the introduction of NHS Direct (nurse telephone triage and advice service).<sup>19</sup> They found:

- *immediate and subsequent medical workload:* a small, but significant, change in use of GP co-operatives (an increase of 2.0% a month before the introduction of NHS Direct to –0.8% afterwards). This contrasted with control co-operatives which showed no evidence of a change (0.8% before NHS Direct compared with 0.9% after). There were no significant changes in trends in use of A&E and ambulance services after introduction of NHS Direct.

*GPs working in emergency departments.* An RCT carried out in Dublin<sup>21</sup> looked at how GPs working in A&E departments managed 'non-emergency' attenders (as triaged by nurses) compared with usual A&E staff.

- *subsequent medical workload:* they found that GPs investigated fewer patients [relative difference 20%, 95% confidence interval (CI) 16–25], referred to other hospital services less often (39%, CI 28–47) and admitted fewer patients (45%, CI 32–56).

A cohort study carried out in south London<sup>22</sup> found similar results. It found the following:

- *subsequent medical workload:* experienced GPs used fewer resources and ordered fewer investigations than junior staff (residents and registrars) when managing similar patients. Both these studies were not specifically looking at patients attending out-of-hours, but some of the patients were seen after hours.

#### *Impact on clinical outcomes*

*Deputizing service versus practice-based service.* The RCT by Cragg and McKinley<sup>7,8</sup> found that prescribing patterns of deputizing doctors might have been less discriminating than practice-based doctors. Practice doctors were less likely to issue a prescription (56% versus 63% of patients), and less likely to prescribe an antibiotic (44% versus 61% of prescriptions issued) than deputizing doctors. They were more likely to prescribe generic drugs (58% versus 32% of drugs prescribed), cheaper drugs



(mean cost of per prescription £3.28 versus £5.04), and drugs in a predefined formulary (50% versus 41%). There was no significant difference in the overall health status measured 24–120 h after the out-of-hours call, number of hospital admissions or subsequent use of the health service between the two groups.

*Deputizing service versus co-operative.* The study by Salisbury<sup>11</sup> found that doctors from the co-operative service prescribed drugs to fewer patients than did the deputizing service (37.6% versus 51.7%).

*Telephone triage and advice service.* The Lattimer<sup>14</sup> RCT in the UK observed no difference between those patients that received a nurse telephone consultation first compared with those where their phone call was transferred immediately by the doctor in the number of deaths within 7 days.

A number of studies have used simulated patients to determine the quality of advice given over the phone in a variety of primary care settings.<sup>26–32</sup> Many of these studies found variability and inadequacies in the telephone advice given. Other studies looked at the appropriateness of advice given to real patients in an A&E setting.<sup>33,34</sup> They found that ‘appropriate’ advice was given to the great majority of patients. A review by Crouch<sup>35</sup> pointed out methodological problems with many of these studies and also pointed out issues of validity in this type of study.

*GPs working in emergency departments.* The Dublin study<sup>21</sup> investigating GPs working in A&E Departments found that GPs managed ‘non-emergency’ attenders (as triaged by nurses) as safely as the usual A&E staff. No difference was found in health status of the patients 1 month after the consultation. This study also found that GPs prescribed more often than the usual hospital staff. A study investigating GPs working in A&E in London<sup>22</sup> found that experienced GPs prescribed more appropriately than junior staff (residents and registrars), and there was no increase in adverse outcomes.

#### *Impact on patient satisfaction*

*Deputizing service versus practice-based service.* The RCT from the UK by Cragg and McKinley assessed patient satisfaction with a questionnaire developed by established qualitative and quantitative methods.<sup>8,36</sup> The study found that 61.8% of patients (95% CI 59.9–63.7) seen by deputizing doctors were satisfied with the care they received, compared with 70.7% (95% CI 68.1–73.2) of patients seen by practice doctors. The greatest difference in satisfaction was with the delay in visiting. Further analysis of the data from this study<sup>9</sup> found that lower satisfaction was expressed by those that were younger, did not have access to a car, expected but did not receive domiciliary care (a home visit) and experienced longer delays between request and care.

In another study, a sample of 177 patients drawn from 13 north London practices were interviewed shortly after they had sought help from their practice outside normal surgery hours.<sup>10</sup> Patients were asked their satisfaction with the encounter. Visits from GPs were more acceptable than visits from deputizing doctors for patients aged under 60, but for patients aged over 60 visits from GPs and deputizing doctors were equally acceptable.

*Deputizing service versus co-operative.* A validated postal questionnaire<sup>36</sup> survey of two overlapping services, one deputizing and one co-operative,<sup>12</sup> found little difference in overall satisfaction (67% response rate). Lower scores for overall satisfaction were reported by patients who received telephone advice, those who would have preferred to see their own doctor, and those who waited longer for their consultation. They reported that levels of patient satisfaction seemed to be lower than previously reported. The authors suggested that “a shift to a service based predominantly on telephone advice may lead to increased patient dissatisfaction”.

*Deputizing service versus co-operative versus practice-based service.* A study using the same study design and same validated questionnaire as above<sup>36</sup> compared patient satisfaction with co-operative, deputizing and practice-based after-hours care (53% response rate). It found that overall levels of satisfaction did not differ by organization. It did find that within the co-operative system, satisfaction was highest for those attending primary care centres, followed by those receiving home visits, and the least satisfied were those receiving telephone advice.<sup>23</sup>

*Telephone triage and advice service.* The two Danish articles<sup>17,18</sup> both presented the same data on patient satisfaction before and after the reforms. Questionnaires were sent to patients before and after the reforms. Response rates were in the mid seventies for both before and after questionnaires. They found that patient satisfaction was significantly lower in 1992 than in 1991. Satisfaction rose again in 1995, but was still significantly lower than in 1991. The main complaint was receiving telephone advice when they were expecting a home visit. The percentage dissatisfied was 13% in 1991, 28% in 1992 and 19% in 1995. Two other studies discussed above also found that there was reduced satisfaction with telephone consultation.<sup>12,23</sup>

*Primary care walk-in emergency centre versus practice-based service.* A study comparing free-standing walk-in emergency centres and family practice clinics in Utah, USA found a higher level of satisfaction with free-standing centres (convenience, waiting time, time spent with physician, time to get appointment, clinic location, out of pocket cost).<sup>24</sup> Costs were higher in free-standing centres. Personal concern and ability to see the same physician brought higher levels of satisfaction for the family

practice clinic patients. They concluded “the free-standing emergency center is clearly becoming a significant factor in the delivery of primary care with evidence to suggest that patients are willing to pay a premium for convenience.”

*GPs working in emergency departments.* As part of the RCT carried out in Dublin,<sup>21</sup> analysis of a consultation satisfaction questionnaire found no difference in satisfaction between patients managed by GPs in the A&E department and those managed by the usual A&E staff.

#### *Impact on doctor satisfaction*

*Co-operative versus practice-based service.* A study from Buckinghamshire, UK, found that the development of after-hours co-operatives was an important factor in the improvement of GPs' health status.<sup>25</sup>

*Co-operative versus deputizing service.* An anonymous postal questionnaire was sent to all GPs belonging to the co-operative or subscribing to the deputizing service. The overall response rate was 72% (202/280), with responses from 80% (111/139) of co-operative users and 65% (91/141) of users of the deputizing service. Overall, 184/201 [92% (88–95%)] of respondents were satisfied or very satisfied with their arrangements for out-of-hours care, with co-operative members being more satisfied ( $U = 3478$ ,  $P < 0.001$ ), particularly with the quality of prescribing and the duty doctors' reports.

## Discussion

This review uncovered few studies with a high quality study design. This is perhaps not surprising considering the logistic and cost difficulties in organizing such a study. Studies included in this review were from the UK, Australia, Denmark, Ireland, Canada and the USA. The USA has a very different provision of primary health care compared with the other countries listed. All the other countries have a GP-based system, but even between these countries there is great variation in how the GP systems operate. The difficulty in comparing the results of studies carried out in one health care setting with those carried out in a different setting need to be borne in mind when evaluating the studies. The highest quality studies have come from the UK, possibly because government funding and organization of the health service make such studies more feasible. This has perhaps given the review a bias towards findings applicable to the UK system.

Our categorization of service models was carried out after our literature search. It has not been devised to be an exhaustive list of all the possible types of service model, but as a means to compare the results of studies of service models included in this review. A shortcoming of our categorization is that some of our models are types of organization, e.g. co-operatives and deputizing services, and others are modes of delivery, e.g. telephone

advice and primary care centres. This does make it hard to disentangle whether it is the mode of delivery or the organization that is responsible for a different outcome. Additionally, different organizations may change their mode of service delivery over time, e.g. deputizing services have, in recent years, increased their use of telephone advice services.

Our categorization of outcomes, likewise, was decided on after our literature search. The outcome of 'medical workload' was subdivided in some studies, where the data were available, into 'immediate medical workload' and 'subsequent medical workload'. 'Subsequent medical workload' could have been categorized as a clinical outcome as it may be a marker of failure of the original contact with the after-hours service. However, we have chosen to categorize it within 'medical workload' to avoid making unproven assumptions.

#### *Medical workload*

The results indicate that the introduction of a telephone triage and advice service for after-hours primary medical care may reduce the immediate medical workload. Deputizing services increase immediate medical workload because of the low use of telephone advice and the high home visiting rate. Co-operatives, which use telephone triage and primary care centres and have a low home visiting rate, may reduce the immediate medical workload. There is little evidence on the effect of different service models on subsequent medical workload apart from GPs working in emergency departments where the evidence points to a reduction in subsequent medical workload compared with A&E staff.

#### *Clinical outcomes*

There is very little evidence about the advantages of one service model compared with another in relation to clinical outcome. The only area of clinical practice where there is some limited evidence is about differences in prescribing habits. The evidence suggests that deputizing doctors may prescribe less appropriately than doctors from practice-based or co-operative services, and that GPs prescribe more appropriately than junior emergency medical staff.

#### *Patient satisfaction*

Studies consistently showed patient dissatisfaction with telephone consultations. No conclusive differences in patient satisfaction between other service models were found. There are indications that in the UK, at least, people are becoming more accepting of the idea of visiting a primary care centre after hours rather than receiving a home visit.

#### *Doctor satisfaction*

There is little evidence available on this topic.

The findings from this review on telephone consultations are in line with what may have been expected,

i.e. that telephone consultations have the advantage of reducing the immediate medical workload but are not popular with patients. However, it is useful to have these theoretical hypotheses confirmed by this review. Policy makers will have to weigh up these conflicting findings in making future decisions about telephone consultation services. The lack of evidence about clinical outcome is stark, and reflects the logistic difficulties and costs of undertaking well designed studies in this field. However, when one considers the overall cost of after-hours medical care which is immense, research in clinical outcomes, despite the investment required, is still worthwhile.

## Conclusion

The rapid growth in telephone triage and advice services appears to have the advantage of reducing immediate medical workload through the substitution of telephone consultations for in-person consultations, and this has the potential to reduce costs. However, this has to be balanced with the finding of reduced patient satisfaction when in-person consultations are replaced by telephone consultations. These findings should be borne in mind by policy makers deciding on the shape of future services.

## References

- Jessopp L, Beck I, Hollins L, Shipman C, Reynolds M, Dale J. Changing the pattern out of hours: a survey of general practice cooperatives. *Br Med J* 1997; **314**: 199–200.
- Shekelle P, Roland M. Nurse-led telephone-advice lines. *Lancet* 1999; **354**: 88–89.
- Hallam L. Out-of-hours primary care. *Br Med J* 1997; **314**: 157–158.
- Lattimer V, Smith H, Hungin P, Glasper A, George S. Future provision of out-of-hours primary medical care: a survey with two general practitioner research networks. *Br Med J* 1996; **312**: 352–356.
- Salisbury C. The demand for out-of-hours care from GPs: a review. *Fam Pract* 2000; **17**: 340–347.
- National Health and Medical Research Council. *How to Use the Evidence: Assessment and Application of Scientific Evidence*. London: National Health and Medical Research Council, 2000.
- Cragg DK, McKinley RK, Roland MO *et al*. Comparison of out-of-hours care provided by patients' own general practitioners and commercial deputising services: a randomised controlled trial. I: the process of care. *Br Med J* 1997; **314**: 187–189.
- McKinley RK, Cragg DK, Hastings AM *et al*. Comparison of out-of-hours care provided by patients' own general practitioners and commercial deputising services: a randomised controlled trial. II: the outcome of care. *Br Med J* 1997; **314**: 190–193.
- McKinley RK, Roberts C. Patient satisfaction with out-of-hours primary medical care. *Qual Health Care* 2001; **10**: 23–28.
- Bollam MJ, McCarthy M, Modell M. Patient's assessment of out-of-hours care in general practice. *Br Med J* 1988; **296**: 829–832.
- Salisbury C. Observational study of a general practice out-of-hours cooperative: measures of activity. *Br Med J* 1997; **314**: 182–186.
- Salisbury C. Postal survey of patients' satisfaction with a general practice out-of-hours cooperative. *Br Med J* 1997; **314**: 1594–1598.
- Salisbury C. Evaluation of a general practice out-of-hours cooperative: a questionnaire survey of general practitioners. *Br Med J* 1997; **314**: 1598–1599.
- Lattimer V, George S, Thompson F *et al*. Safety and effectiveness of nurse telephone consultation in out-of-hours primary care: randomised controlled trial. The South Wiltshire Out of Hours Project (SWOOP) Group. *Br Med J* 1998; **317**: 1054–1059.
- Thompson F, George S, Lattimer V *et al*. Overnight calls in primary care: randomised controlled trial of management using nurse telephone consultation. *Br Med J* 1999; **319**: 1408–1408.
- O'Connell J, Johnson D. The cost-effectiveness of a telephone-based nurse triage service as determined by assessing changes in medical service utilization. *Abstr Book Assoc Health Serv Res* 1998; **15**: 200.
- Christensen MB, Olesen F. Out-of-hours service in Denmark: evaluation five years after reform. *Br Med J* 1998; **316**: 1502–1505.
- Hansen BL, Munck A. Out-of-hours service in Denmark: the effect of a structural change. *Br J Gen Pract* 1998; **48**: 1497–1499.
- Munro J, Nicholl J, O'Cathain A, Knowles E. Impact of NHS Direct on demand for immediate care: observational study. *Br Med J* 2000; **321**: 150–153.
- Darnell JC, Hiner SL, Neill PJ *et al*. After-hours telephone access to physicians with access to computerized medical records. Experience in an inner-city general medicine clinic. *Med Care* 1985; **23**: 20–26.
- Murphy A, Bury G, Plunkett PK *et al*. Randomised controlled trial of general practitioner versus usual medical care in an urban accident and emergency department: process, outcome, and comparative cost. *Br Med J* 1996; **312**: 1135–1142.
- Dale J, Green J, Reid F, Gluckman E, Higgs R. Primary care in the accident and emergency department: I. Prospective identification of patients. *Br Med J* 1995; **311**: 423–426.
- Shipman C, Payne F, Hooper R, Dale J. Patient satisfaction with out-of-hours services; how do GP co-operatives compare with deputizing and practice-based arrangements? *J Publ Health Med* 2000; **22**: 149–154.
- Chesteen SA, Warren SE, Woolley FR. A comparison of family practice clinics and free-standing emergency centers: organizational characteristics, process of care, and patient satisfaction. *J Fam Pract* 1986; **23**: 377–382.
- Fletcher J, Pickard D, Rose J *et al*. Do out-of-hours co-operatives improve general practitioners' health? *Br J Gen Pract* 2000; **50**: 815–816.
- Widger H. Emergency department poison advice telephone calls. *Ann Emergency Med* 1995; **25**: 349–352.
- Verdile V, Paris PM, Stewart RD, Verdile LA. Emergency department telephone advice. *Ann Emergency Med* 1989; **18**: 278–282.
- Aitken M. Telephone advice about an infant given by after-hours clinics and emergency departments. *NZ Med J* 1995; **108**: 315–317.
- Goodman HC, Perrin EC. Evening telephone call management by nurse practitioners and physicians. *Nurs Res* 1978; **27**: 233–237.
- Evans RJ, McCabe M, Allen H, Ranier T, Richmond PW. Telephone advice in the accident and emergency department: a survey of current practice. *Arch Emergency Med* 1993; **10**: 216–219.
- Isaacman D, Verdile VP, Kohen FP, Verdile LA. Paediatric telephone advice in the emergency department: results of a mock scenario. *Paediatrics* 1992; **89**: 35–39.
- Wachter D. Paediatric telephone triage protocols: standardised decision-making or a false sense of security? *Ann Emergency Med* 1999; **33**: 388–394.
- Fatovich DM, Jacobs IG, McCance JP, Sidney KL, White RJ. Emergency department telephone advice. *Med J Aust* 1998; **169**: 143–146.
- Egleston CV, Kelly HC, Cope AR. Use of telephone advice line in an accident and emergency department. *Br Med J* 1994; **308**: 31.
- Crouch R, Dale J. Telephone triage—how good are the decisions (part 2). *Nurs Stand* 1998; **12**: 33–39.
- McKinley RK, Manhu-Scott T, Hastings AM, French DP, Baker R. Reliability and validity of a new measure of patient satisfaction with out-of-hours primary medical care in the United Kingdom: development of a patient questionnaire. *Br Med J* 1997; **314**: 193–198.