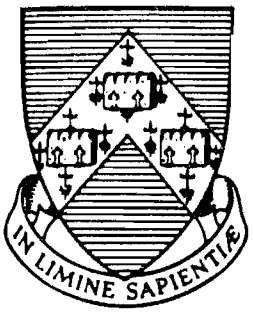

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Appraising Workload and the Scope for Change in Orthopaedics

by RICHARD FORDHAM

DISCUSSION PAPER 25

Appraising Workload and the Scope for Change in Orthopaedics.

by

Richard Fordham

April 1987.

Abstract

This paper describes a method of appraising general workload in any Orthopaedic Department and can be used by Surgeons themselves as well as management to assess performance.

During the period 1983-1986, the Author undertook research in three different Orthopaedic Departments in one Region. In each department a standard initial phase of work was carried out to assess the potential for improvements in the way resources were used. This initial approach became a useful standard method of appraising the main areas of workload and their inter-relationships. The approach described uses official hospital data supplemented as far as possible by data collected locally.

As well as helping the Author to identify specific areas of investigation amenable to further economic evaluation (e.g. See C.H.E. Discussion Paper 14) a general picture of a 'typical' orthopaedic department was built up during this process. Relationships between one part of the Orthopaedic 'system' and another were carefully enumerated at hospital level and knowledge of these can also help other departments engage in the process of 'self-audit'. Some departments moreover may wish to refine the data locally and therefore the method of calculation and the sources of data are provided in the appendices.

The second part of this paper deals with the implications for workload of different organisational arrangements. For example, what impact could the provision of an overnight stay ward have on the throughput of in-patient beds? Is it better to separate cold and trauma orthopaedic beds formally or leave this flexible?

Using the model of an orthopaedic department described it is possible for those influencing the pattern of Orthopaedic care at a district level to anticipate the effects of policy changes before actual implementation. Specific changes of policy however require further analysis to assess the effects on costs and outcome; these can be provided with the help of a health economist.

The Author

Richard Fordham B.A., M.A. is Research Fellow on the 'Economics of Orthopaedics' project. He wishes to thank the Kings Fund, London and Yorkshire Regional Health Authority for the financial support provided for this project.

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Appraising workload and the scope for change

> "Problems can however vary enormously from District to District ... This means that national recommendations and blue prints for their solution may have only limited value and therefore places on each District the responsibility for assessing their own particular problem".
>
> Duthie Report 1981[1]

Introduction

As long as patients make greater demands than limited services can meet, Orthopaedic surgeons will have to make choices. The outcome of these choices will determine the pattern of service, types of workload encountered and performance of each Orthopaedic Department.

Choice occurs at many different levels but in this paper we are interested in the types of choices that determine how available resources are used currently and how they could be used more appropriately in the future. Choices about patterns of management of groups of patients where considerable resources are consumed are of special interest. Likewise choices about processes of treatment where outcome is highly variable.

The range of this type of choice in Orthopaedics is wide. Some more specific examples are covered in other discussion papers. These include; issues concerning the most appropriate management of patients with fractured neck of femur; the cost-benefit of open-access to Physiotherapy for G.P.s services, and whether review outpatient attendances are necessary at present levels.

In this introductory paper a basis is formed for clinicians who have an interest in resource management and who wish to examine their departmental activity more carefully and to understand how the elements of workload combine.

The following analysis should be seen as a diagnostic guide. It describes generally how the different elements in an Orthopaedic

service fit together and interact. Although some readers may find the example as described different from their own it is based on relationships found in three typical Orthopaedic departments, in the one region.

Patient Flow

A typical example of a flow of patients within an Orthopaedic department is shown in Figure 1.* This figure is based on a hypothetical department serving a population of 250,000 persons and shows the most important patient flows.

Where appropriate other departments can construct their own flow charts using the blank copy of Figure 1 provided in Appendix A. The sources of the information contained in each box in the diagram are given in Appendix B.

Figure 1 shows the pattern of patient workload in a typical department as generated from both external and internal sources.

There are three main sources of workload in any Orthopaedic Department. The majority of in-patient admissions (approximately fifty five per cent) are trauma cases and approximately seven per cent are referrals from other hospital departments and other sources.

However, not all patients derived from these sources are admitted as in-patients. Many trauma patients generally admitted via an Accident and Emergency Department require only out-patient review and follow-up [see Boxes A, B, C and D]. Similarly with elective Orthopaedic cases referred from G.P.s, only approximately twenty per cent will require non-urgent surgery and will be placed on an in-patient waiting list. [see Boxes N, M, I and K]. Referrals from other hospital departments [see Box J] constitute a much smaller source of workload.

What pathways do in-patients follow?

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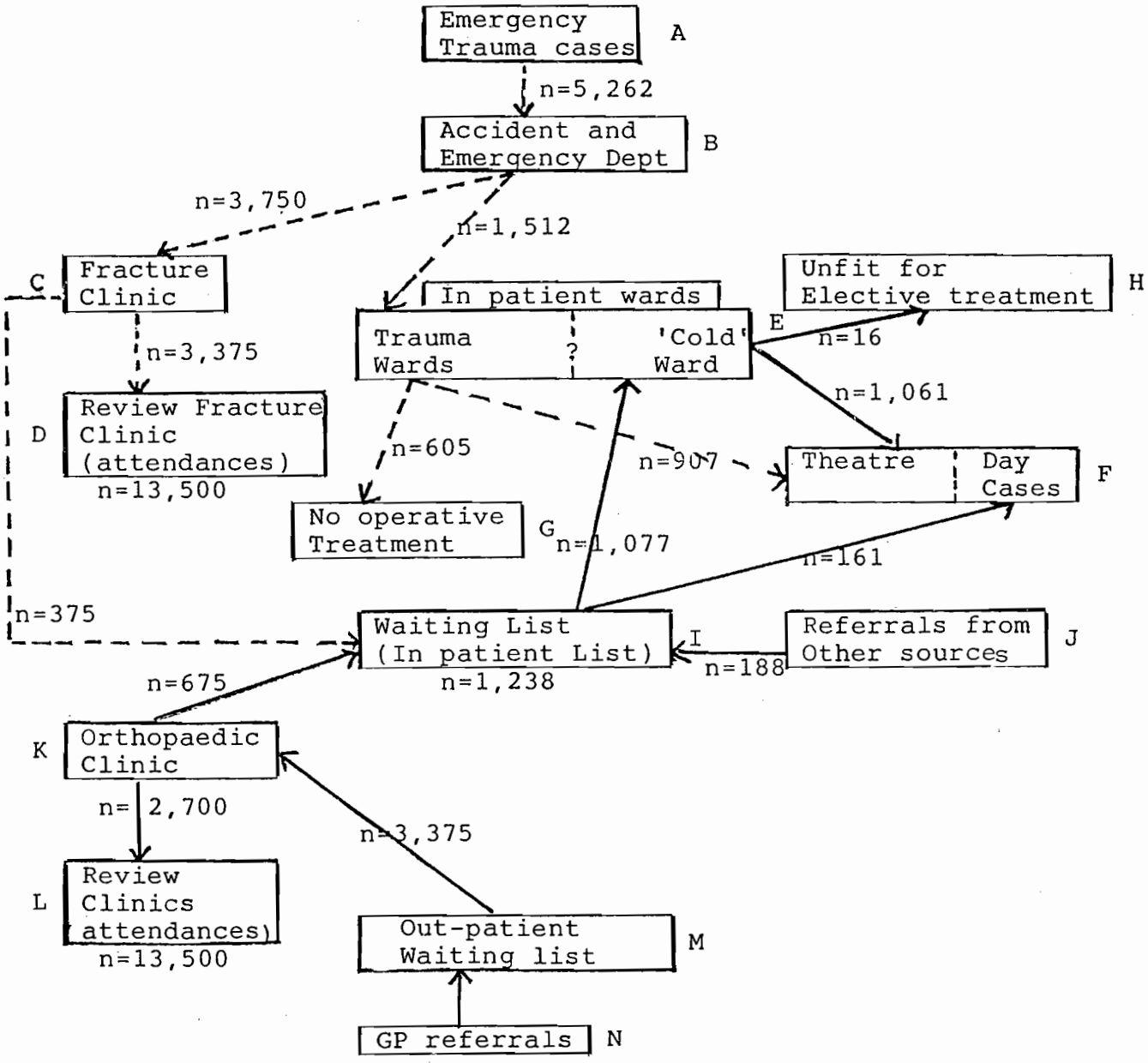
* The assumptions used in this model are shown in Appendix A and although these can vary from department to department they are based on the authors research in three Orthopaedic Departments as well as statistical relationships derived from Regional hospital activity information (SH3s).

Figure 1

Patient Flow in a typical Orthopaedic department



KEY
------ Trauma patients
——— Orthopaedic patients

Trauma patients will generally be admitted directly from the Accident and Emergency Department. These patients can use either beds informally reserved for emergency purposes or general Orthopaedic beds depending on the organisation of Orthopaedic beds [see Box E].

In some departments these patients are accommodated in short stay 'observation' beds before being discharged or transferred. Of all the trauma cases admitted only sixty per cent of them proceed to operating theatre. The remainder are discharged without further treatment or minor treatment only (e.g. reduction of fractures) [See Boxes F and G].

Cold Orthopaedic patients are usually admitted to an Orthopaedic ward after a period of delay on two separate waiting lists. Firstly between referral from the G.P. to the Orthopaedic surgeon, [see Boxes N and M] and secondly between seeing the consultant and being admitted [see Boxes K and I].

Elective patients can be admitted either to beds reserved for 'cold' surgery or to general Orthopaedic beds [see Box E]. In some cases, these patients are admitted as day cases (approximately thirteen per cent). Whether they share beds and operating time with in-patients depends on how day case surgery is organised locally [see box F]. Because elective patients in the main have been selected for admission specifically to receive Orthopaedic surgery, a much higher proportion of these patients proceed to the operating theatre (approximately 98.5 per cent of this group). However a small proportion of these are found to be unsuitable for operation. [See Box H]. Due to the disparity in the proportions of trauma and elective patients proceeding to theatre, Orthopaedic theatre workload can be biased towards elective operations (approximately 57 per cent of total operations in our study were on elective patients) [see Box f].

What pathways do Orthopaedic patients follow who do not require admission to hospital?

Although much activity is based on workload generated by patients in need of hospital admission, the largest group of patients

treated in Orthopaedics are out-patients.

Emergency patients who do not require admission are treated in 'trauma' or 'fracture' clinics. These are referred via the Accident and Emergency Department for a specialist Orthopaedic opinion. Patients are advised to attend these clinics a few days after remedial treatment has been given. Conditions usually include fractures, soft-tissue injuries, sprains and strains etc. At these clinics injuries are checked and treatment confirmed (usually X-rays have been taken in advance to assist in diagnosis and management). [See Box C]. In a typical department there are three times as many trauma out-patients than in-patients.

Following a fracture clinic referral, a high proportion of fracture patients are seen again for further treatment in a review clinic. On average they were seen four times before discharge in this study [see Box D]. Some of these patients inevitably require surgical treatment and are placed on the in-patient waiting list [see Box I], (or in a few cases admitted as urgent cases immediately).

Cold Orthopaedic patients are usually seen in Orthopaedic clinics [see Box K]. This may include patients who have been placed on an in-patient waiting list who may require out-patient treatment as an interim measure. Many patients referred as a new out-patient require further treatment on this basis and on average in the departments we studied they were reviewed approximately five times [see Box L].*

Factors determining patient flow

How is it possible to change the pattern of this workload in a department? There are two types of influences acting on individual Orthopaedic departments which determine patterns of workload. These are external and internal influences.

External influences include epidemiological and demographic characteristics of the population served. The pattern of industry

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* Although the model shown in Figure 1 separates review, fracture and Orthopaedic clinics, in some departments these patients are seen in combined review clinics where no sharp distinction between the source of patient referral is made. However for purposes of analysis it is important that these two types of out-patients can be distinguished since their patterns of review can often differ.

and social structure etc. may affect the types of disease and accidents that present. These factors cannot readily be influenced by Orthopaedic surgeons although they will change slowly over time. Other external influences such as the referral rates of local G.P.s and the patterns of trauma (through prevention and education) can be influenced to some degree by the Orthopaedic department, although this may involve a considerable input of resources and results may be slow to be seen.

Internal influences and their impact on workload may therefore be more accessible to change, although this can still involve a cost in terms of resources used. Before adopting an internal change therefore it should be asked whether it would be cheaper, in terms of departmental resources, to attempt to alter the external causes? For example before introducing a system of pre-operative assessment to help to improve patients readiness for operations (thereby reducing long hospital stay), It might be more effective to educate General Practitioners on the criteria used by the department for fitness for operation? This could be done through a relatively inexpensive seminar programme or a general policy statement for local General Practitioners.

The following are some examples of internal influences :-

(i) Accident and Emergency Specialty

In some areas patients normally seen by an Orthopaedic surgeon are seen and managed by an Accident and Emergency (A+E) consultant. A+E consultants may undertake their own review clinics thereby reducing the number of patients referred to the Orthopaedic out-patient department. Some A+E consultants have a small number of overnight stay beds which can be used for minor trauma patients. Some A+E Consultants are surgically qualified and can undertake minor Orthopaedic procedures, using these types of beds.

(ii) Overnight Stay Wards

Access to 'Overnight stay' or 'Night Admission' wards for Orthopaedic departments is being established in some areas. The effect of these on Orthopaedic in-patient bed requirements can be far reaching. A common group of patients e.g. Minor head injuries (concussion) can be admitted to this type of bed. Figure 1, shows that 605 in-patients could have been admitted to such a unit [see

Box G]. Such beds can help prevent disruption of bed usage enabling better planning of waiting list admissions. They have also developed multiple other uses which can alleviate the pressure on in-patient beds e.g. overnight stay for occasional day case patients unfit for discharge; out-patients requiring immediate minor treatment; patients admitted at night who would otherwise disrupt the main ward etc.

(iii) Out-patient Review Rates

As shown in Figure 1 a substantial amount of workload is generated in the out-patient department and in particular from review patients. Whilst the process of review is obviously necessary in many cases, rates of review (i.e. the number of re-attendances to clinic) need to be carefully monitored. High review rates will inevitably reduce the number of new patients that can be seen and consequently increase out-patient waiting times.

(iv) Division of beds between emergency and elective patients

Figure 2 shows three examples of bed organisation in three different hospitals in the same Region - the ratio of beds per 1000 population is approximately equal.

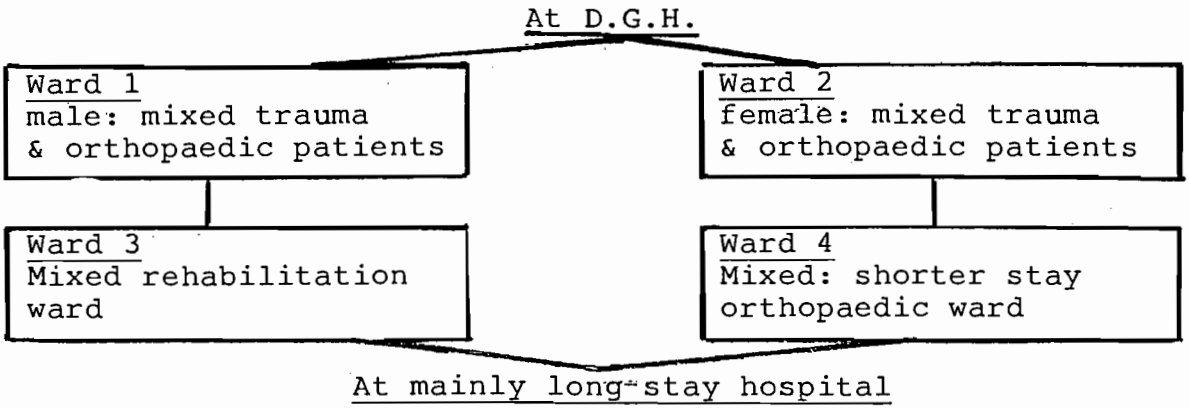
Whether to mix or keep trauma patients separate from elective patients is a traditional problem for most orthopaedic departments. In many departments beds are not formally differentiated between trauma and cold although some informal earmarking is sometimes made. One of the reasons for this is the belief that this system can give greater flexibility in coping with the unpredictable numbers of trauma patients. However this policy may operate to the disadvantage of elective patients who have to be cancelled at short notice due to an influx of trauma patients into available beds.

The Duthie Report[2] found that separation worked in favour of elective patients:

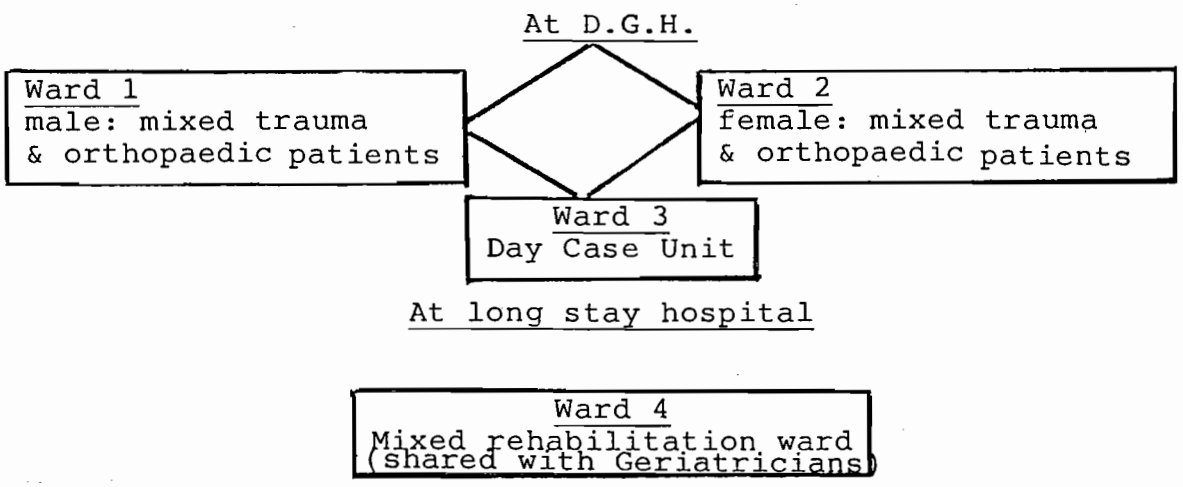
> "We are not surprised that we have received so much evidence which expresses the view that where there is a geographical separation or even a physical separation within a single hospital of traumatic and orthopaedic beds ... admissions can be planned and waiting times for elective surgery can be reduced."
>
> Para 6.5.2.

Figure 2

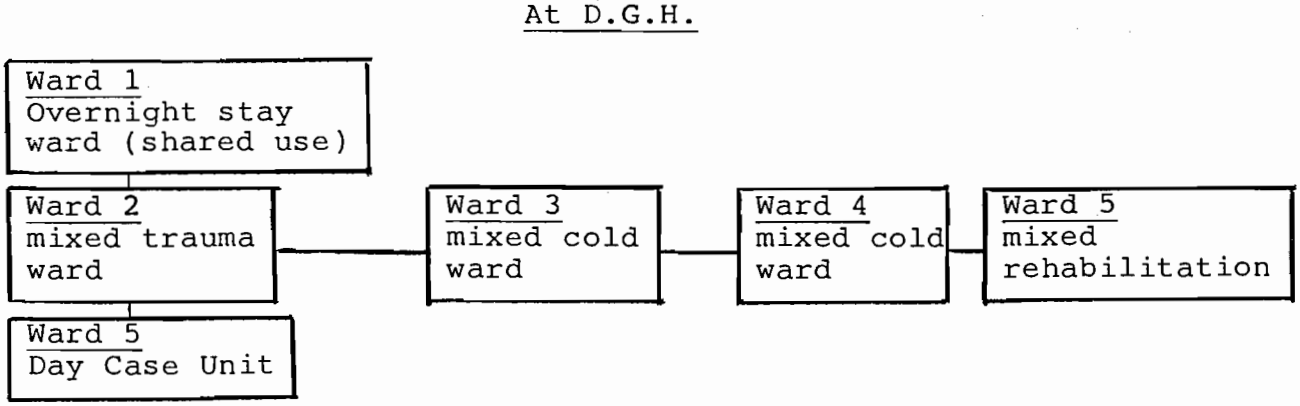
DEPARTMENT A



DEPARTMENT B



DEPARTMENT C



Whilst separation of beds is desirable it is obviously more difficult to accomplish in departments where separation is not physically possible or where other organisational arrangements of bed usage conflict with this policy e.g. division of beds by individual consultants or sex/type of patients.

A compromise solution may still be possible however by a more accurate assessment of the demands of trauma patients on total available beds.

The number of beds occupied by trauma patients at any time is determined by their rate of arrival (A), and their average length of stay (B). Analysis of workload over a reasonable period of time (e.g. six months) will give orthopaedic surgeons the likely number of beds they will need to 'earmark' for emergency use (AxB) within 'statistical confidence'. (See Appendix C).

(v) Day Case Surgery

Another way of reducing pressure on existing beds is for departments to substitute day case surgery for in-patient admission. This works best where separate day case beds are available and not impinged on by in-patients. With day cases, the length of stay variable is removed from the calculation of bed requirements and therefore operative workload can be planned much more accurately. Patients can be given specific dates for admission to day case units and waiting times can be kept relatively short if workload is undertaken regularly. Further scope still exists in many departments to increase the amount of day case surgery but this will not be possible without the requisite number of beds being available. Locating these on in-patient wards may prevent the optimal number of day cases being undertaken.

Many operations are suitable for day case surgery and in the long term it has been estimated that it should be possible to undertake forty per cent of all elective operations as day cases.[3] Such operations include:

- manipulation of joints e.g. for frozen shoulder, back of knee
- epidural injections

- removal of pins, plates and screws
- excision of ganglia, synovial cysts and benign synoviomata
- decompression of carpal tunnel
- arthroscopy
- removal of neuroma e.g. on the hand
- amputation of the fingers and lesser toes
- operation on ingrowing toe nails
- tenotomy
- interphalangeal fusion of the toes
- release of trigger finger
- removal of external fixator
- simple excision of palmar fascia in Dupuytrens
- removal of foreign bodies
- scar revision
- small free skin grafts

(vi) Relationships with other departments

The relationships that an orthopaedic specialty develops with other hospital specialties and rehabilitation services influencespatient flow. Good relationships with colleagues in Rheumatoloty, Geriatrics and Paediatrics in particular ensures that an appropriate two way flow of patients is established. This enables orthopaedic surgeons both to refer and receive patients at an early stage for specialised care. Innovations such as joint Specialty clinics and ward rounds facilitate better patient management and consequently better resource usage.

Good relationships with other hospital services also ensure better use of orthopaedic resources. In particular remedial therapists such as physiotherapists, occupational therapists and social workers as well as nurses play a key role in helping to rehabilitate patients after orthopaedic surgery. After a traumatic injury or an elective operation patients need to regain their previous abilities in basic activities of daily living such as walking, dressing, toileting etc. Remedial therapists help them to achieve this as quickly and together

with medical social workers ensure that the patient is ready for home at the earliest opportunity. This helps to relieve hospital resources as soon as is practicable.

If used properly these services complement the work of orthopaedic surgeons. It is essential therefore that a good team approach is established recognising the constituent skills of its members.[4] However as the level of sophistication of remedial treatment has increased in recent years orthopaedic surgeons have found it increasingly difficult to keep abreast of changes of approach to treatment. Given the level of specialisation which has occurred it may be more appropriate in some cases to refer patients to these departments as they would to another clinical specialty. Correspondingly policies giving remedial therapists discretion to initiate treatment and decide when discharge is necessary are gaining wider acceptance.[5] In some areas General Practitioners are now given direct use of hospital therapy units giving therapists discretion about the course and length of treatment of referred patients.[6] Such 'open access' policies reduce referrals to Orthopaedic Surgeons and consequently waiting times for hospital services, providing initial resources are made available for this.

Conclusions

It is hoped that the ideas and information in this paper will give Orthopaedic surgeons an insight into how they can conduct their own internal reviews of workload and policy. Ideally these reviews should be undertaken in collaboration with other orthopaedic colleagues and related staff.

Emphasis has been placed on the interaction of the orthopaedic system and how workload in one area affects another area. Many of these relationships are already well understood by clinicians but the necessity to quantify them has often been overlooked or considered to be too difficult an exercise to undertake. However better knowledge of where the relevant data is kept and the widespread introduction in many Health Authorities of computerised Patient Administration Systems is simplifying this exercise. Once the dynamics of workload are more clearly enumerated the easier policies can be developed to influence the way resources are employed. More importantly, undertaking

their own self-audit exercise will mean that decisions about the best use of resources are generated first from orthopaedic and related staff.

Bibliography

1. "Orthopaedic Services: Waiting time for out-patient appointments and in-patient treatment". Report of a Working Party to the Secretary of State for Social Services, DHSS, 1981.

2. Ibid.

3. "Guidelines for Day Case Surgery". Commission on the provision of Surgical Services, Royal College of Surgeons, July 1985.

4. D.H.S.S. Health Service Development Circular "Relationship between the medical and remedial professions" 1977.

5. "Community physiotherapy and direct access to physiotherapy services by General Practitioners within the NHS" C.J. Partridge, Kings Fund College, 1984.

6. "Access by general practitioners to physiotherapy department of a district general hospital", Norman, P. et.al. British Medical Journal, 25 Oct., 1975.

APPENDIX A

Assumptions used in Figure 1

i. Orthopaedic discharges and deaths (in-patients) = .011 per 000 pop. (∴ 250,000 pop = 2,750 D+D's per annum).

ii. Fracture clinic patients = .015 per 1000 pop.

iii. Fracture patient review rate = 4:1.

iv. Fracture patients requiring in-patient treatment = 10%

v. Trauma patient operation rate = 60%.

vi. % day cases (of all D+D's) = 13.3%.

vii. G.P. referral rate = .014 per 1000.

viii. % of out-patients put on in-patient waiting lists = 20%.

xi. % of waiting list cases admitted (of all admissions) = 38%.

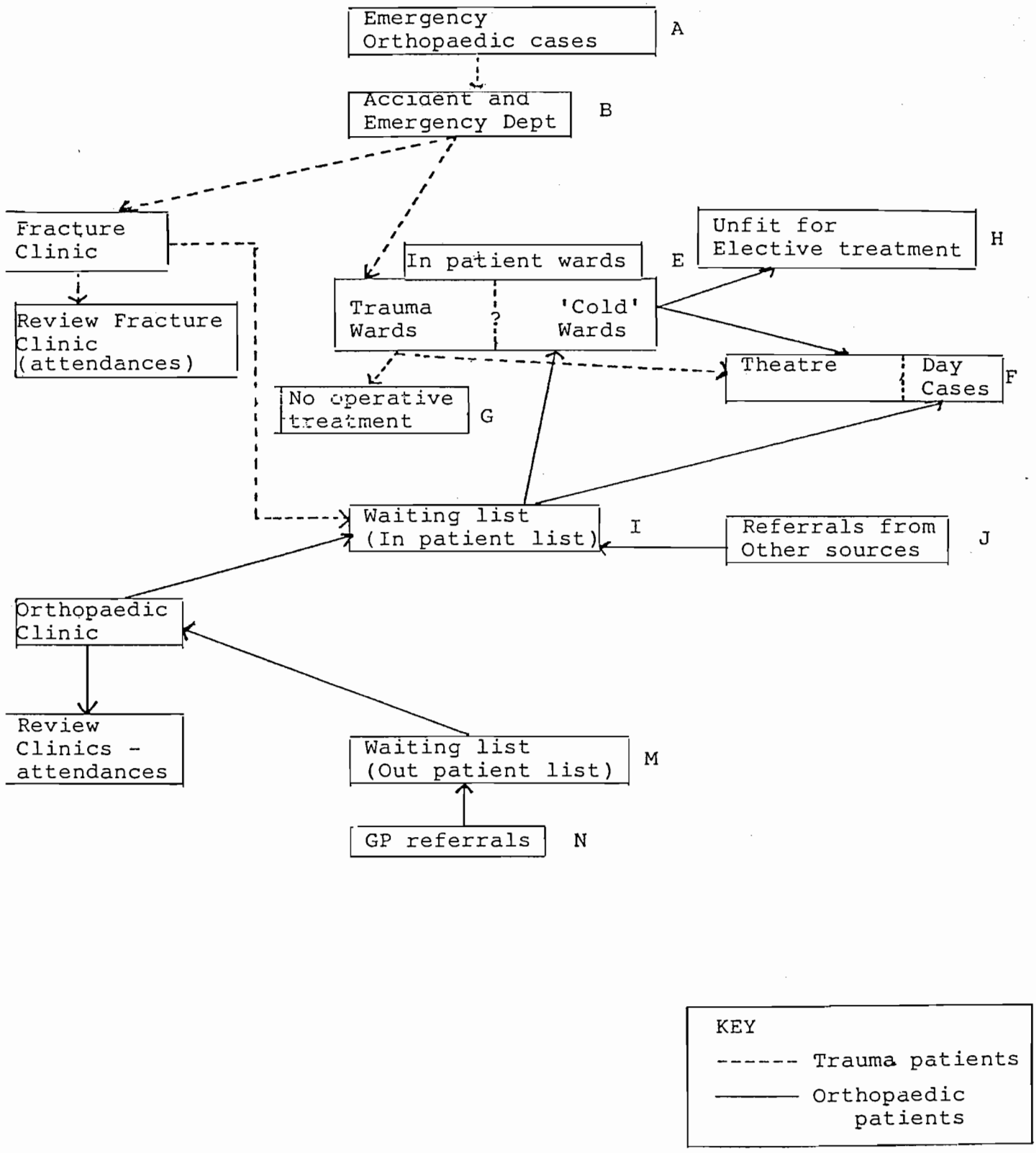
x. % of patients from other sources (of all admissions) = 7%.

xi. Orthopaedic out-patient review rate = 5:1.

xii. % of elective cases not operated on = .015%.

APPENDIX A cont

Patient Flow in a typical Orthopaedic department



NB This diagram shows the most important patient flows within a department. Other flows are possible and should be added where relevant.

APPENDIX B

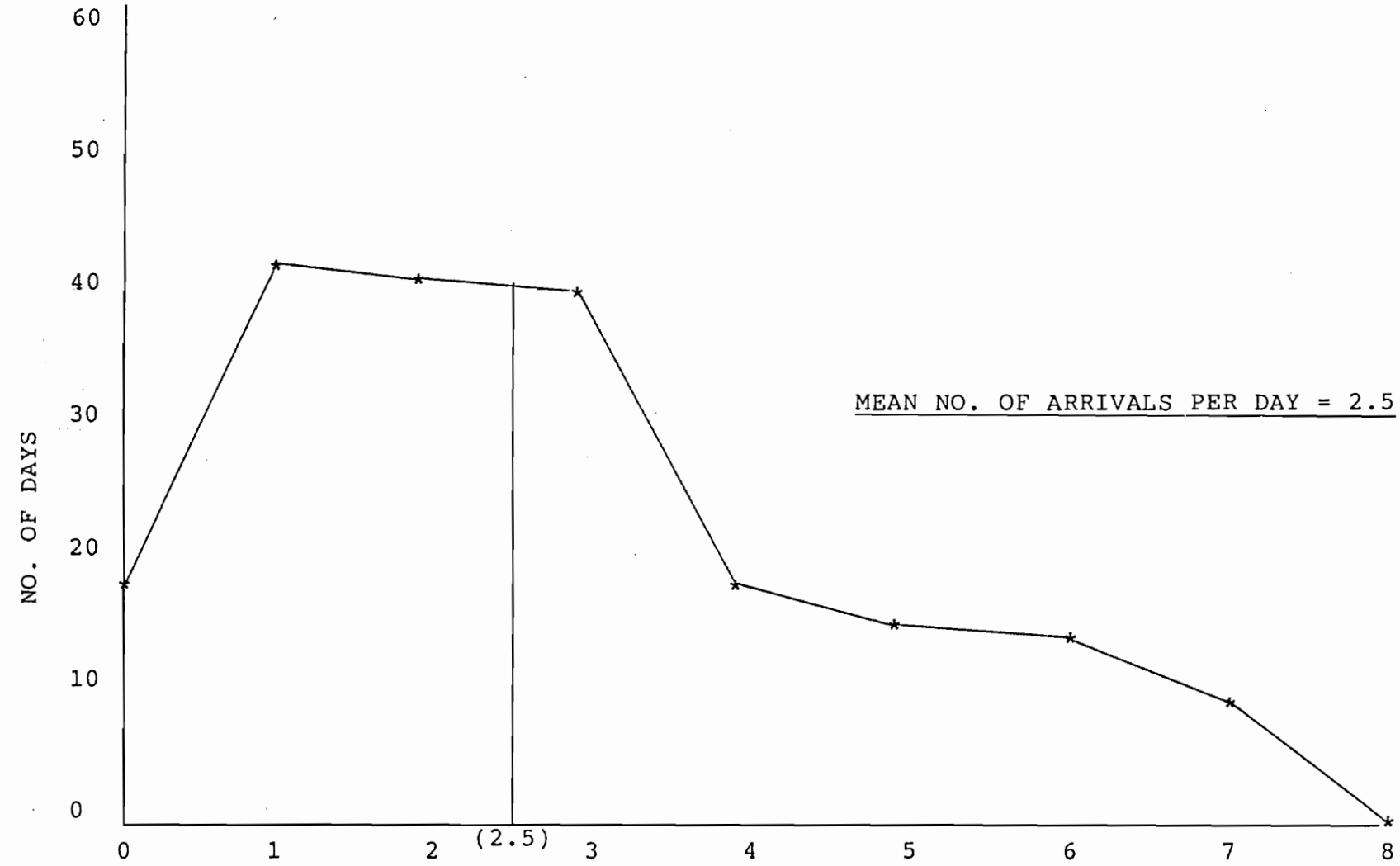
Sources of information

(refer to Appendix A for diagram)

	SOURCE
BOX A - } BOX B - }	A + E Attendance Register
BOX C -	Clinic register and Medical Records Dept, Quarterly Summary
BOX D -	Clinic register and Medical Records Dept, Quarterly Summary
BOX E -	Ward admission/discharges register
BOX F -	Theatre book
BOX G -	Ward admission/discharge register
BOX H -	Ward admission/discharge register
BOX I -	Waiting list
BOX J -	Waiting list
BOX K -	Clinic register and Medical Records Dept, Quarterly Summary
BOX L -	Clinic register and Medical Records Dept, Quarterly Summary
BOX M -	Clinic appointment book
BOX N -	Medical Records Dept or Clinic appointments dept or consultants office

APPENDIX C

FREQUENCY OF THE NUMBER OF EMERGENCY ADMISSIONS PER DAY IN AN ORTHOPAEDIC DEPARTMENT (over a six month period)



APPENDIX C cont

NUMBER OF BEDS REQUIRED FOR TRAUMA ADMISSIONS WITH A 5% RISK OF OVERFLOW INTO OTHER BEDS

Mean length of trauma admissions (days)

MEAN ARRIVAL RATE PER DAY	1	2	3	4	5	6	7	8	9	10
1	3	4	6	7	9	10	11	13	14	15
2	4	7	10	13	15	18	20	23	25	27
3	6	10	14	18	21	25	29	32	36	39
4	7	13	18	23	27	32	37	41	46	50
5	9	15	21	27	33	39	45	50	56	62

CALCULATION

No of beds required = $(1.645 \times \sqrt{\alpha}) + \alpha$

where α = Mean Length of stay x Mean Arrival rate/day