A SYSTEM FOR THE ASSESSMENT OF THE ADEQUACY OF ANAESTHETIC STAFFING IN SCOTTISH HOSPITALS

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SUMMARY
A technique based upon Scottish inpatient operation statistics was investigated for the assessment of anaesthetic staffing requirements. Each operation category was given a time factor covering all aspects of anaesthesia to give a total time for anaesthetic work. In a preliminary trial of this system it was found that inpatient operation statistics could only be representative of half the anaesthetic work and data needed supplementation by estimates of the time for obstetric and intensive care work, outpatient anaesthesia, teaching and research. Despite this shortcoming the inpatient statistics provide a useful measure of part of the anaesthetic work load.

In view of the present shortage of anaesthetists in Scotland (Parbrook, 1971) we have investigated a new technique for the assessment of anaesthetic needs, based on operation statistics.

ALTERNATIVE TECHNIQUES OF ASSESSMENT
In the past many hospitals have made their assessment of anaesthetic needs on the basis of the number of theatre sessions covered. A big problem in using such techniques to compare hospital groups is the lack of any indication of the duration of a session and the lack of information on the emergency operation cover which is given. Thus, perhaps, in one hospital with a chronic nursing shortage a session may be 3 hours theatre work, while in another hospital with fully staffed surgical teams a session may last for 5 hours or more. Although the calculation of work sessions can be useful within an anaesthetic department, it lacks the precision and impartiality needed if one wishes to assess the staffing requirements in a hospital group.

To obtain more accurate information one may carry out work studies. One problem of work studies is that the knowledge that a study is in progress may alter the work processes being observed and such studies may be costly in terms of the time of the administrative staff.

A satisfactory basis of assessment is deduced from the ratio of the number of anaesthetists to surgeons and this has been described elsewhere (Tomlin, 1970; Parbrook, 1971). Although such a technique is useful for comparison of the staffing of large areas such as Scotland with the rest of Britain, it becomes less satisfactory when one considers the smaller hospital groups owing to the smaller number of surgeons involved and the difficulty in giving an average figure for the amount of anaesthetic work each individual type of surgeon represents. Nevertheless, one ought to expect to find at the very minimum one consultant anaesthetist for every two consultant surgeons and a similar ratio at junior level (Parbrook, 1971). Operation data have been used to show the growing demand for anaesthetic services in a hospital (Mushin, Campbell and Shang Ng, 1967) and an assessment of anaesthetic needs, based on the number of operations performed, warrants consideration as an alternative or as a supplementary technique to the above systems.

ASSESSMENT BASED ON OPERATIONS PERFORMED IN A HOSPITAL GROUP
In Scotland returns are made by hospitals to the Home and Health Department, giving statistical data of all the patients admitted, including operations. Owing to computerization, this data can now be processed more rapidly and the annual tables produced by the Home and Health Department (Scottish Hospital Inpatient Statistics, table 9B) include details of the number of operations performed according to category. As a special trial the Scottish Home and Health Department kindly provided the figures for operations for the Glasgow Royal Infirmary and associated hospitals.

An excerpt of these data is given (table I) together with an indication of how the tables could be used as a basis from which anaesthetic load could be calculated (table II). A time factor was applied to each operation category and in this way total anaesthetic time was calculated.

**Table I. Excerpt from computer table.*

<table>
<thead>
<tr>
<th>Anaesthetic time factor† (hr)</th>
<th>Total time (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td></td>
</tr>
<tr>
<td>30  All operations on the appendix</td>
<td>568</td>
</tr>
<tr>
<td>280 Hernia hernioplasty, inguinal and femoral</td>
<td>331</td>
</tr>
<tr>
<td>290 Partial gastrectomy</td>
<td>56</td>
</tr>
<tr>
<td>360 Nephrectomy</td>
<td>39</td>
</tr>
<tr>
<td>381 Cystoscopy</td>
<td>177</td>
</tr>
</tbody>
</table>

* As there are 114 categories it is impracticable to give the full table.
† Time factor includes allowance for all aspects of anaesthesia (see text).

**Table II. Royal Infirmary Group, 1968.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Inpatient operation times</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16,924</td>
<td>19,845</td>
</tr>
<tr>
<td>2</td>
<td>2,562</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2,164</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>636</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>592</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>25,899</td>
<td>1,295</td>
</tr>
<tr>
<td>Travelling time allowance (5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall total</td>
<td>27,194</td>
<td></td>
</tr>
</tbody>
</table>

1 Obstetric anaesthetic cover† | 11,000 |
2 I.C.U.† | 11,000 |
3 Outpatients (a) Casualty (b) ECT and Dental | 1,085 | 1,500 |
4 Administration | 1,835 | 1,500 |
5 Teaching (outwith theatre) | 600 | 1,500 |
6 Research | |
| Inpatient operations | 27,435 |
| Total anaesthetic time† | 54,629 |

Supplementary deficit
Uncovered work load: operating lists requested by surgeons but not covered in 1968 due to staff shortage | 3,276 |

* See text.
† “On call non-working” time not included.

**Time factors.**

The time factors were not only the operating time, but included the full anaesthetist time involved, i.e. for premedication, induction and operation, including any allowances for teaching in theatre and for time to observe the patient after operation prior to induction of the next patient, and for postoperative visits. As time factors include allowance for visiting wards and finding and identifying patients they are particularly generous for emergency operations, which are normally time-consuming in this aspect. In the case of operations for which two anaesthetists were desirable the induction and operation time was doubled, while in the case of operations sometimes performed under local analgesia without an anaesthetist being present the time factor was proportionately reduced or omitted.

**Additional factors.**

After the total anaesthetic time had been calculated in this way additional factors were allowed for as indicated (table II). These include obstetric anaesthesia, as obstetric operations were not included in the published operation statistics, though it is possible that special figures for operative obstetric work will become available in due course. Similarly, outpatient and casualty anaesthesia must also have a special estimate, including e.c.t. and dental chair anaesthesia. Intensive care unit work provides an additional facet, as does teaching outwith theatre and research, and all must receive their special allowances. Only after addition of these factors can one assess the overall work load (excluding “on call non-working” time).

**Assessment of anaesthetic shortage.**

The overall work load may be related to the number of consultants in order to give a relative index of commitments undertaken, and their expansion over a period of time. Alternatively one may use such an index to compare areas and indicate those in which the anaesthetist shortage is greatest. When used in either manner the size of the supporting staff is an additional factor to consider.

It may be better to utilize the figures as an index in this way than as true hours of work per anaesthetist, as many feel it would be a retrograde step to bring in concepts of an “x-hour week” in anaesthesia, even at a theoretical plane. On the other hand, if one is prepared to recommend ideal weeks...
for various categories of anaesthetists, one can achieve an absolute measure of staff shortage.

To complete the picture one must also add details of any known work load not covered due to shortage of anaesthetists as indicated at the foot of table II. In many centres there is a backlog of surgical work which could be undertaken if anaesthetists were available and it is important that anaesthetic departments solicit information on this aspect from surgeons and colleagues in other disciplines to give a full picture of the extent of the shortage of anaesthetists.

Problems in application of the technique.

The study was of special interest in indicating limitations in the basic operations data. Of these limitations, the loss of the last 17 per cent of the year's data was corrected as indicated (Hospital I, table II). Obviously great care is needed to check that the operation data are complete.

In addition it was noticed that less than one sigmoidoscopy per week was recorded for the major teaching hospital and there is, therefore, doubt whether all the minor procedures had been entered when they were part of the patients' assessment prior to a major operation. The accuracy of patient documentation will undoubtedly improve and one trusts these problems will not be relevant in the future. Progress in computerization and the speed of processing data may also reduce the time lag between the time of collection of the data (1968) and the availability of the tables.

One important limitation which had not been appreciated was that the inpatient operation data only allowed one to estimate half the total anaesthetic work (table II). The major items not covered were obstetric work, intensive care work and outpatient anaesthesia. Teaching, administration and research also provide a sizeable work load for the department. Although it might be reasonable to give a fixed percentage allowance for teaching, administration and research according to the type of hospital, some special yardsticks are needed to assess the other components of anaesthetic work. One such measure could be obstetric operative delivery statistics.

A final problem in the use of the inpatients' operation statistics is that of obtaining accurate estimates for certain operation groups, because the average time estimates for an operation category may vary from one area to another. Ophthalmic operations provide a particular difficulty as, if anaesthetists are not available, or if the surgeon prefers, many eye operations are performed under local analgesia.

Advantages of the system.

One benefit of this system is that the basic figures prior to the application of special factors can be produced without asking anaesthetists to keep extra records of the time they spend in wards and theatres. In addition these figures cannot be intentionally biased as the statistics are produced from the official hospital records.

A further advantage is that assessments of work load can be reviewed regularly and changes revealed. The system of assessment can be made forward-looking with regard to the time provided for various aspects such as preoperative and postoperative visits by the anaesthetists.

CONCLUSIONS

The study shows that operation inpatient statistics can be used to provide an index of half of the anaesthetic work load and so can be of value in demonstrating changes such as the rate of expansion of inpatient theatre work. Additional allowances such as those for obstetric and intensive care work are needed before the total work load of a department can be estimated.

Some technique for assessing the degree of anaesthetic understaffing is essential if anaesthesia is to progress and statistical data of this type will be desirable as evidence of the size and rate of expansion of anaesthetic commitments. Anaesthetists could find themselves increasingly under pressure if the specialty were restricted to a standardized national rate of expansion. Evidence of the current level of understaffing and rate of expansion of work is needed to obviate this.

ACKNOWLEDGEMENTS

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REFERENCES


SOMMAIRE
Une technique basée sur des statistiques écossaises portant sur des interventions effectuées chez des malades hospitalisés, a été étudiée en vue de vérifier les exigences posées par l'organisation de l’anesthésie. On a attribué à chaque catégorie d’opération un facteur “temps” englobant tous les aspects de l’anesthésie, afin d’obtenir un temps total correspondant au travail de l’anesthésiste. Lors d’un essai préliminaire de ce système, on a constaté que les statistiques portant sur des opérations effectuées chez des malades hospitalisés ne pouvaient être représentatives que de la moitié seulement du travail de l’anesthésiste et que l’on avait besoin d’un supplément d’information en ce qui concerne les chiffres correspondant au temps consacré aux actes d’obstétrique, aux soins intensifs de réanimation, aux anesthésies pratiquées chez des malades non hospitalisés, à l’enseignement et à la recherche. Malgré ces imperfections, les statistiques établies à partir des malades hospitalisés fournissent une mesure utile d’une partie des tâches incombant à l’anesthésiste.

ASSOCIATION OF ANAESTHETISTS OF GREAT BRITAIN AND IRELAND

The Association of Anaesthetists will be holding their ANNUAL SCIENTIFIC MEETING in 1972 at the Bloomsbury Centre, London W.C.1, on Thursday and Friday, November 16-17.

Those wishing to submit papers for the scientific sessions are requested to send FOUR COPIES of a summary of 200–500 words, not later than Monday, May 1, 1972, to:

The Hon. Secretary, Association of Anaesthetists of Great Britain and Ireland, Room 126, Tavistock House North, Tavistock Square, London WC1H 9HR.