Clinicians' Guide to Hospital Activity Data

Produced by the RCP Information Laboratory (iLab)

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BACKGROUND TO THE GUIDE

This guide has been produced to support hospital activity data at the level of an individual clinician, presented to consultants working in Wales. We have found a number of common questions arise when looking at such information: this guide will provide you with answers. You will find additional detail in the Glossary\(^1\), and there are some worked examples in the Case Studies section. At the end is a summary of clinical coding tips which we would encourage you to copy and distribute to junior medical staff.

How will this guide help me?

Looking at hospital activity data can be educational, informative, confusing and frustrating in equal measures. This guide aims to help you better understand:

- What it is, where it's come from and what it's used for
- Some of the common quality issues encountered with consultant-level data
- Your role in all this - what it can do for you and simple measures you can take to improve it

From where does this guide originate?

It has been produced by the Health Informatics Unit at the Royal College of Physicians\(^2\). In 2004-05 the unit's Information Laboratory (iLab) conducted a study across Wales, England & Scotland examining the potential use of these data to support consultant appraisal. We supported individual clinicians in the provision and interpretation of their hospital activity data. Many of the lessons we learned are in this guide\(^3\).

We have shared our methods of data analysis with hospital Trust Information Departments, to supplement any existing methods they use so that consultants from any specialty - medical or surgical - can be provided with useful analyses. Our work in Wales is funded by the Informing Healthcare Programme\(^4\), and has been endorsed by the Academy of Royal Colleges in Wales.

ABOUT THE DATA

What am I looking at?

Each Trust will process their data slightly differently, so this guide may not exactly match what you're seeing. The amount of data available for analysis differs between clinical specialties too. For a full explanation of your personal data, consult your information department.

You are looking at tables and graphs of data routinely collected by your Trust. The data represent individual "finished consultant episodes" of care (FCEs), grouped together by a number of parameters. Each FCE is attributed to a single, responsible consultant (or consultant team) - you are looking at those held against your name, as well as comparisons with the activity of your specialty colleagues.

Where has this information come from?

The majority of this information comes from your hospital's patient administration system (PAS). There may be additional data available for certain specialties, from pathology or radiology systems, for instance.

How are PAS data collected?

All the clinical components of the data in front of you originate from the patient record. Information recorded by clinical staff (either written entries to the notes, letters or discharge summaries) are subsequently extracted to the PAS by clinical coding staff. Details of diagnoses are coded using ICD-10 and procedures using OPCS4, in order to build a full picture of the patient's hospital stay and enable statistical analysis and comparison. What is written in the notes, and how it is written, have an effect on the data available to the Trust and to you.

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\(^1\) Terms in the text which may be unfamiliar are highlighted in blue and linked to the Glossary
\(^2\) http://hiu.rcplondon.ac.uk
\(^3\) A full report and recommendations are available at http://hiu.rcplondon.ac.uk/iLab
\(^4\) http://www.wales.nhs.uk/ihc/home.cfm

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Other elements of the data (such as admission type, start and end dates, consultant allocation) are input to the PAS by a range of administrative staff in the hospital, e.g. ward clerks, clinic clerks, reception staff.

What are PAS data used for? Are they important?

Figure 1 shows a schematic of the flow of information from its origin (patient notes) to its final destination (PEDW).

**Figure 1: Information flows for routinely collected data**

- **Patient notes**
  - Primary use (i.e. support patient care)

- **Clinical Coding** (ICD10, OPCS4)

- **Hospital PAS**
  - Administrative detail
  - Local secondary uses

- **WELSH ASSEMBLY GOVERNMENT**
  - Hosted by Health Solutions Wales (HSW)
  - Switching service (data standardisation)
  - Central datasets e.g. PEDW

- **Wider secondary uses:***
  - Financial returns
  - Resource allocation
  - Waiting times
  - Monitoring health trends
  - Public health measures
  - Epidemiology
  - Audit
  - Performance monitoring
  - Clinical governance
  - Research
  - Disease registries
  - LHBs & commissioning

**Original design of dataset:**
- These data have been collected in roughly the same format since the late 1980s, when the decision to routinely collect an admitted patient care commissioning dataset (APC CDS) was made
- The design - which has not changed - was focused on corporate resource management and the monitoring of health trends, at an aggregate level
- The ability to assign activity to an individual consultant team was only added in 1998. This is done using the responsible consultant's GMC code

PAS data are used to produce reports for the internal running of the hospital (e.g. bed occupancy, patient throughput, waiting times).

They also form the basis of many centrally-held datasets which monitor activity and enable decision making across the NHS.

It's important these data are as accurate as possible for the smooth running of the service.
THE CLINICIAN’S ROLE

What’s this got to do with me? Why have I been given these data?

Traditionally, doctors have had little to do with PAS data, seeing it as a largely administrative dataset. However, the fact that much of it is derived from the patient notes has implications for quality. Various national reports\(^5,6\) have highlighted a lack of clinical interest as a key reason for errors: if its validity is never checked, then improvements cannot be made (see Figure 2). And while it’s uncommon, it’s also worth bearing in mind that activity data pertaining to individual clinicians can be released into the public domain through a Freedom of Information request.\(^7\)

Initiatives in England such as Payment by Results\(^8\) depend heavily on accurate data originating from patient notes and PAS systems.

The Bristol Inquiry\(^9\) recommended building clinical confidence in PAS data, by establishing closer working arrangements between doctors and clinical coding staff.

Consultants visiting the iLab during the study period found the data to be more useful than they thought, and the majority stated they would use it to support their next consultant appraisal.

What relevance does it have to my practice? How might I use the data?

Each consultant’s analyses are unique. The iLab study found that for some, the data they were presented gave a fair representation of their activity, whereas for others it did not. This variation is due not only to specialty differences, but also local processes - both clinical and administrative. To get to the bottom of why the data look like they do, it often requires discussion with a member of the information or coding department. In this way improvements can be made.

Take another look at Figure 2. If clinicians can begin to see their data and highlight any problems they find, quality begins to improve and confidence builds. Consultants in the iLab study said they also wanted to use the data for:

- Supporting local service development
- Clinical audit
- Job planning
- Research

It must be remembered that many uses are outside the original scope of the dataset design - it’s not advised to try making judgements from them. But when used sensibly and in conjunction with other data sources, they can add significant value.

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\(^7\) Details of a legal test case involving the publication of Scottish consultants’ mortality data can be found at [http://www.itspublicknowledge.info/appealsdecisions/decisions/Documents/Decision066-2005.pdf](http://www.itspublicknowledge.info/appealsdecisions/decisions/Documents/Decision066-2005.pdf)


What influence do I have over the data collected?

The written record is completed by clinical staff, after which details of diagnoses and procedures are encoded by clinical coding staff, using rules and conventions. Getting feedback on episodes which may be difficult to code is a good way of increasing quality. See the later section on Data Quality.

Remember, the information you are looking at has not been collected for your purposes. A corporate view of the data will differ from a clinical one: a greater understanding of these differences from both sides is key to improvement.

Are there factors which are out of my control?

Yes. There will be many instances of the data seeming at odds with what you know to be your activity. This goes back to the original, corporate design of the dataset and the underlying classification systems used.

Some of the most common reasons are listed in Figure 3 opposite.

Those involved with corporate information (both centrally and in Trusts) are aware of these limitations, and are addressing them wherever possible.

Your involvement is crucial if solutions are to be found.

OTHER SOURCES OF DATA

How does this information differ from that of external benchmarking companies (e.g. CHKS, Dr Foster)?

Any hospital activity data presented to you benchmarked against colleagues will also have originated largely from your hospital PAS. However, the statistical assumptions made when grouping and comparing the data are outside the control of your trust information department.

Whenever a clinician interprets their activity data (from any source), they should always ask for an explanation of the assumptions made - it significantly affects the way the data look. Below are brief examples you might come across:\textsuperscript{10}

- Reported by episodes vs inpatient spells
- Primary diagnosis vs all diagnoses (or procedure)
- Denominators for comparisons (local colleagues vs external peer group - defined how?)
- Definitions used for lengths of stay
- Time periods used (especially readmission data)
- Details of casemix and age adjustment
- Use of social deprivation index in calculations

Information provided to you by your information department may have few adjustments - such "raw" data might appear to contain more inconsistencies than adjusted data. Our experience shows that looking at unadjusted data can highlight problem areas, offering the greatest opportunity for positive change.

Figure 1 shows that any improvements to hospital PAS data will lead to increased validity of analyses both within the Trust and when submitted centrally for wider secondary uses.

\textsuperscript{10} A comprehensive set of questions can be found in Annexes E and F at http://hiu.rcplondon.ac.uk/HESguide.pdf.
**My specialty has a national audit database. Would it not be more appropriate to use this clinically rich data for my appraisal?**

Clinically designed and owned audit datasets are an excellent tool for examining services within one specialty. Your Trust may encourage their use as a supporting source of evidence for appraisal. However, the following should be born in mind:

- Audit datasets sit outside the processes shown in Figure 1. PAS data collects all episodes of inpatient and daycase care.
- Scope is limited to certain specialties, and then to certain conditions or procedures performed within that specialty.
- Definitions of data items will invariably differ from those used for routinely collected data.
- Coverage is not guaranteed - comparisons with PAS based analyses often demonstrate missing episodes.

It can be a useful exercise to help information staff cross-validate PAS data and audit data against each other.

**I keep accurate records of my own activity on a personal or departmental database. Could this be used instead?**

It depends what you want to use the information for. It’s useful to compare your activity against that of your colleagues, and that’s often not possible with personally held data.

Departmental databases can give useful measures of your colleagues’ and your own activity, because they are designed with clinicians in mind.

Sharing the outputs with information staff can increase their understanding of clinical information needs.

### DATA QUALITY

**Isn’t the quality of PAS data poor?**

There are several aspects to data quality, as depicted in Figure 4. When assessing quality, the following points should be noted:

- Judgements of data quality must be set in the context of its use (e.g. depth may be perfectly adequate for one use, but insufficient for another).
- PAS data quality is mixed. When collected, coded and used at an aggregate level (within the remit of its original design) PAS data quality is generally good.
- Data quality issues become more apparent when examining individual consultant team data.
- There are tensions between certain elements of data quality: to improve timeliness may result in reduced completeness or depth.

![Figure 4: Elements of data quality](image)
Shouldn’t accuracy be improved before it’s shared? Who checks the data?

- Look again at Figure 2: clinical mistrust and rejection limit the probability of improving activity data.
- Figure 1 shows the flow of information. Part of the validation process involves ensuring the accuracy of written patient notes, ideally by a senior clinician.

Data quality is important for all staff working with health information, throughout the entire process represented in Figure 1.

There are a number of processes in place to validate PAS data technically, when submitted. Your information department will be able to provide you with details of the internal quality checks that occur routinely (e.g. data quality meetings, clinical coding audits).

However, huge volumes of hospital activity are generated constantly, and checking every episode for each consultant is not possible. Sharing the information with you and getting your feedback is an invaluable part of the process of improving accuracy.

Will PAS ever be able to reflect my activity accurately? What about future changes?

The quality of PAS data can certainly be improved, especially with the involvement of clinicians. But remember, when they were designed, it was not with the purpose of examining clinical activity in mind.

- PAS data are collected primarily to support corporate & administrative processes - reflected in their content.
- The classification systems used (ICD-10 and OPCS4) group detail into broader conditions so comparisons can be made. These code descriptions are predefined, and may not reflect your clinical practice meaningfully.
- PAS systems are not electronic patient records; the information they produce should not be regarded as such.
- In the future, development of more sophisticated health records underpinned by clinical terminologies (such as SNOMED CT) will enable more detailed clinical information to be collected and retrieved.

Large amounts of my activity are missing. Is it all allocated to the incorrect consultant?

There are several reasons why your data may not appear quite how you expect, some of which have already been described. Regards missing or incorrectly allocated data, refer back to Figure 1 and bear in mind the following:

- Information on diagnoses and procedures originates from the patient notes before it is coded. The details therefore need to be complete and clearly visible to coding staff (see Top 10 Coding Tips at end of guide).
- Your specialty may hold its activity data separate from the PAS (e.g. GU Medicine, Palliative care, Radiology), or your practice may be largely outpatient-based (where little clinical activity is currently captured).
- PAS systems cannot keep pace with changes in clinical practice. Increasing sub-specialisation, multiple consultant transfers, ward referral activity and shared care all present big challenges. Some activity is hard to capture.
- Transfers of care are notoriously difficult to record, especially for inpatient procedures (see Case Study 2 for a worked example). Daily ward returns are the principle means for recording transfers - communication with staff who complete them is essential.
- Many genuine problems with accuracy can be uncovered and easily rectified by looking at analyses of your activity. Discussing your data with Trust information and coding staff is an essential part of that process.

From Figure 1:

- Patient notes are the source document for clinical coding. If it’s not documented, it didn’t happen!

From Figure 3:

- There are a number of known limitations to using PAS data at consultant level.
- These should always be considered when making judgements about data quality.

The next section gives ideas for improving data, using examples from the iLab study.
HOW TO IMPROVE THE DATA

Isn’t data quality an "information" or a "coding" problem?

No. High quality health information supports patient care, both directly and indirectly. It is the responsibility of all NHS staff to ensure the information used in decision making is as accurate as possible.

One of the best ways to identify the sources of data quality problems is for clinicians and information staff to work through activity data together. This way, both can gain an appreciation of the information needs of the other.

Are there specific examples of changes that can be made?

Yes. In the next section there are worked examples of the following specific issues which were identified when working with consultant physicians in the iLab study:

- Rectifying mis-allocated data between two consultants
- Identifying inaccurate lengths of stay
- Understanding the coding of inpatient procedures

What about general measures? What good practices can I encourage my team to follow?

There are many ways in which clinicians of any seniority can help data quality. These range from mindfulness of these issues during day to day practice, to getting more involved with initiatives managed by information staff:

Open channels of communication between clinicians & information/coding staff:
- Invite coding staff on a ward round
- Offer to see the casenotes of any episodes they may be having difficulty coding
- Find out the top 3 problem diagnoses or procedures clinical coding staff encounter in your clinical specialty
- Ask to see a proportion of your coded FCEs each month and feed back any problems
- Discuss the design of any proformas you might use with coding staff: small changes can result in large coding improvements
- Find out what data quality meetings exist in your Trust, and ensure clinical representation. If there aren’t any, then start one!

Ensure the details of all diagnoses and procedures are clear and easy to find in every set of casenotes

Copy and circulate the Top Ten Coding Tips to junior staff. They are basic note-keeping tips which make a huge difference to coders

Encourage juniors to undertake audits using hospital activity data

Communicate all transfers of care to those responsible for the ward returns (usually ward clerks). Write them in the notes too

Use structured admission and discharge proformas whenever practical

Summarise diagnoses and procedures in the last entry in the casenotes before discharge

CASE STUDIES

Case Study 1: Allocation of activity data

One of the commonest identified data quality problems is that of incorrect allocation of activity to individual consultants. The diagram over the page represents a team of eight consultants working in one department. There may be a rational explanation for the obvious discrepancy between the two highlighted consultants, for example consultant 7 may represent a locum or an academic with few clinical commitments, while consultant 4’s casemix might consist of multiple short-stay admissions. However, if you are aware that activity levels in the department should be distributed roughly equally, then this appearance may signify mis-allocation and warrant further investigation.
Allocation can sometimes be skewed for historical reasons, or when new consultants start, or it might be that administrative coding has resulted in procedures being mis-allocated. Consultants 4 and 7 might be paired on an acute rota.

Without validation by a clinician who has knowledge of expected patterns of activity, simple errors can easily go undetected.

**What can I do?** Compare your knowledge of local practices with the reported activity levels. Discuss how any obvious discrepancies might be rectified with your information department.

The same principles apply when examining length of stay data. Before looking at their activity data, most clinicians will have a reasonable idea of lengths of stay within their department. When looking at distribution graphs or comparisons against colleagues there will likely be several rational explanations for differences or perceived anomalies[^11]. However, experience has shown that inaccurate lengths of stay can, and do, occur. Clinical validation of data is the best way to identify, and subsequently rectify, such errors.

**Case Study 2: Coding of inpatient procedures**

Another type of allocation problem which is more difficult to solve occurs when a patient under the care of one consultant undergoes an inpatient procedure under another. Because activity can only be allocated to one clinician at a time, there are two ways of capturing this data using finished consultant episodes (FCEs). Take the example of a medicine for the elderly patient being taken for an inpatient bronchoscopy by a respiratory consultant, before returning to their bed. The diagram shows how one such inpatient spell can comprise either one or three FCEs:

<table>
<thead>
<tr>
<th>Scenario A:</th>
<th>Respiratory Consultant</th>
<th>Geriatrician</th>
<th>Bronchoscopy</th>
<th>1 FCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 FCEs total</td>
<td>ToC → Bronchoscopy</td>
<td>ToC → 1 FCE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario B:</th>
<th>Respiratory Consultant</th>
<th>Geriatrician</th>
<th>0 FCEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 FCE total</td>
<td>Bronchoscopy</td>
<td>1 FCE</td>
<td></td>
</tr>
</tbody>
</table>

In Scenario A, overall responsibility is deemed to have passed to the respiratory consultant for the duration of the procedure. Two transfers of care (ToC) have been recorded, resulting in two FCEs for the geriatrician, and one (denoting the bronchoscopy) for the respiratory consultant.

In Scenario B, overall responsibility for the patient's care is deemed to have remained with the geriatrician throughout. They are allocated the only FCE (which includes the procedure performed by the respiratory consultant). Your activity data could reflect either of these consultants, in either scenario.

To most clinicians it may seem intuitive to always employ Scenario A, but what constitutes a “significant procedure” and how you define “responsibility” mean it’s a grey area when recording data. Scenario B actually has more in common with the original design and purpose of the dataset - it’s another example of how widening the uses of PAS data beyond their original scope can reveal limitations.

Because of this historical ambiguity, we know that different Trusts follow different scenarios. The need for common measures in this and other situations is understood, and is being acted upon by those responsible for setting information standards in both Wales and England.

**What can I do?** Establish the policies for allocation used by your Trust information department, and work with information and administrative staff to improve the accuracy of recording transfers.

[^11]: Refer to the Other Sources of Data section (p5) for questions you should ask when examining such data.
There are various levels of grouping at which PAS data can be examined, using the standard currency of the FCE. At the most detailed level, this is the activity of an individual consultant team. Above this are department, directorate, hospital and Trust (and International comparisons). Generally speaking, the higher the level of aggregation, the better the validity of the data.

Admitted patient care commissioning dataset. A mandated, centrally held subset of episode-based data items extracted from hospital patient administration systems (PAS). Collected in its current form since the late 1980s and used for key decision making in the NHS.

The translation of a diagnostic or procedural term, as written by a clinician in the patient record, into an alpha-numeric code (with associated code description), using the statistical classifications ICD-10 and OPCS-4. Use of such codes allow comparisons of activity to be made at an aggregate level.

The responsible consultant, or the "name at the end of the bed". The contribution of other team members or junior staff is not recorded separately. Each FCE can only be attributed to one consultant team (i.e., shared care cannot be represented). See also Transfer of care.

The period of time a patient spends under the care and responsibility of one consultant team. See also Transfer of care and Inpatient spell.

Appended to each FCE since 1998, this is the code used to identify the responsible consultant (or consultant team) providing care to a patient. It allows activity data to be examined at the aggregate level of an individual consultant.

The National and International standard for the classification of diagnoses, developed by the World Health Organisation. Because classification systems group similar diagnoses together for the purpose of comparison, clinical detail is lost in the clinical coding process.

The patient's entire stay in hospital. Usually this consists of one FCE, but a transfer of care can result in multiple FCEs under more than one consultant team. See Case Study 2 for implications.

A UK classification of operations and procedures, which is updated regularly to keep pace with clinical practices. In 2007, Wales updated from version 4.2 to version 4.3 (see Figure 5).

The central computer database in a hospital, containing details of every patient admission to hospital (incl. diagnoses & procedures), along with information about referrals, waiting lists and scheduling. Also contains administrative details of outpatient attendances. There are different makes of PAS, so capabilities for analysis will differ from hospital to hospital. Regular central submissions of the APC dataset are sent from PAS, ultimately becoming the Patient Episode Database Wales (PEDW; See Figure 1).

The national repository for record level hospital data concerning all episodes of inpatient and day case care (submitted as the APC dataset).

The Systematised Nomenclature of Medicine - Clinical Terms. A clinical terminology (computerised language) which underpins the development of electronic patient records. In England, all new computer systems will be SNOMED compliant. SNOMED incorporates all the clinical terms contained within READ codes.

A consultant transfer occurs when the responsibility for a patient transfers from one consultant to another within an inpatient spell. Ambiguity over the meaning of the word "responsibility" can result in hospitals currently recording transfers of care differently (see Case Study 2).

A daily update of the hospital PAS, to include information about patients currently resident on a hospital ward, including which consultant team is providing their care. Also known as "daily bed occupancy" or "daily bed management report". Usually completed by ward clerks, although sometimes by nursing staff, bed managers or even junior doctors. See also Transfer of care.

Figure 5: OPCS v4.3
To reflect changing practices, v4.3 of the UK procedures classification is 25% larger than its predecessor. New codes cover most specialties, but the following are greatly enhanced:

- Diagnostic & interventional radiology
- Radio and chemotherapy
- Rehabilitation
- Diagnostic testing (e.g., patch tests)

Consultants are advised to contact their Trust information department to ensure such information is accessible for coding.
Clinical coding is the process whereby information written in the patient notes is translated into coded data and entered onto hospital information systems. This usually occurs after the patient has been discharged from hospital, and must be completed to strict deadlines in order for hospitals to be paid for their activity.

Clinical coding staff are entirely dependent on clear, accurate information about all diagnoses and procedures in order to produce a true picture of hospital activity. The coded data is vitally important, and is used for:

- Monitoring the provision of health services across the UK
- Research and the monitoring of health trends and variations
- NHS financial planning and Payment by Results
- Local and national clinical audit and case-mix analysis
- Clinical governance

There are many ways in which clinicians can assist the process of clinical coding, some of which are summarised below. Every one of them is based on the basic principles:

1. Write clearly and legibly in the notes and on discharge documentation, using black ink only. Make sure the patient is identified on every sheet of paper used in the notes

2. Sign, date and time every entry in the notes. Print your name and position at the end of every entry

3. Never remove notes from the hospital. If you need to take notes away from the ward or clinic for an audit or a meeting, always let administrative staff know, and return them immediately afterwards

4. Always communicate any transfers of care to ward administrative staff. This includes when patients go for an investigation or a procedure performed by another clinical team

5. Clearly record details of all diagnoses (including co-morbidities) and procedures (including those done on the ward) in the notes, writing the main diagnosis first. Best practice is to summarise all of these as the last (discharge) entry in the notes - it makes your discharge summaries easier too. For injuries, note the cause; for overdoses, note the drug; and for infections, note the organism.

6. Get a senior member of medical staff to confirm or validate these diagnoses and procedures. This can be done as part of writing in the notes on the discharge ward round

7. Include the details of all diagnoses and procedures on discharge summaries and TTOs (preliminary discharge summaries). Don’t let your discharge summaries pile up on a shelf for weeks on end, awaiting dictation - coding staff have strict deadlines to meet and delays cause huge problems

8. If a clear diagnosis has not been reached, make sure you detail main symptoms in the notes or discharge summary. Any “query” diagnoses, or diagnoses preceded by a “?” can not be coded by clinical coding staff. If histology is awaited for a definitive diagnosis, note this down

9. Avoid the use of new or ambiguous abbreviations (e.g. “M.S.” could mean multiple sclerosis or mitral stenosis). Remember: clinical coding staff are not allowed to make any clinical inferences

10. If your hospital has a standard proforma for admissions or discharge, use it! Fill in all the details it asks for

Remember that clinical coders – like you – have a job to do, and you can help make that job a lot easier.