National Centre for Classification in Health

PROFESSIONAL RELATIVITIES STUDY

RESOURCE MATERIAL G

Procedure Time Estimates Validation Process (PTEVP)

Report detailing: the collection, collation and screening of theatre times data from hospitals and other sources for the PRS Theatre Times Database: and, provision of theatre times data and bias checks to Consensus Groups to aid in the estimation of times for MBS items.

Part 1: PTEVP Report

prepared for
Medicare Schedule Review Board
December 2000

National Centre for Classification in Health

PROFESSIONAL RELATIVITIES STUDY

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prepared for

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PROCEDURE TIME ESTIMATES VALIDATION PROCESS

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1. INTRODUCTION

The purpose of this report is to provide detailed information to the Medicare Benefits Schedule Review Board on the validation of procedure times as estimated by clinicians for the Professional Relativities Study (PRS).

The validation of times estimated by clinicians has been built into the PRS process to:

- provide feedback to clinicians on the times estimated for Relative Value Unit development;
- ensure that times used in the development of a formula are valid in terms of current practice;
- confirm times used for the PRS; and
- facilitate time based recovery rates for the Practice Cost Study

Three time estimates for evaluating professional work were provided by clinicians working on the PRS, these being: the pre service time [1], intra service time [2] and post service time [3]. The combination of these times is the total professional time for a service. The processes outlined in the PRS method paper to validate all three times are listed below:

1. Check of intra service times
   - check of intra service time bias
   - check for intra service time outliers

2. Check of pre and post times
   - between specialty consistency checks
   - reconciliations of total time checks

3. Check of link item times

Data from Australian hospitals and other sources has been collated to form an extensive system of theatre data. This will be used primarily to validate intra service time:

- to check and refine clinician estimates of intra service time for MBS standalone surgical procedures;
- to provide those estimates in validated form for use in the PRS, and
- to report upon such use.

1 Pre service time = Time taken to prepare for a specific service
2 Intra service time = For procedures: time in which the provider is in direct contact with the patient in the procedure room.
For consultations: face to face time with the patient.
3 Post service time = For procedures: closure or end of service to completion of normal aftercare.
For consultations: time spent on a specific service after cessation of face-to-face contact.

This report focuses on the collection, screening and processing of times collected and the use of this information for checking the intra service time bias identified in 1 above.

Initial checking was performed to validate the empirical data as formatted by the hospitals and other sources. Later screening involved the synthesis of these data to provide the basis for more powerful statistical tests. Auxiliary objectives in developing the PTEVP were to:

- make its application readily usable and transparent
- assist auditing of all aspects of its processes and outputs.

The description of processing in this document is generally more detailed than that contained in the PRS Method paper prepared in October 1998. A basic familiarity with the processing of intra service times as described in that paper is recommended as pre-reading.

In mid-1999, NCCH conducted an audit of the definitions of timespan and event boundaries as provided by the data sources. This resulted in changes to several definitions as used to determine the processing of data. These changes together with the data received from additional hospitals and other sources between September 1999 and February 2000 are included in this May 2000 version of the PTEVP report.

2. OVERVIEW

2.1 Data Sources

The NCCH initiated data requests in 1997 from selected Australian public and private hospitals. In mid-1998, a general request for supply of operating room time data was distributed more widely. A copy of that general request is included at Appendix A. Some discrepancies were noted in the aggregation and averaging of data as initially received and thereafter most data were supplied in clock time format. By December 1999, twenty-one public and private hospitals had responded and supplied large volumes of empirical time data for surgical MBS items together with some ancillary data for anaesthetic and other non-surgical items. Those data sources are referred to as Hospitals 1 to 21.

Empirical data were also obtained in the form of six separate studies and surveys originally arranged by government and other authorities for purposes outside those of the PRS. The first five of these sources were the Australian Private Hospitals Association Banding Study, the Casemix Protocol Database, the Commonwealth Anaesthetic Survey, the Deloitte Touche Tohmatsu Theatre Service Weights Study and the West Australian Group Survey.

The sixth study received in February-March 2000, utilised data from American hospitals as collated by Harvard University for a Resource Based Relative Value Scales Study (RBRVS). Its data summary has been reduced to some 370 Current Procedural Terminology (CPT) codes considered to have one-to-one equivalence to MBS items. These six studies and surveys are referred to as APHA, CASEMIX, CANS, DELOITTE, WAGROUP and HARVARD.

These empirical data together with a reference listing of the Anaesthetic Times for surgical MBS items are collectively referred to in this paper as “other time estimates” (OTE). They are used to check the estimates of intra service times provided by clinicians’ Consensus Groups (CGs).

2.2 Types of Data

There was considerable variety in the nature of the empirical data and the format descriptions provided with the source datasets. As a result, six distinct types of data corresponding to time definitions determined by the Professional Relativities Technical Committee were identified as collectable for comparison purposes. These data were broadly grouped to establish parameters for comparison with study definitions. Individual bounds may differ slightly from these. For example, “application of dressing” and “drapes removed” are each taken to equate to the end of a surgical

procedure. Listed in usually increasing order of duration [4], local descriptors for each type of timespan data together with their general descriptions are:

- OST knife to skin -to- dressing applied or drapes removed
  - introduced to cater for procedure timespan as recorded at some hospitals (as an alternative to OPT see below)

- OPT start of surgical procedure -to- end of surgical procedure (**clinician intra service time**)

- OPT2 start of surgical procedure -to- patient leaves Operating Room for Recovery / ICU / Ward

- OAT start of anaesthetic procedure -to- end of surgical procedure

- OAT2 start of anaesthetic procedure -to- patient leaves OpRoom for Recovery / ICU / Ward (for many/most cases, OAT2 [5] corresponds to **anaesthetist** intra service time)

- THT patient enters OpRoom / Anaesthetic Bay -to- patient leaves OpRoom for Recovery / ICU / Ward.

Data from the hospitals and the studies and surveys were received with various levels of detail. Some formats enabled calculation of five types of timespan and an associated frequency or frequencies. Contrastingly the data received from two hospitals comprised just one type of timespan expressed as an average without an accompanying frequency.

The definitions provided by the data sources to define their data and timespans are shown as the rows of the 'pyramid' diagram in Appendix B. Similarly, the events immediately involved in a surgical procedure are shown as the columns of that pyramid. To ensure consistency, the chronology of those events was regarded as invariant. This resulted in the discard of some clocktime data and also some aggregated data in which the usual chronology had apparently been disturbed by a factor such as;

- administration of anaesthetic by the surgeon
- involvement of assistant surgeon for only some part of a procedure.

A summary of data received is shown at Appendix C. This summary excludes several files which consisted wholly of data for multi-procedure cases.

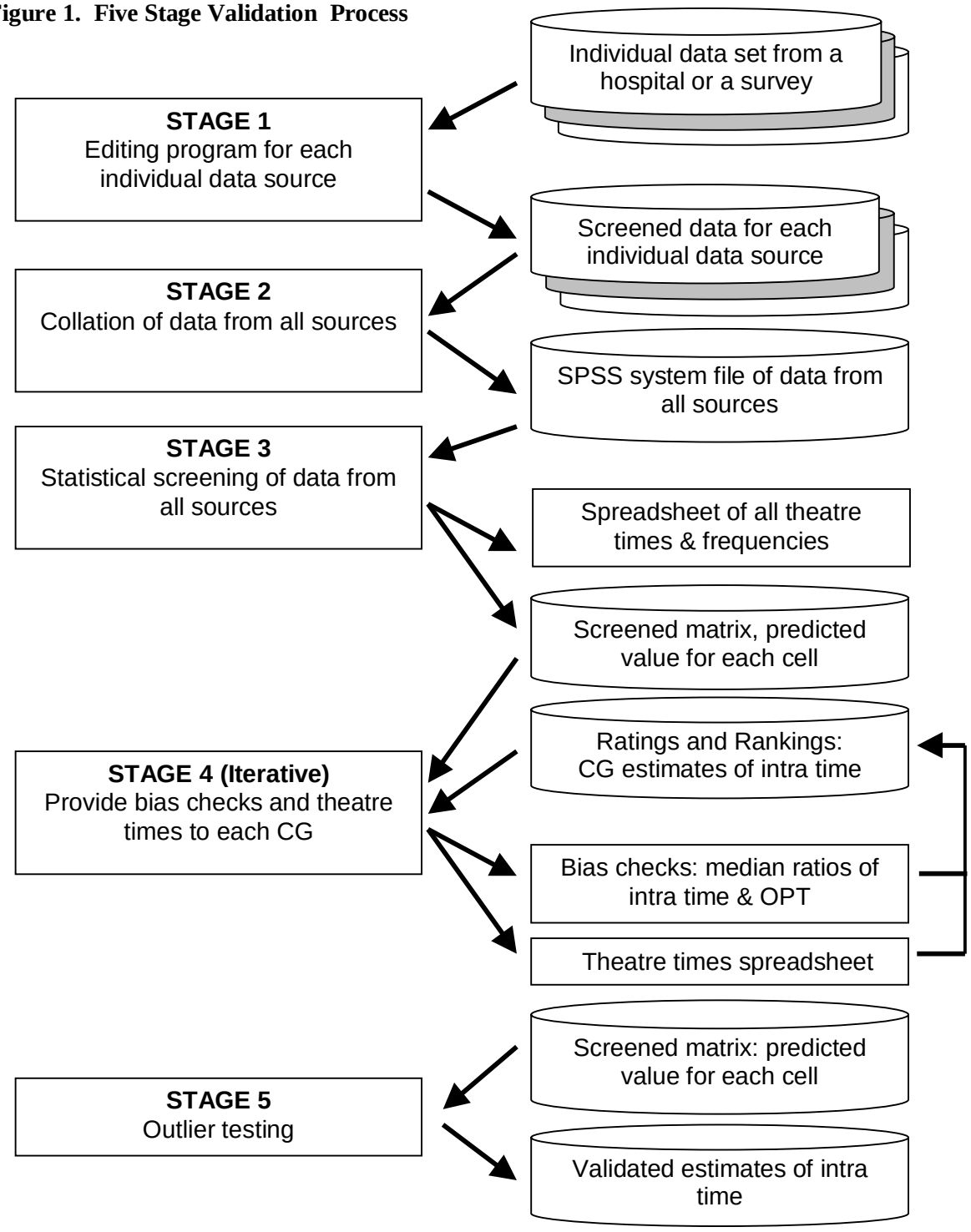
[4] OPT2 may exceed OAT. Also OST as provided by some Hospitals was due to an unknown reason larger than OPT for the same item as provided by other hospitals.

[5] In this report MBS anaesthetic time is regarded as equating to OAT2,. Hence a time that corresponds to the anaesthetic time-units as listed in the MBS schedule is referred to as MBSOAT2.

2.3 Five Stage Validation Process

The stages of the process for validating intra service times are shown together with input files, output files and reports in Figure 1.

Figure 1. Five Stage Validation Process



3. STAGE 1: CHECKING INDIVIDUAL DATA SETS

3.1 Aims and Limitations

In order to check the nature, consistency and validity of available data, a specialised screening program was developed for each data source. These programs - written in SPSS - include tests directed at the source format and content specifics of surgical MBS items current at 30 June 1997. Each test is followed by editing to:

- discard data identified as probably erroneous but uncorrectable
- modify and retain data where appropriate.

The mandatory requirement for this screening and associated editing is that it be clearly justified and documented in a form amenable to auditing. This demands consistent application across data sources and so the programs tend to have a sequence of similar check algorithms followed by source and data specific editing modules. For some data sources an uncommon test had to be developed, and so the need for and functioning of the common and especially the uncommon tests are extensively detailed in program comments.

The principal limitations noted during screening were:

- wide variety in the nature and detail of the recording and pre-processing of data
- pre-processing such as the aggregating and averaging of data tends to obscure the causes of general or specific anomalies and errors
- general or specific anomalies or apparent errors can only be queried some time after and at varying distances from the place of initial data recording.

3.2 Types of Data Presentation

3.2.1 Specific Clock Times

Most of the later data sources provided specific clock times on a case-by-case basis. Differencing the clock times then produced one or more timespans for every case. The checks practicable within each such dataset were:

- within each case:
  - times in chronological order

  - duration of each specific timespan compared with those of any other spans for that case
- across all cases with the same MBS code (effectively 'repeats' of that procedure):
  - consistency (within wide limits) of each type of timespan.

Five examples of typical data errors are set out below (MBS numbers assumed correct, probable errors underlined):

MBS	Patient into OR	A'tist Start	Op Start	Dressing Applied	Patient Leaves OR	Description
30029	15:15	15:55	16:10	03:15	03:25	Debridement and repair
41764	12:45	13:00	00:00 [6]	00:00	14:00	Laryngoscopy
44376	07:40	07:50	08:20	08:20 [7]	09:10	Above knee amputation

MBS	Arrive Theatre	Anaes Start	Op Start	OP End	Rec In	Rec Out
30068	15:25	16:05	16:06	16:31	16:30 [8]	18:00
30484	11:15	11:15	11.00	11:20	11:22	12:05

3.2.2 Specific Timespans

Data reported as specific timespans would notionally support exactly the same testing as specific clocktimes in 3.2.1. However this format was used by only one source which provided just a single timespan for each case. Hence checking within that source dataset was reduced to:

- across cases that 'repeated' the same MBS code:
  consistency (within wide limits) of the one type of timespan,
  (and fortuitously consistency with a data field that detailed the associated anaesthetic MBS).

Two examples of typical data errors are set out below (MBS numbers assumed correct and likely errors underlined):

[6] Some sources used 00:00 - rather than **blank -** as the default for a missing or unknown value.
[7] Other sources used a stutter of a previous time - rather than **blank** - as the default for an unknown time.
[8] Possibly due to use of unsynchronised timepieces.

Surg MBS	Anaes MBS	Anaes Start to Patient Transferred to Recovery
32026	17728	80 mins
49557	17707	540 mins

3.2.3 Aggregated Timespans

Several data sources provided a count of the number of cases involving the same procedure code accompanied by an aggregate - and usually also an average - of each type of timespan for those cases.

After the calculation of averages as necessary, the checks practicable within each such dataset were:

- duration of each average timespan compared with those of any other average timespans for that case
- across averages that 'repeated' the same MBS code consistency (within wide limits) of the duration of each type of timespan.

Many 'repeats' were already embedded in the averages. Hence application of the test was for some datasets limited to second-level 'repeats' in the form of averages supplied for two or more specialties, theatres, or providers and occasionally MBS items which had undergone a change of number some time before or during the reporting period. Some datasets included many second-level 'repeats' ,[9] but others had none.

Four examples of typical data entry and processing errors are set out below (probable errors underlined):

MBS	Case-mix Type	Descrip.	Freq	Aggregate Op Time (mns)	Av Op Time (mns)
31330	Other	Surgery	2	116	58.0
31330	Private	31330	31	1084	35.0
31330	Public	Surgery	5	53	10.6

[9] Inconsistencies in the Casemix dataset - stemming probably from use of different event timespans at the contributing hospitals - lead to the discard of much data during the checking of 'repeats'.

MBS	Freq	Pre Tot: An Start to Op Start	Op Tot	Rec Tot	Av Op Time (mns)	Av Anaes Time (mins)	Av Rec Time (mns)
30631	1	5	20	20	50.0	25.0	20.0
48909	18	1845 [10]	940	438	52.2	154.7	24.3

3.2.4 Average Timespans

Several data sources provided just the average duration for one or more types of timespan across cases involving the same procedure code. Usually this was accompanied by a frequency count of the number of such cases. The checking of these datasets was basically the same as that for aggregated data, but was in some instances hindered by lack of the corresponding frequency data.

Three examples of typical data processing errors are set out below (MBS numbers assumed to be correct, probable errors underlined after comparison with MBSOAT2 and averages for same procedures from other sources):

MBS1	Av Op Time	Av Rec Time
42818	280	45
48930	9	56
49518	16	65

3.3 Nature and Manifestations of Errors

Even the small variety of examples above are sufficient to confirm that most time data must have been initially recorded as clock times. At some locations accuracy may have been assisted by use of a hot key but the data records received incorporated a wide variety of time errors. Some of these had occurred during initial data preparation and entry into a recording system while others had been introduced during source pre-processing such as aggregation and the calculation of averages. Some of these errors could be readily detected and in some instances corrected.

The most observable errors were specific clock times out of chronological order. This cause was aggravated at some sources by the problematic use of 'zero(s)' as a default for a missed or unknown time. In aggregated data this type of error was indicated by a disproportionately large timespan average, the size of which reduced as frequency increased. Data from other sources included a repeat or 'stutter' of a clock time in place of an unknown time or times. This lead to the discard of almost 50 percent of

[10] Apparently included an error in a chronological sequence of times which wrongly lead the source to adjust a time or times that seemed to cross 2400 by adding 1440 (ie: 24 x 60) minutes during pre-processing.

the cases provided by one hospital in which the start time was stuttered to provide a finish time.

In some sequences of specific clock times it was possible to infer an error or repetitive error of two hours resulting from erroneous conversion of time from a 12-hour clock: as for example entering 5:30 PM as 1530. Simple errors of one hour in a clock time were expected to be unobservable. Notwithstanding this - and assuming that a particular case did in fact consist of one standalone item - some one hour errors in an operation timespan could be inferred particularly when a precursor or posterior anaesthetic timespan also seemed to differ by about 60 minutes from its contemporaries[11].

MBS item numbers were also mis-reported. This was particularly apparent in the case of Hospital 19 which provided clock data accompanied by an independently entered summary description of the procedure, and a further parameter for the principal surgical specialty. A unique test was developed for this data using the specialty as a filter to select possible data entry errors for inspection. Then, where the summary description failed to correlate with the MBS item, the description was taken to be correct and it was assumed that the number had been wrongly selected from a hardcopy list. This testing revealed an error rate of more than 2 percent. Some other sources provided a summary description with each procedure but word-perfect repetition indicated that the descriptions had been extracted from a soft-copy list. So although each such source presumably had machine assistance in its selection of an appropriate MBS from a list of descriptions (or of the description corresponding to an already nominated MBS), the resultant lack of independence precluded useful testing within the PTEVP.

Also it became apparent that two sources (at least) had included some estimates together with their empirical data. The presence of estimates was first suggested by a data return which included entries for unusual or rarely performed procedures: each represented as a sole example in aggregate or average format with a frequency of one. Both sources had entries for a wide range of unusual procedures and, during subsequent processing, many of their 'sole example' entries were found to be inconsistent with the timespan data provided by other sources. As a result the validity of all 'sole example' data became doubly questionable.

Overall it was apparent that errors were most readily observed and diagnosed within records which listed specific clock times. Errors were less observable and many more were presumably obscured when embedded in records which provided aggregated or averaged data. However, the disturbance caused to averaged data by large time-related errors could

[11] As with other errors affecting an individual clock time and dependent upon the boundary at which this occurred, a 60-minute increase in a precursor or posterior anaesthetic timespan could also involve a 60-minute reduction in OST or OPT.

often by inferred by comparison with other data from the same or another source.

3.4 Structure of Initial Screening Process

Preliminary screening of the data received in individual source files was directed firstly at the discard of cases that involved any of the following types of extraneous data:

- cases involving multiple MBS items
- informal or temporary item numbers or descriptors that could not be equated to an MBS number
- items with MBS numbers outside the range of 340 and 11000-53460
- numbers not listed in the MBS-MBS historical map
- data lines with fundamental numeric errors such as negative totals or missing frequency data.

This screening included also the re-numbering of obsolete MBS items that had been changed prior to 30 June 1997; and also the reversion where practicable of re-numbered MBS items to a prior number that had applied at 30 June 1997 [12].

Follow-on screening aimed at the format and data specifics of each source was structured as a sequence of tests to assess reasonableness and consistency. The applicability of these tests varied within each data format and was particularly constrained by the skeletal nature of the data provided by some sources. In consequence, and also because of the affects of aggregating and averaging, it was considered necessary to introduce some consistency checks between datasets.

3.5 Follow-on Tests and Correction Procedures

Specific tests were applied dependent upon the nature and format of data. The following sequence of tests was used where practicable for each clock time dataset:

- ➔ MBS item number corresponds with literal description of procedure as flagged by surgical specialty
- ➔ clock times of 00:00
- ➔ clock times in chronological order including any that apparently cross into a following day
- ➔ precursor timespan (anaesthetist or anaesthetic start to clinician or operation start) unusually long
- ➔ posterior timespan (operation finish to anaesthetist or anaesthetic finish) unusually long

[12] This re-numbering was implemented in accordance with an MBS-MBS historical map supplied by the Department of Health .

- ➔ OAT abnormally short and suggestive of default times, and/or OPT unusually consistent and suggestive of default times
- ➔ where the average OPT or OAT across all repeats in a data set is greater than 60 minutes, filter out individuals times which are less than 40% or greater than 250% of the average.

Due to the relatively small number of useful 'repeats' present, the tests applied to all aggregated and averaged datasets tended to be interactive. The common tests were applied in the following sequence:

- ➔ consistency of timespans in any repeats within dataset
- ➔ consistency of short duration procedure timespan averages against other datasets
- ➔ consistency of long duration procedure timespan averages against other datasets
- ➔ average OAT2 less than 33% of MBSOAT2 or greater than 300% of MBSOAT2 (tagged for interactive comparison against OAT2 averaged across all sources).

The numbers of data lines directed to this initial screening process are shown as "Data Lines for Checking" in Appendix C, and also "Data Lines Input in Appendix D. Those that survived the process are shown as "Data Lines Retained" in Appendix D.

The correction procedure implemented was to either discard a complete data line or to discard only data relating to a particular timespan or timespans affected by an error. The former was commonly applied to clock data lines which described a single case, and the latter was selectively applied to data lines that provided aggregated or averaged data.

Hence, in some instances averaged or clock-time data reported for an MBS number were discarded on the basis that one or more of the constituent timespans was - compared to other examples for that MBS from the same or some other source - abnormally short or long. The justification for discard due to abnormally short timespan was that either the procedure's MBS number was incorrectly reported or that the nominated procedure had been suspended due to morbidity or other cause. Discard due to an abnormally long timespan - especially a precursor or posterior anaesthetic timespan - was based on the supposition that either the MBS number was incorrect, or that the data related in part or whole to multi-procedure cases.

The OAT2 / MBSOAT2 test above was initially useful in identifying numerous errors within the datasets. It also unexpectedly highlighted many instances where the MBSOAT2 time listed for an item proved to be inappropriately short or long compared to the OAT2 generated by averaging screened data across all datasets. Notwithstanding this unreliability, some 'sole example' [13] entries that could not be checked

[13] See also paragraph 3.3.

against other sources due to lack of corresponding data were discarded simply on the basis that they were inconsistent with MBSOAT2.

The general purpose of Stage 1 screening was to identify and remove gross errors from the source datasets. Implemented essentially within conservative limits it also identified and led to the discard of problematic data which had only subtle indications of error.

3.6 Outputs

3.6.1 Raw Data, Test and Correction Summary

The run-time listing of the specialised SPSS program developed for each data source functions as a general summary of both data and processing. Firstly, these listings include in their condescriptives the statistics for input data as designated variables. Statistics provided for output typically included the number of times a variable was observed, its minimum and maximum values, sum, mean and standard deviation. (See also the extract in Appendix E.) Secondly, commented instructions in each program listing describe the tests applied. These comments were complemented - size permitting - by copies of the actual raw data lines isolated by each test and the detail of subsequent data discards and edits. The run-time listings were retained as records for auditing purposes.

3.6.2 System Files

The timespan and frequency data from all data lines which survived the individual screening programs were then consolidated by MBS item and output as SPSS system files: one file for each source hospital and survey. Frequency data were simplified. Instead of retaining up to five frequencies[14], one for each type of timespan, one frequency was taken to apply to all timespans for that combination of source and MBS item. The frequency retained was that applying to OPT (or alternatively OST), and if this was not available then the frequency for OPT2 or OAT or OAT2 or THT in that order.

[14] Differences in these frequencies could occur when one or more timespans for a particular data line were either missing or discarded due to a data error or omission.

4. STAGE 2: COLLATION OF DATA FROM ALL SOURCES

The SPSS system files generated in Stage 1 were then matched on MBS item number to provide a combined system file of all data for single item cases. This system file was essentially a large matrix. The rows were all the MBS numbers (340 and from 11000 to 53460) retained in the individual source data sets after initial screening; the columns were all combinations of source and type of data provided (for example H9A OPT2, H9A OAT2); and the elements of the matrix were the corresponding average theatre times and simplified frequencies.

The combined matrix provided data for 2830 MBS numbers and 72 distinct types of timespan by source: 4 x OST, 14 x OPT, 11 x OPT2, 15 x OAT, 17 x OAT2, 11 x THT [15]. A set of SPSS statistics for the timespan data in this combined matrix is provided at Appendix E.

[15] Descriptions of these timespans by source can be seen in Appendices B and F.

5. STAGE 3: STATISTICAL SCREENING OF COMBINED DATA

Considering only timespan data, the combined system file generated in Stage 2 was sparsely populated. This was because each hospital typically encountered only a subset of MBS items. As of May 2000, only 53,820 (26%) of the 203,760 cells of the matrix were occupied. This data sparseness meant that for most MBS items the number of cells occupied by timespan data was between 5 and 25.

Furthermore, the timespans stored were not always the same. For example, item 12345 might have had H1 OPT, H1 OAT, MBSOAT2, H3 THT and WAGROUP OAT2; whereas item 23456 had H9B OPT2, H9B OAT2, MBSOAT2, and CASEMIX Public THT. For this reason it was very difficult to screen the data without modelling the cells of the matrix (observed times) in terms of the rows (MBS items) and columns (source x type of timespan).

The preliminary model used for that purpose was multiplicative in terms of both rows and columns. At a first approximation it was assumed that the ratio for each time for Item A to the corresponding time for Item B was the same. Similarly the ratio of H1OPT to H19 THT (or any other timespan) was approximately the same for all MBS items they had in common. It was then possible to predict values for the empty cells and to complete the matrix. Having completed the matrix, each of the actual theatre times observed could then be compared against a predicted value.

This comparison formed the basis of the statistical screening process. All times (except for MBSOAT2) were compared to their predicted values. Any times which were more than twice [16] or less than a half of their predicted values were rejected. This gave a maximum fourfold range of values for each MBS item X Source X Type of Timespan estimate. In the latest run this step resulted in the filtering out of 2,413 values (ie: 4.5% of the original 53,820 occupied cells). Coincidentally this filtering also reduced the number of data rows in the matrix from 2830 to 2826. The four discarded rows each had some occupied cells but all differed substantially from their predicted values and they had to be discarded. The resultant matrix then had 203,472 cells of which 51,407 (25.3%) were occupied. These data together with the numbers and percentages of observed values discarded by the screening process are shown in Appendix E.

[16] Note there is no reason why we have to use a factor of 2. With far more data from more sources this factor could possibly be reduced.

A copy of the resultant matrix/combined system file was also generated in EXCEL format for expedient feedback to CGs. In this format it was referred to as the Total Theatre Times Report.

6. STAGE 4: PROVISION OF THEATRE TIMES DATA AND BIAS CHECKS TO CONSENSUS GROUPS

6.1 Report Specialty Specific MBS Numbers

Statistical feedback was provided to each CG upon receipt of its latest estimates of pre, intra and post times and intensities. The time and frequency data from the screened version of the combined system file were matched with the CG's time estimates which were contained in a "Ratings and Rankings" spreadsheet. Two forms of feedback were generated through this process.

6.2 Create Theatre Times EXCEL File

The first feedback report - Theatre Times - was generated by simple extraction of data held on the combined SPSS system file described in Section 5 above. It was similarly formatted and included all screened time and frequency data available for the MBS items being considered by that CG. Part of a Theatre Times spreadsheet is reproduced at Appendix F.

6.3 Perform Bias Checks

The second report - Bias Checks - compared the CG estimates of intra time against screened OST, OPT, OPT2, OAT, OAT2 and THT data. The only valid direct comparison was **intra time / OPT**. Comparisons with OST, OPT2, OAT, OAT2 and THT were also provided, but these were for general interest and informal extrapolation where OPT times were not available. An example of a Bias Checks report is provided in Appendix G.

The simplest way to undertake a bias check is to examine the ratios of the specialty's average intra time estimate to each of the average observed OPT times, with the averages taken over those items for which both estimates are available. This is illustrated in Table 1.

Table 1: Comparison of Specialty 'A' Intra Times with Other Time Estimates (August 1999)

Other Time Estimate(OTE)	No. of Items In Common	Average Time In Minutes SpA	OTE	Ratio 100 x Sp A/OTE
H1 Op Start to Op End	4	42.0	45.3	92.7
H4 Op Start to Op End	7	44.9	34.9	128.8
H6 Op Start to Op End	1	16.3	16.7	97.7
H8 Surgeon St to Drapes Removed	23	89.3	92.5	96.6
H9A Surgery St to Surgery Finish	70	146.5	117.2	124.9
H9B Surgery St to Surgery Finish	4	60.3	30.9	194.9
H10 Op Start to Op End	1	16.3	9.3	175.3
H11 Knife to Skin – Applic of Dressing	12	106.1	125.8	84.4
H13 Surgeon Start to Surgeon Finish	1	16.3	12.6	129.4
H15 Op Start to Op End	62	137.5	92.7	146.4
H16 Proc Start to Proc End	86	154.6	157.3	98.3
H17 Surgical St to Surgical End	105	168.6	196.6	85.8
H18 Proc Start to Proc End	65	139.5	93.2	149.8
H19 Positioning to Dressings Applied	101	169.1	167.3	101.1
APHA Procedure Time	56	148.8	114.6	129.8
DELOITTE Procedure Time	25	124.3	95.6	130.0

Median ratio of Sp A intra time estimates to OPT
Unweighted = 126.9%
Weighted (for number of items in common) = 101.1%

Table 1 can be seen to exhibit a somewhat unusual distribution of values with several spread across the range 84 - 101 % and then a cluster of values between 124 - 130%. Because of this uncertainty, we would recommend that this specialty would not need at this stage to attempt to correct for any overall bias. Instead the data could be passed forward to screening for outliers while the CG should continue to review individual intra times against observed values.

A different situation would apply for Table 2 with hypothetical Specialty B (SpB). The averages of its intra time estimates exceed all 16 OPT averages. Probably the most effective way to remove the bias from this table would be to reduce the CG's estimates by 35.6 % (= 100 * (1 - 100 / 155.3)).

Table 2: Comparison of Specialty 'B' Intra Times with Other Time Estimates (August 1999)

Other Time Estimate (OTE)	No. of Items In Common	Average Time In Minutes		Ratio 100 x Sp B/OTE
		Sp B	OTE	
H1 Op Start to Op End	15	126.9	89.4	142.0
H4 Op Start to Op End	33	121.6	99.8	121.8
H6 Op Start to Op End	6	96.3	59.9	160.8
H8 Surgeon St to Drapes Removed	39	167.3	90.6	184.7
H9A Surgery St to Surgery Finish	53	173.9	120.6	144.2
H9B Surgery St to Surgery Finish	9	83.9	55.4	151.5
H10 Op Start to Op End	19	140.9	86.1	163.7
H11 Knife to Skin - Applic of Dressing	28	163.6	152.9	107.0
H13 Surgeon Start to Surgeon Finish	7	101.8	60.1	169.2
H15 Op Start to Op End	67	181.5	90.0	201.8
H16 Proc Start to Proc End	81	188.6	118.8	158.8
H17 Surgical St to Surgical End	100	190.7	122.8	155.3
H18 Proc Start to Proc End	42	153.9	100.3	153.4
H19 Positioning to Dressings Applied	58	190.9	129.8	147.1
APHA Procedure Time	47	196.0	123.4	158.9
DELOITTE Procedure Time	14	146.2	106.5	137.2

Median ratio of Sp B intra time estimates to OPT
Unweighted = 154.4%
Weighted (for number of items in common) = 155.3%

7. STAGE 5: OUTLIER TESTS

All specialty intra service time estimates can be checked for outliers, however, this should only take place once any overall bias has been removed. The checking for outliers is accomplished by performing a regression analysis using the specialty's intra time estimate as the dependent variable and all other time estimates as the independent variables in order to generate a predictor of the specialty's intra time estimate. The outliers can then be identified as the specialty's intra time estimates which differ by more than a specified amount (eg: three standard deviations or 70%) from this predictor.

The reason why **this check should not be carried out if there is a bias in the intra time data** is that this bias will also be incorporated in the predictor. In this event half or more of the outliers identified will not be true outliers. The reverse could be true; they could be good data which are free of the bias.

8. CONCLUSIONS AND RECOMMENDATIONS

The final theatre times data base contains 51,407 times for 2826 MBS items. These data were assembled from 173,861 lines of data received from 28 data sources.

The NCCH is satisfied with the theatre times data and would encourage more data to be forwarded during the study. These data provide an excellent starting point for validating intra times on an aggregate (ie: specialty) basis. However, they are less reliable at an item level. Extreme caution should be taken before using item level averages unless they are derived from a reasonable range of sources.

Preliminary checking and validation of the more detailed source datasets has proved to be quite productive but little such processing was possible with the skeletal datasets. However, it would be inappropriate to reject skeletal data simply on the basis of its format. It is instead preferable and practicable to employ statistics across all available data in order to screen and filter out errors from all datasets. The most appropriate general rule is "the more sources and the more data the better the result".

Generally the validation process has demonstrated its capability to assist in the refinement and validating of intra times for use in the PRS. Nonetheless it is apparent that pre-processing of clock data by a source to form specific timespans, aggregates and averages adds to the complexity of checking and adjusting for individual errors in data. Also such pre-processing can lead to the later discard of useful data such as a data record which may have aggregated one instance of grossly erroneous data with other data for accurately recorded cases. For those reasons it is recommended that the nature and format of any further datasets sought should be along the lines described in Appendix H.

Glossary of Terms

APHA	Survey data/source: Australian Private Hospitals Association Banding Study
CANS	Survey data/source: Commonwealth Anaesthetic Survey
CASEMIX	Survey data/source: Casemix
CG	Consensus Group
DELOITTE	Survey data/source: Deloitte Touche Tohmatsu, Theatre Service Weights Study
HARVARD	Survey data/source: Harvard University, Resource Based Relative Value Scales Study
MBS	Medicare Benefits Schedule
MBSOAT2	Anaesthetic time in minutes as specified in MBS Book
OAT	Start of anaesthetic procedure -to- end of surgical procedure
OAT2	Start of anaesthetic procedure -to- patient leaves Operating Room for Recovery / ICU / Ward (for many/most cases, OAT2 corresponds to **anaesthetist** intra service time)
OPT	Start of surgical procedure -to- end of surgical procedure (**clinician intra service time**)
OPT2	Start of surgical procedure -to- patient leaves Operating Room for Recovery / ICU / Ward
OST	Knife to skin -to- dressing applied or drapes removed. Introduced to cater for procedure timespan as recorded at some hospitals (an alternative to OPT see above)
OTE	Other time estimate
PRS	Professional Relativities Study
PTEVP	Procedure Time Estimates Validation Process
THT	Patient enters Operating Room / Anaesthetic Bay -to- patient leaves Operating Room for Recovery / ICU / Ward.
WAGROUP	Survey data/source: West Australian Group Survey

APPENDIX A

LETTER REQUESTING THE PROVISION OF OPERATING ROOM TIMES

Chief Executive Officer
Xyz Hospital

Dear Sir/Madam

PROFESSIONAL RELATIVITIES STUDY:

REQUEST FOR THE PROVISION OF OPERATING ROOM TIMES

The purpose of this letter is to seek your assistance in providing operating room times to assist the National Centre for Classification in Health (NCCH) in undertaking work on the Relative Value Study (RVS) of items listed in the Medicare Benefits Schedule (MBS).

The RVS is being undertaken as a joint project by the Department of Health and Family Services and the Australian Medical Association with the aim of determining appropriate relativities between items in the MBS. The RVS is being directed by the Medicare Schedule Review Board (MSRB) comprised of representatives of both the Department and the AMA .

The NCCH has been engaged as a consultant by the MSRB to undertake a study to determine the resource based relative values for professional work relating to items in the MBS. This Professional Relativities Study (PRS) involves Australian clinician input to determine resource based relative values for procedures within each specialty, using a range of data including Australian intraservice times; other estimates of time; intensity ratings; and maps between the Medicare Benefits Schedule and the American Medical Association Physicians' Current Procedural Terminology.

As part of the study process, Clinician Consultants are estimating procedural time for pre, intra and post service periods. To assist in confirming these estimates, the NCCH has requested actual times from a selection of Australian private and public hospitals for comparison. Unfortunately, insufficient data has been received from hospitals to allow validation of these times with any degree of certainty.

As a result, I am writing to request the provision of operating room times from your health care facility (if available) for the validation of times estimated by clinicians working with the NCCH for the Professional Relativities Study.

The information will be used to assess the times estimated by clinicians representing the specialist Colleges, Societies and Associations and will be used for comparative purposes only. The NCCH will consider the information with the strictest confidentiality. Each hospital will be deidentified and no times will be reported or published.

The information and format preferred for the assessment of times is detailed below:

1. Data	**-** per MBS Item number if available
Procedure time	**-** average time (eg start to end of procedure)
Preparation time	- average time (eg dress scrub and wait times pre procedure)
Post procedure time	- average time (eg recovery time etc (only if doctor involved)
Anaesthetic time	- average time
Frequency	- number of cases for average times
2. Definitions	- could you please provide definitions of the times
3. Range of MBS items	- Category 1 (Items 173 and 340 only) - Categories 2-4 (all items in the range 11000-53460)
4. Data limits	- latest available fiscal (preferably 1996/97) or calendar year.
5. Format	- electronic format if possible (ie ASCII format comma delimited or Excel spread sheet). The information can be sent via Email to Patricia Dahdah – pdahdah@cchs.usyd.edu.au.

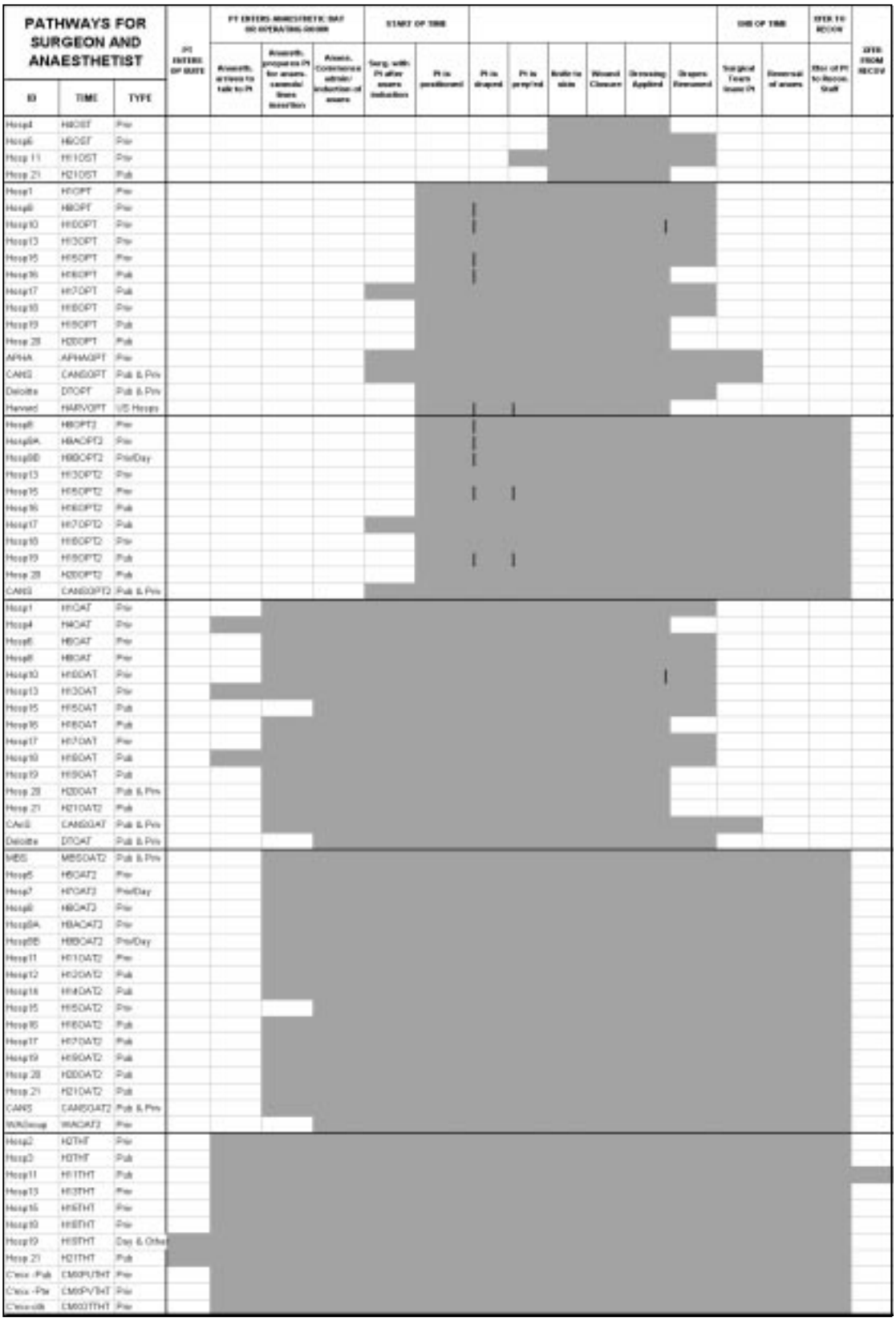
Thank you very much for considering this request. If you are able to assist us by providing operating room times, the NCCH would appreciate a response by 18 September 1998. If you have any queries on the technical matters relating to this request, would you please contact Lauren Jones at the NCCH on 02 9351 9097. David Reddy (02 6285 2819), from the Medicare Schedule Review Task Force which is directing the RVS, is available to answer any other concerns you may have.

Yours sincerely

Col Bailey
Director
20 August 1998

APPENDIX B

DEFINITIONS PYRAMID



KEY: | = Hospitals where start/end times are defined by >1 pathway time option

APPENDIX C

SUMMARY OF DATA RECEIVED

Source of Data	Collection Period	Type of Time Data	Apparent Accuracy of Time Data	Single Item Case Distinguishable from Multi Proc	Frequency Data Provided	Data Lines Received *	Data Lines for Checking **
Hosp 1	not specified	aggregate	minute	Y '1st item of billing	Y	772	772
Hosp 2	12 months	averages	minute	? not specified	N	840	840
Hosp 3	Aug 96 - ?	aggregate	minute	Y 'prim av mins'	Y	278	206
Hosp 4	Jly 96 - Jne 97	aggregate	minute	Y '1st item of billing	Y	580	580
Hosp 5	Jly 97 - Feb 98	averages	minute	? not specified	N	620	620
Hosp 6	not specified	aggregate	minute	Y 'first proc'	Y	400	400
Hosp 7	not specified	aggregate	minute	Y 'prim av mins'	Y	428	371
Hosp 8	Jne 97 - Aug 98	averages	minute	Y sep file for multi	Y	825	825
Hosp 9	not specified	aggregate	minute	Y 'single proc ops'	Y	850	850
Hosp 10	not specified	aggregate	minute	Y explicit	Y	1574	683
Hosp 11	Calender 1997	averages	minute	Y 'principal proc'	Y	496	496
Hosp 12	Aug 96 - May 97	specific	minute	Y explicit	1 per line	876	698
Hosp 13	not specified	averages	minute	Y sep file for multi	Y	416	416
Hosp 14	Oct 96 - May 97	spec span	5 minutes	Y sep file for multi	1 per line	26939	26939
Hosp 15	not specified	clocktimes	minute	? not specified	1 per line	10098	10098
Hosp 16	Feb-Sep 1998	clocktimes	minute	Y explicit	1 per line	18724	9500
Hosp 17	FY 1996/97	averages	minute	? not specified	Y	1153	1153
Hosp 18	not specified	averages	minute	Y sep file for multi	Y	1045	1045
Hosp 19	Apr 95 - Oct 98	clocktimes	minute	Y explicit	1 per line	15390	11372
Hosp 20	Jly 98 - Jne 99	clocktimes	minute	Y explicit	1 per line	15468	11615
Hosp 21	May 97 - Nov 99	clocktimes	minute	Y implicit	1 per line	51291	27139
APHA	not specified	averages	minute	? not specified	Y	827	827
CANS	Sep-Oct 1998	clocktimes	minute	Y explicit	1 per line	15203	10687
CASEMIX	not specified	averages	minute	? not specified	Y	3197	3197
DELOITTE	1 Aug-30 Nov 94	averages	minute	Y	N	646	466
HARVARD	not specified	averages	minute	Y implicit	N	370	370
WAGROUP	several years	averages	15 minutes	? not specified	N	1965	1965
MBSATIME	as at 30 Jun '97	T-units	15min/10min	Y explicit	not avail.	2590	2590
TOTAL						**173861**	**126720**

* Excludes some files which consisted entirely of data for multi-item cases.
** Excludes lines involved in multi-item cases.

APPENDIX D

SUMMARY OF INITIAL SCREENED DATA

Source of Data	Timespans Obtainable from a Fully Completed Data Line	Data Lines Input	Data Lines Discarded	Data Lines Retained	Corres. Number of MBS Items	Corres. Number of Cases	Corres. Nr of Cells in Matrix
Hosp 1	OPT OAT	772	15.3%	654	380	2257	760
Hosp 2	THT	840	8.2%	771	752	not avail.	752
Hosp 3	THT	206	10.7%	184	155	671	155
Hosp 4	OST OAT	580	8.6%	530	521	7113	1032 **
Hosp 5	OAT2	620	5.3%	587	583	not avail.	583
Hosp 6	OPT OAT	400	3.8%	385	376	3217	752
Hosp 7	OAT2	371	15.6%	313	313	4611	313
Hosp 8	OPT OPT2 OAT OAT2	825	2.9%	801	755	10475	3020
Hosp 9	OPT2 OAT2	850	3.6%	819	817	8480	1634
Hosp 10	OPT OAT	683	8.8%	623	215	1376	430
Hosp 11	OST OAT2 THT	496	6.9%	462	462	5534	1386
Hosp 12	OAT2	698	1.3%	689	155	689	155
Hosp 13	OPT OPT2 OAT THT	416	23.3%	319	300	2151	1200
Hosp 14	OAT2	26939	2.1%	26369	1408	26369	1408
Hosp 15	OPT OPT2 OAT OAT2 THT	10098	13.5%	8738	665	8738	3325
Hosp 16	OPT OPT2 OAT OAT2	9500	7.3%	8803	1045	8801	4179 **
Hosp 17	OPT OPT2 OAT OAT2	1153	7.6%	1065	1047	10930	4188
Hosp 18	OPT OPT2 OAT THT	1045	5.2%	991	977	17644	3908
Hosp 19	OPT OPT2 OAT OAT2 THT	11372	51.8%	5479	810	5479	4047 **
Hosp 20	OPT OPT2 OAT OAT2	11615	8.5%	10632	823	10632	3292
Hosp 21	OST OAT OAT2 THT	27139	13.1%	23578	1176	23556	4704
APHA	OPT	827	1.8%	812	812	105283	812
CANS	OPT OPT2 OAT OAT2	10687	14.1%	9181	972	9181	3888
CASEMIX	THT (for Pte Pub Other)	3197	28.7%	2279	2219	267990	2219
DELOITTE	OPT OAT	466	6.7%	435	433	16586	866
HARVARD	OPT	370	0.5%	368	368	not avail.	368
WAGROUP	OAT2	1965	4.3%	1880	1854	not avail.	1854
MBSATIME	MBSOAT2	2590	0.0%	2590	2590	not avail.	2590
TOTAL		**126720**	**12.9%**	**110337**	**2830**	**not avail.**	**53820**

**Reduced from 1042, 4180 and 4050 resp. due to presence of some incomplete data lines.

APPENDIX E

SUMMARY OF COMBINED TIME DATA FOR ALL SOURCE FILES

BEFORE STATISTICAL SCREENING							AFTER SCREENING		
Variable	Mean	Std Dev	Minimum	Maximum	Sum	N	Number Retained	Screened Out	Screened Out(%age)
MBSNUM						2830	2826	4	0.1
MBSOAT2	117.1	97.6	15.0	730	303165	2590	2590	0	0.0
H10PT	46.4	41.8	5.0	290	17626	380	342	38	10.0
H10AT	59.2	47.2	9.7	345	22511	380	363	17	4.5
H2THT	76.0	55.7	7.0	360	57118	752	717	35	4.7
H3THT	55.1	46.3	9.9	352	8536	155	137	18	11.6
H40ST	49.9	41.2	3.5	255	26020	521	476	45	8.6
H40AT	77.5	49.8	10.0	309	39613	511	494	17	3.3
H50AT2	80.7	58.8	10.0	495	47058	583	565	18	3.1
H60ST	47.1	34.9	4.5	213	17713	376	357	19	5.1
H60AT	57.5	38.3	7.5	233	21621	376	367	9	2.4
H70AT2	43.1	29.2	8.0	210	13484	313	300	13	4.2
H80PT	54.9	49.2	2.0	422	41471	755	703	52	6.9
H80PT2	59.7	50.6	5.0	435	45100	755	731	24	3.2
H80AT	67.5	54.7	6.0	484	50964	755	741	14	1.9
H80AT2	72.2	56.2	8.0	497	54518	755	748	7	0.9
H9A0PT2	87.4	65.7	10.0	377	47281	541	512	29	5.4
H9A0AT2	101.4	71.5	10.0	445	54849	541	520	21	3.9
H9B0PT2	35.2	23.8	5.4	122	9726	276	252	24	8.7
H9B0AT2	48.3	25.7	11.0	135	13329	276	263	13	4.7
H100PT	47.7	44.9	2.2	235	10262	215	201	14	6.5
H100AT	63.0	54.9	5.3	310	13536	215	205	10	4.7
H110ST	74.2	46.3	4.0	305	34255	462	429	33	7.1
H110AT2	93.4	52.7	15.0	350	43144	462	441	21	4.5
H11THT	110.7	56.0	23.0	378	51151	462	447	15	3.2
H120AT2	61.9	46.4	10.0	270	9596	155	142	13	8.4
H130PT	41.8	33.9	2.0	229	12529	300	282	18	6.0
H130PT2	46.6	35.5	4.0	233	13976	300	287	13	4.3
H130AT	55.5	38.5	6.0	257	16640	300	290	10	3.3
H13THT	60.2	40.1	7.0	261	18069	300	292	8	2.7
H140AT2	105.3	80.9	4.8	655	148207	1408	1327	81	5.8
H150PT	60.9	57.3	4.0	690	40483	665	618	47	7.1
H150PT2	65.9	58.7	4.0	700	43831	665	631	34	5.1
H150AT	75.5	63.5	5.0	705	50209	665	641	24	3.6
H150AT2	80.5	64.9	5.0	715	53557	665	654	11	1.7
H15THT	100.0	69.6	8.7	735	66499	665	649	16	2.4
H160PT	72.3	60.7	1.0	632	75524	1044	953	91	8.7
H160PT2	78.5	62.3	2.0	639	81991	1045	982	63	6.0
H160AT	88.2	66.3	4.0	677	92211	1045	984	61	5.8
H160AT2	94.4	68.0	6.0	684	98682	1045	994	51	4.9
H170PT	84.6	74.4	7.0	531	88605	1047	1014	33	3.2
H170PT2	92.9	76.6	7.0	539	97228	1047	1023	24	2.3
H170AT	111.6	84.2	15.0	566	116880	1047	1028	19	1.8
H170AT2	119.9	86.5	15.0	576	125503	1047	1030	17	1.6
H180PT	55.3	49.6	3.0	340	54071	977	915	62	6.3
H180PT2	61.0	51.7	3.0	360	59596	977	941	36	3.7
H180AT	69.2	56.9	3.0	395	67571	977	943	34	3.5
H18THT	74.7	59.1	3.0	415	73013	977	949	28	2.9
H190PT	73.6	72.1	2.0	630	59592	810	735	75	9.3
H190PT2	81.3	74.3	6.5	635	65791	809	763	46	5.7
H190AT	96.2	81.9	5.0	665	77924	810	777	33	4.1
H190AT2	103.9	84.1	8.0	670	84068	809	781	28	3.5
H19THT	120.3	84.4	19.0	680	97284	809	788	21	2.6
H200PT	59.1	58.3	3.0	395	48625	823	755	68	8.3
H200PT2	67.2	60.4	5.0	408	55320	823	787	36	4.4
H200AT	79.6	67.6	9.6	440	65517	823	798	25	3.0
H200AT2	87.8	69.9	10.0	453	72235	823	802	21	2.6
H210ST	69.4	59.2	3.0	476	81621	1176	1086	90	7.7
H210AT	81.5	63.6	6.7	491	95864	1176	1118	58	4.9
H210AT2	86.5	65.4	7.6	497	101731	1176	1116	60	5.1
H21THT	125.4	69.0	10.0	547	147500	1176	1047	129	11.0
APHA0PT	70.0	45.8	11.8	352	56848	812	798	14	1.7
CANS0PT	72.3	61.8	1.0	420	70269	972	947	25	2.6
CANS0PT2	78.0	63.9	2.0	450	75823	972	949	23	2.4
CANS0AT	80.7	66.1	10.0	510	78414	972	957	15	1.5
CANS0AT2	86.4	68.3	12.0	525	83967	972	957	15	1.5
CMXPUTHT	37.8	31.0	2.4	329	27430	726	650	76	10.5
CMXPVTHT	42.4	26.5	2.0	316	52796	1246	1168	78	6.3
CMXOTTHT	35.2	33.0	5.0	383	8705	247	226	21	8.5
DTT0PT	53.2	41.3	7.0	251	23022	433	426	7	1.6
DTT0AT	63.3	45.8	7.0	276	27426	433	429	4	0.9
HARV0PT	77.4	58.0	3.0	326	28492	368	342	26	7.1
WA0AT2	80.0	69.1	15.0	450	148313	1854	1735	119	6.4
				TOTAL		53820	51407	2413	4.5

APPENDIX F

THEATRE TIMES – SPECIALTY ABC

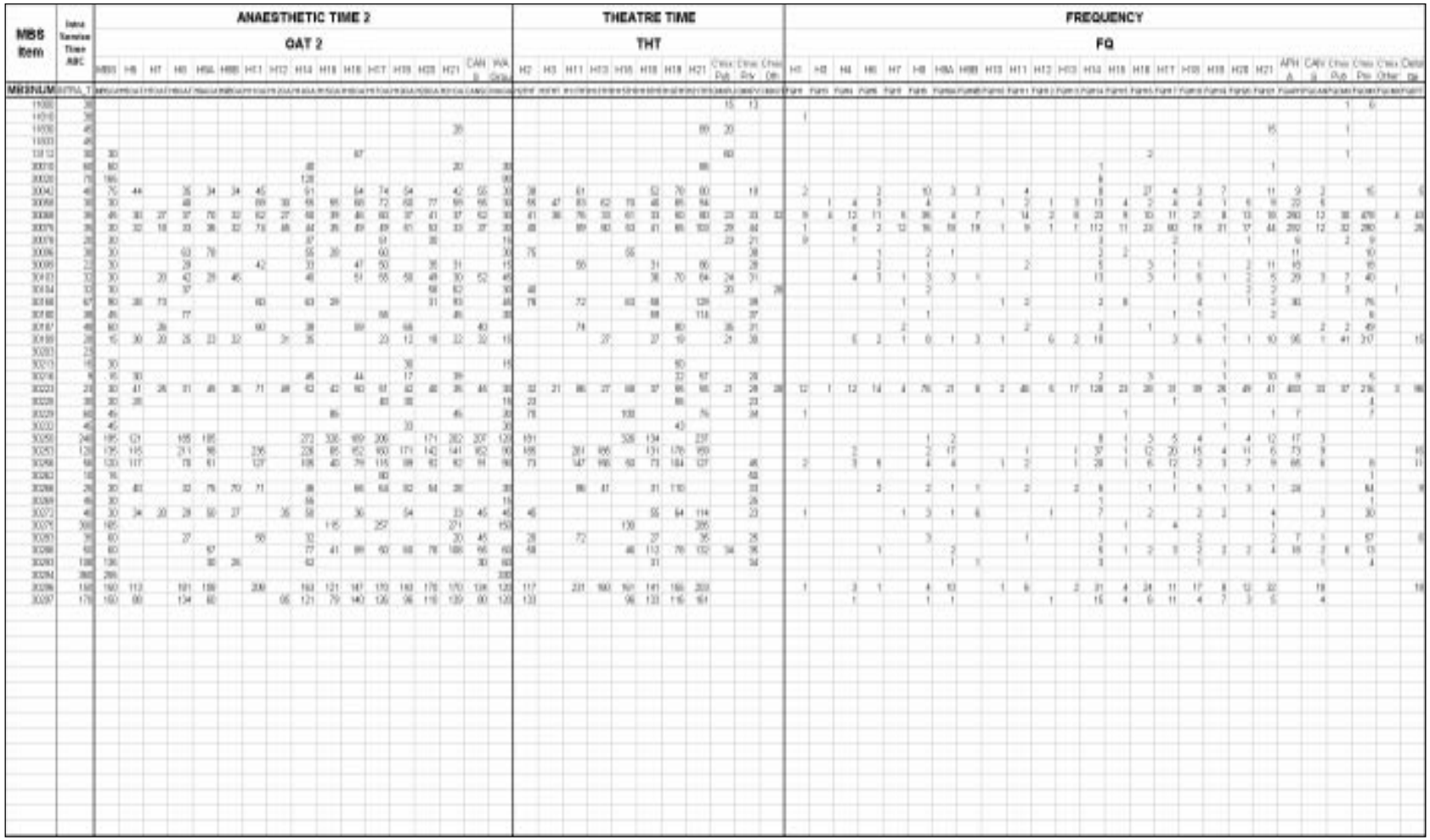
MBS Item	Intra Service Time ABC	AVERAGES: Operation Time OST	OPT	OPT2	Anaesthetic Time OAT	OAT2	Theatre Time TRT
MBSNUM	INTRA_T	AVOST	AVOPT	AVOPT2	AVOAT	AVOAT2	AVTRT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MBS Item	OP SKINTIME OST: H4	H8	H11	H21
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MBS Item	OPERATION TIME OPT: H1	H8	H10	H13	H15	H16	H17	H18	H19	H20	APH A	CAN 5	Deloitte	Harvard
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MBS Item	OPERATION TIME 2 OPT 2: H8	H8A	H8B	H13	H15	H16	H17	H18	H19	H20	CAN 5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MBS Item	ANAESTHETIC TIME OAT: H1	H4	H6	H8	H10	H13	H15	H16	H17	H18	H19	H20	H21	CAN 5	Deloitte
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



APPENDIX G

BIAS CHECKS-COMPARISON OF ABC INTRA TIME ESTIMATES WITH OTHER ESTIMATES

Time	OTHER TIME ESTIMATE (OTE)			No. of items in common	Average Time in Minutes		Ratio 100 x ABC/OTE
	ID	Type	Definition of Time *		ABC	OTE	
OST	H4	Priv	Knife to Skin -to- Dressing Applied	111	73.1	55.5	131.7
	H6	Priv	Knife to Skin -to- Drapes Removed	96	63.6	52.4	121.3
	H11	Priv	Pt Prepped -to- Drapes Removed	104	66.7	87.3	76.5
	H21	Pub	Knife to Skin -to- Dressing Applied	206	83.7	76.4	109.5
OPERATION TIME ** (OPT)	H1	Priv	Pt Positioned -to- Drapes Removed	86	60.9	47.1	129.2
	H8	Priv	Pt Positioned -to- Drapes Removed	145	77.1	64.3	120.0
	H10	Priv	Pt Positioned -to- Drapes Removed	62	58.0	43.0	135.1
	H13	Priv	Pt Positioned -to- Drapes Removed	80	59.8	46.1	129.8
	H15	Priv	Pt Positioned -to- Drapes Removed	128	78.6	50.8	154.7
	H16	Pub	Pt Positioned -to- Dressing Applied	178	78.3	71.6	109.4
	H17	Pub	Surgeon with Pt -to- Drapes Removed	205	90.2	68.7	131.2
	H18	Priv	Pt Positioned -to- Drapes Removed	176	81.9	58.8	139.3
	H19	Pub	Pt Positioned -to- Dressing Applied	133	81.7	60.2	135.8
	H20	Pub	Pt Positioned -to- Dressing Applied	152	75.9	59.9	126.8
	APHA	Priv	Surgeon with Pt -to- Surgeon Leaves Pt	140	82.9	77.1	107.5
	CANS	Pub & Priv	Surgeon with Pt -to- Surgeon Leaves Pt	171	75.1	67.6	111.2
	Deloitte	Pub & Priv	Pt Positioned -to- Drapes Removed	94	64.1	55.0	116.5
	Harvard	US Hosps	Pt Positioned -to- Dressing Applied	52	85.8	95.4	90.0
OPERATION TIME 2 (OPT 2)	H8	Priv	Pt Positioned -to- Trans. to Recovery Staff	150	78.0	72.3	107.8
	H9A	Priv	Pt Positioned -to- Trans. to Recovery Staff	121	82.3	87.3	94.3
	H9B	Priv/Day	Pt Positioned -to- Trans. to Recovery Staff	56	39.6	30.4	130.3
	H13	Priv	Pt Positioned -to- Trans. to Recovery Staff	81	59.7	53.0	112.7
	H15	Priv	Pt Positioned -to- Trans. to Recovery Staff	131	79.1	56.9	139.0
	H16	Pub	Pt Positioned -to- Trans. to Recovery Staff	184	78.1	76.6	101.9
	H17	Pub	Surgeon with Pt -to- Trans. to Recovery Staff	208	90.1	76.9	117.2
	H18	Priv	Pt Positioned -to- Trans. to Recovery Staff	182	80.0	63.6	125.8
	H19	Pub	Pt Positioned -to- Trans. to Recovery Staff	136	81.9	69.2	118.3
	H20	Pub	Pt Positioned -to- Trans. to Recovery Staff	156	77.9	72.3	107.7
	CANS	Pub & Priv	Surgeon with Pt -to- Trans. to Recovery Staff	171	75.1	72.9	103.1
ANAESTHETIC TIME (OAT)	H1	Priv	Prep. Anaes. -to- Drapes Removed	91	60.4	60.5	99.9
	H4	Priv	Anaesthetist with Pt -to- Dressing Applied	112	70.6	80.5	87.7
	H6	Priv	Prep. Anaes. -to- Drapes Removed	99	62.2	61.9	100.5
	H8	Priv	Prep. Anaes. -to- Drapes Removed	156	77.0	80.3	95.9
	H10	Priv	Prep. Anaes. -to- Drapes Removed	67	58.0	57.1	101.7
	H13	Priv	Anaesthetist with Pt -to- Drapes Removed	80	60.2	62.2	96.7
	H15	Priv	Induction of Anaes -to- Drapes Removed	132	80.2	66.6	120.4
	H16	Pub	Prep. Anaes. -to- Dressing Applied	185	77.3	85.7	90.3
	H17	Pub	Prep. Anaes. -to- Drapes Removed	208	90.2	92.4	97.7
	H18	Priv	Anaesthetist with Pt -to- Drapes Removed	183	79.8	72.3	110.4
	H19	Pub	Prep. Anaes. -to- Dressing Applied	142	80.3	80.0	100.3
	H20	Pub	Prep. Anaes. -to- Dressing Applied	161	76.9	83.7	92.0
	H21	Pub	Prep. Anaes -to- Dressing Applied	217	85.5	89.0	96.0
	CANS	Pub & Priv	Prep. Anaes. -to- Surg.Leaves Pt	172	74.8	74.5	100.4
	Deloitte	Pub & Priv	Induction of Anaes. -to- Drapes Removed	94	64.1	65.3	98.2
ANAESTHETIC TIME 2 (OAT 2)	MBS	Pub & Priv	Anaesthetic Time Units as per MBS Schedule	339	99.9	124.1	80.5
	H5	Priv	Prep. Anaes -to- Trans. to Recovery Staff	118	79.1	85.6	92.4
	H7	Priv/Day	Prep. Anaes. -to- Trans. to Recovery Staff	46	39.6	31.3	126.6
	H8	Priv	Prep. Anaes -to- Trans. to Recovery Staff	157	77.6	86.7	89.5
	H9A	Priv	Prep. Anaes. -to- Trans. to Recovery Staff	125	82.5	99.3	83.1
	H9B	Priv/Day	Prep. Anaes. -to- Trans. to Recovery Staff	60	39.9	44.5	89.7
	H11	Priv	Prep. Anaes -to- Trans. to Recovery Staff	106	66.1	105.4	62.7
	H12	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	52	58.6	69.0	84.9
	H14	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	259	91.7	107.3	85.5
	H15	Priv	Induction of Anaes. -to- Trans. to Recovery Staff	133	79.8	71.3	111.9
	H16	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	187	77.1	91.9	84.0
	H17	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	207	90.5	100.6	90.0
	H19	Pub	Prep. Anaes -to- Trans. to Recovery Staff	142	80.4	88.1	91.2
	H20	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	161	76.9	92.8	82.9
	H21	Pub	Prep. Anaes. -to- Trans. to Recovery Staff	215	86.0	95.3	90.2
	CANS	Pub & Priv	Prep. Anaes. -to- Trans. to Recovery Staff	172	74.8	79.9	93.6
	WAGroup	Priv	Induction of Anaes. -to- Trans. to Recovery Staff	266	96.7	95.1	101.6
TIME IN THEATRE (TIT)	H2	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	154	78.7	80.8	97.4
	H3	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	33	46.7	43.4	107.8
	H11	Priv	Anaesthetist with Pt -to- Trans. from Recovery	106	66.1	123.3	53.6
	H13	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	82	59.6	69.3	86.0
	H15	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	132	79.7	89.5	89.0
	H18	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	183	79.8	78.5	101.7
	H19	Pub	Pt. Arrives in Theatre -to- Trans.to Recovery Staff	141	79.7	103.5	77.0
	H21	Pub	Pt. Arrives in OpSuite -to- Trans.to Recovery Staff	201	88.0	141.7	62.1
	C'mix	Pub	Anaesthetist with Pt -to- Trans.to Recovery Staff	103	36.8	32.2	114.3
	C'mix	Priv	Anaesthetist with Pt -to- Trans.to Recovery Staff	146	42.8	38.4	111.5
	C'mix Othe	Day & Other	Anaesthetist with Pt -to- Trans.to Recovery Staff	45	34.0	29.3	116.1

* Definition of Time - see Appendix B

** **Median ratio of ABC intra time estimates to OPT**
Unweighted = 128.0 %
Weighted (for number of items in common) = 126.8 %

APPENDIX H

RECOMMENDATIONS FOR DATA FORMATS

The following summarises data formatting that would provide detailed and accurate case files for the PTEVP and PRS.

General:

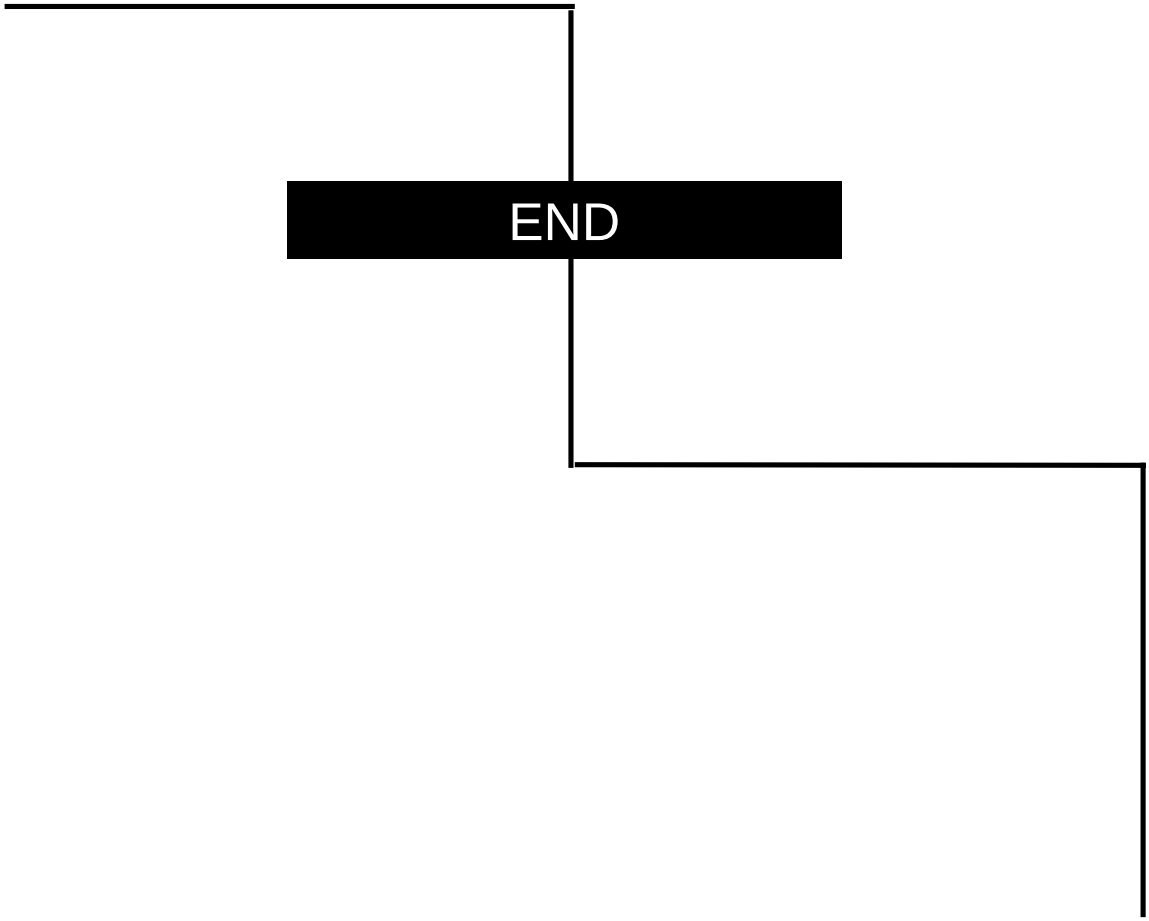
- Retain all specific non privacy data for each case as first recorded during initial data entry in a format suitable for electronic manipulation
- Times recorded to nearest minute with times missed or unknown left blank
- Any other (non-time) data missed or unknown to be flagged as "missed" or left blank
- Any data column added during later processing to be headed as edited
- Include MBS number(s) corresponding to procedure(s) if initially recorded in some other system of coding
- In such instances the original reference in that other code should be retained as part of the data (see also first dot point)

Source Data for Each Case:

- Date of operation
- Case identification number or equivalent
- MBS item number(s): primary first
- Item identifier(s) in other coding system (if applicable): primary first
- Time patient arrived in Operating Theatre/Procedure Room/Anaesthetic Bay
- Start time of anaesthetist with patient
- Start time of surgical procedure (positioning/start of clinician intra service time)
- End time of surgical procedure
- End time of anaesthetist (patient transferred to Recovery/ICU/Ward staff)
- Summary description of operation as performed (rather than as obtained from a reference file that equates each MBS number with a description)
- Any ancillary descriptor which describes the surgical category or specialty

Also useful would be:

- Copy of data entry pro-forma and the procedures/instructions provided to staff responsible for data entry
- Description of data entry process : use of hotkey/12-hour/24-hour clocks, transcription of data etc
- Copy of any list used to equate local/temporary identifiers to MBS numbers
- Copy of any list used to equate item description to MBS number


END