

## STATISTICAL ANALYSIS IN PARAPLEGIA

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THE introduction of electronically controlled data processing machines has greatly simplified the recording and collation of information and this statistical method is being increasingly used in medicine. Medical records contain a vast amount of detail and considerable time and energy can be spent in a search through these records to obtain information for research or as a guide to the treatment of future patients.

Guttman (1953) has stressed the need for international agreement with regard to statistical work on paraplegics to ensure proper comparison in the future. International agreement on so complicated a subject may be hard to obtain and, for some time, each centre will continue to use its own methods. The method described below is similar to that used in the British limb-fitting service and as described by Campbell, Noall and Hopkins (1964) at the Scientific Exhibition of the American Academy of Orthopaedic Surgeons in Chicago. It has been in use at Edenhall for the past year. The data for all new cases can be recorded in a matter of minutes before the patient's discharge and work is slowly progressing in the recording of data relating to all former patients.

Accuracy in recording is absolutely essential as a machine can only reflect the accuracy of the material fed into it and, for this purpose, cross-checking by a medical colleague is highly desirable.

**Preparation of Records.** The final record consists of an 80-column punch card (fig. 1), each column representing a specific category of information, as shown on data sheets (figs. 2 and 3). Each number in the column represents the particular

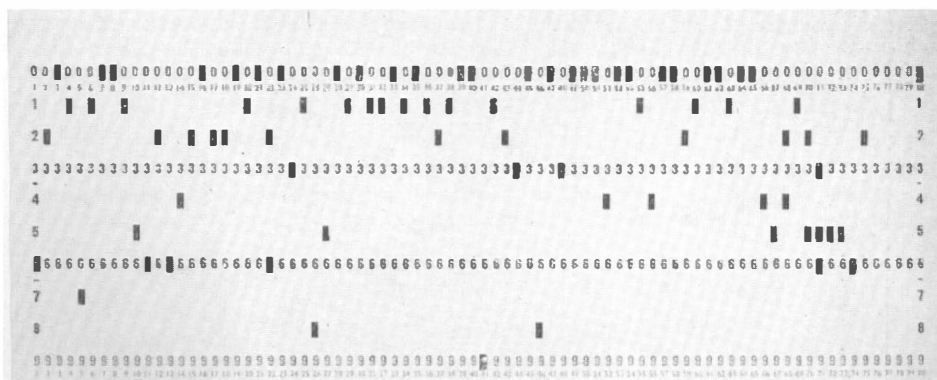


FIG 1

Completed data processing card.

variable or variables relating to the patient. It is remarkable how many categories and variables can be related to a paraplegic, and it has been found necessary to exclude a few categories recommended by consultant colleagues and, on occasion, to place two allied categories in the same column. It is felt, however, that most items

INITIAL

CASE NUMBER	COL.	NAME: D _____ A _____	COL.
6 2 0 1 7	1-5		
Marital status ..	1 6	<u>P L A S T I C</u>	
Home residential area,,,,,	0 7	Deep sores on admission.....	1 38
Sex.....	0 8	Superficial sores on admission.....	0 39
Date of birth..... 24/1/	1 5 9 -10	Unstable scars on admission.....	0 40
Date of onset... 25/5/	6 2 11-12	New sores after admission.....	9 41
Age at onset.....	6 13	Treatment.....	1 42
Interval from onset to admission to Unit..	4 14	<u>U R O L O G I C A L</u>	
<u>P A R T T W O - P A T H O L O G Y</u>		Bladder control on discharge.....	2 43
Vertebral level of injury.....	2 15	Urinal or catheter.....	3 44
Cause.....	0 2 16-17	Moryl injections on discharge.....	0 45
Mechanism.....	2 18	Period of catheter drainage.....	8 46
Other injuries.....	0 19	Operative treatment.....	0 47
Investigations.....	1 20	Bladder wall.....	3 48
Definitive treatment of spine (hospital)..	0 21	Urinary infection on discharge.....	0 49
Nature of final treatment.....	2 6 22	Calculi during stay.....	0 50
Other surgical procedures.....	0 23	Urethra.....	0 51
Nursing.....	3 24	Reflux.....	4 52
<u>P A R T T H R E E - C O N D I T I O N O N D I S C H A R G E</u>		Dilation of ureters.....	0 53
<u>N E U R O L O G I C A L</u>		Renal function.....	0 54
Neurological cord level.....	1 8 25-26	Epididymitis.....	1 55
Degree of neurological damage.....	5 27	Systolic B.P. on admission.....	4 56
Change in level or degree.....	0 28	Systolic B.P. on discharge.....	0 57
Pain.....	1 29	Blood urea on discharge.....	0 58
Autonomic disturbances.....	0 30	<u>B O W E L</u>	
Spasm.....	1 31	Mode of control.....	2 59
Treatment of pain or spasm.....	1 32	<u>S E X U A L F U N C T I O N</u>	
<u>O R T H O P A E D I C</u>		Erections.....	1 60
Special treatment.....	0 33	Ejaculation.....	0 61
Operations for spasm.....	1 34	Menstrual function.....	0 62
Ectopic bones.....	0 35	Intercourse.....	1 63
Joint involvement.....	1 36		
Oedema of feet.....	2 37		

FIG. 2. Completed data sheet from which Figure I was prepared.

PARAPLEGIA

<u>PSYCHOLOGICAL</u>	
Acceptance of disability..... 0	64
Psychiatric consultation..... 0	65
<u>GENERAL HEALTH DURING STAY</u> ..... 4	66
<u>PART FOUR - REHABILITATION</u>	
Use of calipers..... 5	67
Mechanical apparatus..... 2 4	68
Activities of daily living -	
Personal care..... 1	69
Domestic independence..... 2 5	70
Independence in mobility..... 3 5 6	71
<u>PART FIVE - RESETTLEMENT</u>	
Housing on discharge..... 5	72
Work..... 5	73
<u>PART SIX - LENGTH OF STAY</u>	
Period..... 6	74
Cause of excessive delay..... 2	75
<u>PART SEVEN - DEATH</u>	
Date.....	76-77
Cause.....	78
Survival time.....	79
CLASS OF CARD 0	80

FIG. 3  
Completed data sheet from which Figure 1 was prepared.

of importance have been included and that there were not sufficient omissions to justify the use of two cards for each patient, giving 160 columns.

The figure to be inserted in the data sheet is obtained from a code sheet. This consists of five sheets of foolscap and, for reasons of space, cannot be included in an article of this nature. Two examples are, however, given (fig. 4) and copies of the full sheet can be supplied by the author if desired. Minor amendments to the code

DEGREE OF NEUROLOGICAL DAMAGE (Col. 27)

*Cervical cord lesion*

Complete . . . . .	0
Minor Tract sparing . . . . .	1
Major Tract sparing . . . . .	2
Central Cord Syndrome . . . . .	3
Full cord recovery . . . . .	4

*Non-Cervical cord lesion*

Complete . . . . .	5
Minor root escape . . . . .	6
Major root escape . . . . .	7
Incomplete cord lesion . . . . .	8

*Roots only*

Cervical . . . . .	9
Cauda . . . . .	10
Unknown . . . . .	11

DEEP SORES ON OR BEFORE ADMISSION (Col. 38)

Nil . . . . .	0
Sacral . . . . .	1
Trochanteric . . . . .	2
Ischial . . . . .	3
Heel . . . . .	4
Occiput . . . . .	5
Patella . . . . .	6
Ilium . . . . .	7
Elsewhere . . . . .	8

FIG. 4

Examples of code references taken from the initial code sheet.

sheet were made in the early stages but it must be realised that any future amendment would necessitate amendment to all previously prepared data sheets and cards.

In the preparation of the data sheets care has been taken to include negative information or to record that the information required is not available. This ensures the separation of 'nils' from the 'unknowns' and, as a result, a completed initial data sheet should have at least one entry for every category except, in the majority of cases, for columns 76-79 relating to the ultimate death of the patient.

More than one entry can be inserted in a column if necessary and the information desired from the data processing machine can be obtained simply by passing the relevant cards through more than once. In a trial run of the first two dozen completed record cards it was found, for example, that 11 were traumatic thoracolumbar cases and of these eight were admitted with no pressure sores, one with a superficial heel sore, one with a deep sacral sore and one with multiple sores. Exam-

ination of this card showed that the sores were on the sacrum, iliac crest and patella. Further details with regard to this or any other patient can be obtained by referring back to the case notes, the five-figure number being shown in columns 1-5.

**Reviews.** It will be noted that column 80 refers to the 'class of card'. An 'o' in this column signifies that the card relates to the initial care of the patient. Another code sheet has been prepared for recording the patient's progress at periodic intervals after injury or onset. Only 40 columns are used for each review, card '1' relating to reviews at one and two years, card '2' to reviews at five and ten years and card '3' to reviews at 20 and 30 years after injury or onset.

A patient may be first seen many years after onset or may still be undergoing initial treatment when a periodic review becomes due. Allowance is made for this in columns 9 and 46 of the review code sheet. This column is headed 'Review carried out or not' and gives a choice of seven reasons for failure. The figure '3' refers to the circumstance referred to above and is titled 'anachronistic'.

The other review columns refer to any alterations in marital state or residential area and any change in clinical state, improvement or deterioration in the activities of daily living, or changes in housing, work, etc. In some cases detail such as the site of new sores or the development of reflux can be recorded but, in other categories such as housing or mobility, a simple statement of 'unchanged, deteriorated or improved' is all that has been allowed for. If further details are required the card again gives ready reference to the relevant case notes for further study.

#### SUMMARY

Rapid reference to statistical information is invaluable for research and for the proper study of the clinical aspects, rehabilitation and resettlement of patients.

A description is given of a method of obtaining this information by the use of 80-column data processing cards.

#### RÉSUMÉ

Une référence rapide à l'information statistique s'est montrée d'une très grande valeur en ce qui concerne la recherche, l'étude des aspects cliniques, la réadaptation fonctionnelle et professionnelle des malades.

Une description de cartes de référence est donnée.

#### ZUSAMMENFASSUNG

Schnelle statistische Information ist von grösster Wichtigkeit für wissenschaftliche Forschung und für das Studium klinischer Probleme, Rehabilitation und Wiedereingliederung von Patienten.

Eine Methode für solch eine Information ist beschrieben.

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