MRI ASSESSMENT PROGRAM

FIRST INTERIM REPORT

A REPORT BY THE

MRI TECHNICAL COMMITTEE

OF THE

NATIONAL HEALTH TECHNOLOGY ADVISORY PANEL

SEPTEMBER 1987

MRI ASSESSMENT PROGRAM

FIRST INTERIM REPORT

by the

MRI TECHNICAL COMMITTEE

of the

NATIONAL HEALTH TECHNOLOGY ADVISORY PANEL

Any comments or information relevant to the subject matter of this report would be welcome. Correspondence should be directed to :

The Secretary
National Health Technology Advisory Panel
Australian Institute of Health
GPO Box 570
CANBERRA ACT 2601

SEPTEMBER 1987

MRI ASSESSMENT PROGRAM - FIRST INTERIM REPORT

ISBN 0 642 12181 8

ISBN 0 642 12180 X (SET)

AUSTRALIAN INSTITUTE OF HEALTH

MRI TECHNICAL COMMITTEE

Dr D Hailey (Chairman)	- Commonwealth Department of Community Services & Health
Dr G Benness	- Milson's Point, Sydney (nominee of the Royal Australasian College of Radiologists)
Dr D Dewhurst	- Mitcham, Melbourne (nominee of NHTAP)
Dr I McDonald	- St. Vincent's Hospital, Melbourne (nominee of NHTAP)
Dr W Sorby/Dr J Roche	- Royal North Shore Hospital
Prof W Hare/Dr B Tress	- Royal Melbourne Hospital
Dr A Robertson	- Royal Adelaide Hospital
Dr K Siddle	- Princess Alexandra Hospital
Dr M Khangure	- Sir Charles Gairdner Hospital
Dr D Dunt	- Department of Community Medicine University of Melbourne

Executive Officer

Mr B Crowe - Australian Institute of Health

MRI ASSESSMENT PROGRAM

Contents

MRI ASSESSMENT PROGRAM

INTERIM REPORT

ANALYSIS to 30 JUNE 1987

INTRODUCTION

This interim report presents preliminary usage and cost data from the MRI Assessment Program and is intended as the first of a series during the life of this health technology assessment project. The report should be regarded as an indication of progress made during the initial months of routine operation of the first MRI scanners at hospitals participating in the program.

The data give an incomplete picture of the use of the technology and additional detail will be provided in later reports. The cost data are subject to audit and at this stage should be regarded as an initial guide to levels of capital and operating expenditure for some currently available MRI scanners. It should be noted that, because capital expenditure in the program has been met by government grants, the costing model used in the MRI program does not include a component for interest charges.

BACKGROUND

The MRI Assessment Program involves installation and operation of five MRI units in public hospitals and the evaluation at each unit of the cost and efficacy of the technology over a period of two years.

The program is a joint project between the Commonwealth and State Governments. It is co-ordinated by the National Health Technology Advisory Panel (NHTAP) and managed by the Panel's MRI Technical Committee which includes NHTAP members, a representative from the Royal Australasian College of Radiologists and representatives from each participating hospital. Administrative support is provided by the NHTAP Secretariat.

Capital costs have been met by Commonwealth and State government grants. A Commonwealth Health Program Grant has been arranged for the employment of staff at the hospitals to allow for the conduct of the assessment program. State governments have been responsible for the selection of hospitals and the purchase, installation and operation of the MRI equipment. Each MRI unit is providing routine diagnostic services in addition to conducting assessment work.

The selected MRI units in the program are as follows:

State	Hospital	MRI Unit	Start up date
N.S.W.	Royal North Shore Hospital (RNSH)	GENERAL ELECTRIC 1.5T	August 1986
VIC.	Royal Melbourne Hospital (RMH)	FONAR 0.3T	August 1986
S.A.	Royal Adelaide Hospital (RAH)	SIEMENS 1.0T	January 1987
QLD.	Princess Alexandra Hospital	FONAR 0.3T	September 1987
W.A.	Sir Charles Gairdner Hospital	PHILIPS 1.5T	January 1988 (est)

Due to the phased introduction of the MRI units, the assessment program will not be completed until the latter part of 1989, allowing for two year's evaluation at each installation.

Collection of data from the units involves three elements:

* A Minimum Data Set (MDS) collected on each patient in a standard format during examination at the MRI unit.
* Cost data collected to a standard protocol designed by Coopers & Lybrand, WD Scott.
* Detailed follow-up studies of selected patients and disease categories (Vertical Studies).

Microcomputers are used by each hospital to collect MDS and cost data which are then transmitted to the NHTAP Secretariat for collation and analysis. Follow-up studies are conducted in each hospital by assessment staff funded under the Health Program Grant. A schematic overview of the operation of the program is shown in Appendix A and the collection format for the MDS in Appendix B.

MINIMUM DATA SET ANALYSIS

Detailed analysis of data from the MDS is included in Appendix C. Up to 30 June 1987 some 3944 MRI examinations had been conducted. Due to the complex nature of MRI, it has been agreed by the Technical Committee that the first three months of operation will be treated as a pilot period (August-October 1986 for RNSH and RMH, and January-March 1987 for RAH). Data relating to 818 examinations carried out during that phase will be dealt with separately at a later stage.

Numbers of Examinations

Analysis has been performed on data from 3131 examinations relating to 2992 patients. The number of completed examinations (or scans) was 3036. Some 95 scans were not completed due to patient discomfort or technical difficulties. Analysis of uncompleted examinations is performed as part of the quality control procedures at each MRI unit. Some 4.6% (138) of patients required two or more scans in order for all required information to be obtained.

Throughput data to 30 June, 1987 are given for RNSH and RMH in Figure 1. They suggest that it may be possible for each MRI unit to achieve an overall throughput of 200 examinations per month, using currently available equipment/software and working on a two shift basis. Allowing for a downturn in activity during the December/January period, an annual throughput of 2,200 - 2,300 patients may be realistic. However, over the last two months covered by this report, periods of unscheduled downtime were experienced due to equipment malfunction or updates. Throughput figures will require further assessment over the next twelve months.

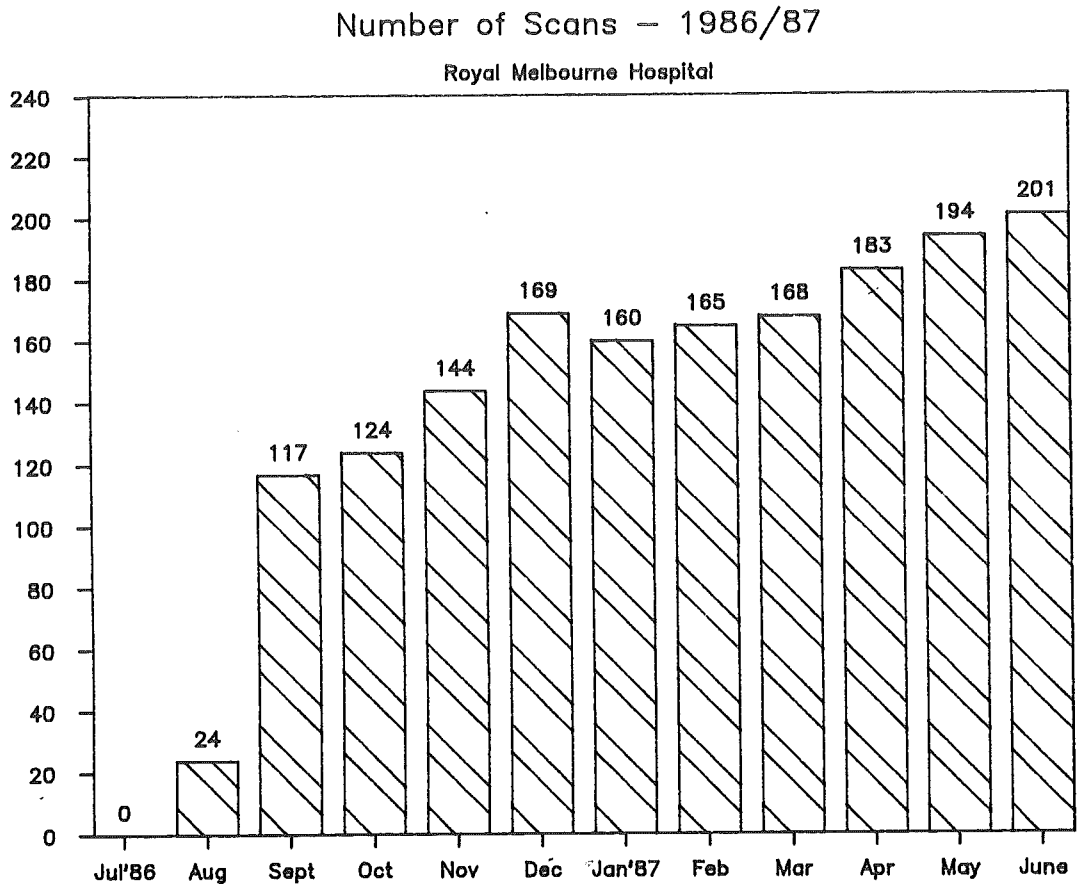
Patient Status

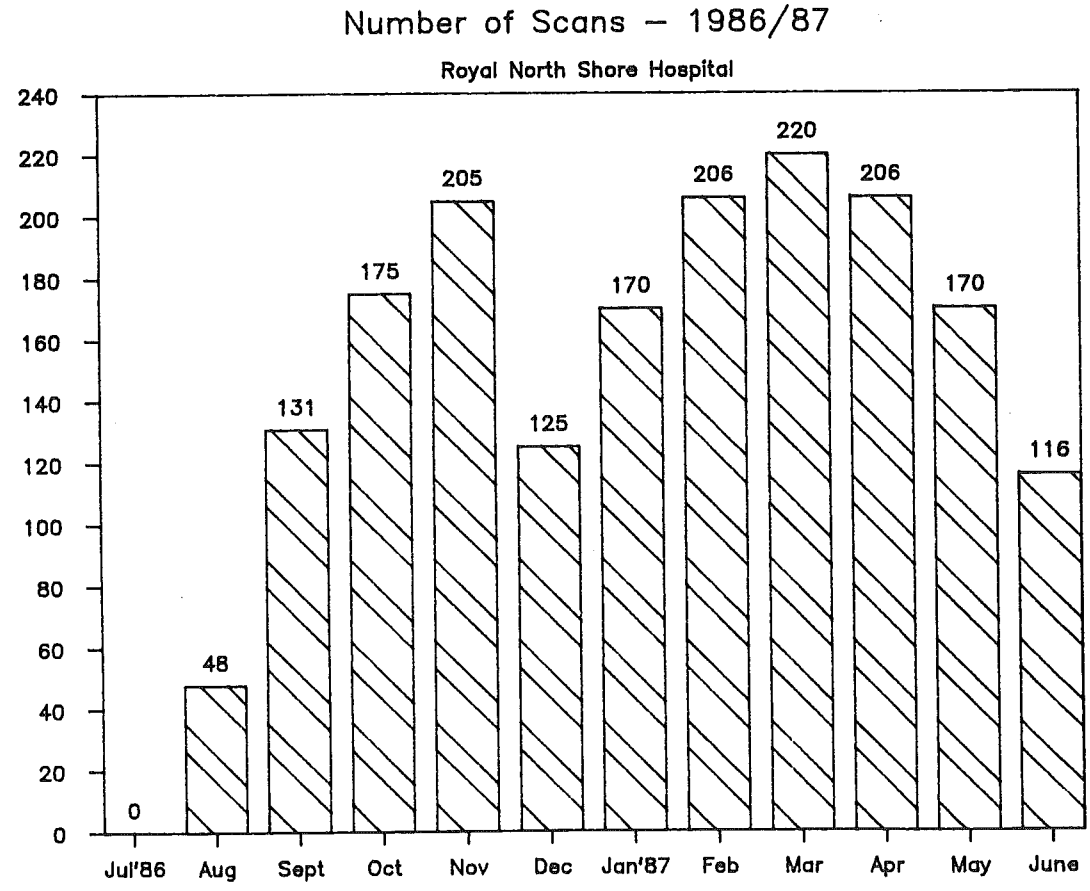
Section 2 of Appendix C relates to the status of patients examined. The majority of the patients (65%) were outpatients. Many patients are referred from other hospitals. For example, 42% of patients examined at the RNSH unit were from other hospitals. This workload pattern and subsequent follow up of patients, requires a large amount of co-ordination activity with referring specialists. The public/private ratio of patients is about 1:1.

The majority (78%) of patients were mobile (walking) with 50% classified as being fully active and 40% as having "limited activity".

Males and females were equally represented with the majority (54%) of patients in the age range 30-59. Some 14% of patients were aged 19 years or less. A preference appears to be emerging for using MRI in the diagnosis of illness in children and young persons to avoid the radiation burden associated with other diagnostic modalities.

Figure 1


Number of Scans – 1986/87
Royal Melbourne Hospital
240
220
200
180
160
140
120
100
80
60
40
20
0
0
24
117
124
144
169
160
165
168
183
194
201
Jul'86
Aug
Sept
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
June


Number of Scans – 1986/87
Royal North Shore Hospital
240
220
200
180
160
140
120
100
80
60
40
20
0
0
48
131
175
205
125
170
206
220
206
170
116
Jul'86
Aug
Sept
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
June

Examination by Radiologists

Section 3 of Appendix C provides an analysis of MRI examinations performed and the subjective opinions of the radiologists on the usefulness of the examinations.

Most examinations were of the head (61%). Spinal examinations made up 23% of the total, and 16% were in other regions. The majority (70%) of the MRI examinations took less than 60 min (time in room). Head examinations were performed in an average time of 45 min. Spinal examinations tend to take longer than head examinations. The average scheduling time for all examinations is of the order of 80 min to allow for patient handling and preparation.

When asked to indicate the major reason for undertaking the MRI examination, the radiologists reported that the majority of cases (58%) were in the category "Disease present, diagnosis uncertain, test for further information".

The opinion of the radiologists was that, at the time of examination, in approximately one-third of MRI scans no abnormalities were detected. Such 'normal' findings have potential benefits to patients in cases where the presence of serious disease had been suspected on the basis of earlier examinations.

In the opinion of the examining radiologists, some 90% of the MRI examinations were considered to be either indispensable or helpful. As these results may represent a bias on the part of the examining radiologists, follow-up studies have been undertaken. Results from these studies at RNSH indicate that the referring clinicians concurred with the analysis in some 70% of cases.

MRI was often judged to be superior to CT although it is noted that CT was either not done or not available in many cases (24% RNSH, 41% RMH). Where CT was available, MR was considered to be markedly superior to CT (RNSH 68%, RMH 80%). The absence of CT data partly reflects the views of the examining radiologists that a number of conditions should be examined by MRI rather than CT, as MRI is a less invasive modality. In addition, CT results are regarded as not available when the quality of the earlier examination is doubtful.

These data provide early subjective opinions on the role of MRI as seen by the examining radiologists at the time of the examination. These impressions will be confirmed or modified when the patients are followed up with referring clinicians and the outcome of the suspected condition is available. Data on the indications for MRI examinations will be considered in a later report.

COST DATA

A model for recording cost data has been developed and refined by Coopers & Lybrand, WD Scott who have acted as consultants to the program. The cost model is designed to reflect the costs of providing MRI services in a public hospital setting. The preliminary data give an initial indication of cost and may be subject to revision.

The total figure for expenditure excludes leasing and interest charges as the MRI units are financed by capital grants from Commonwealth and State Governments.

Data for February 1987

Figure 2 shows details of costs for the RNSH and RMH units for February 1987. This month was selected as being the first after the initial familiarization period, when operation of the units had become well established.

RNSH

Costs for February 1987 at RNSH totalled $130,390 for 204 patients. As would be expected, the largest single item of expenditure was the depreciation on site and equipment of $47,642 per month (36.5% of expenditure). When maintenance of equipment is included ($15,417 per month) the total amount related to equipment was $63,059 or 48.4% of expenditure.

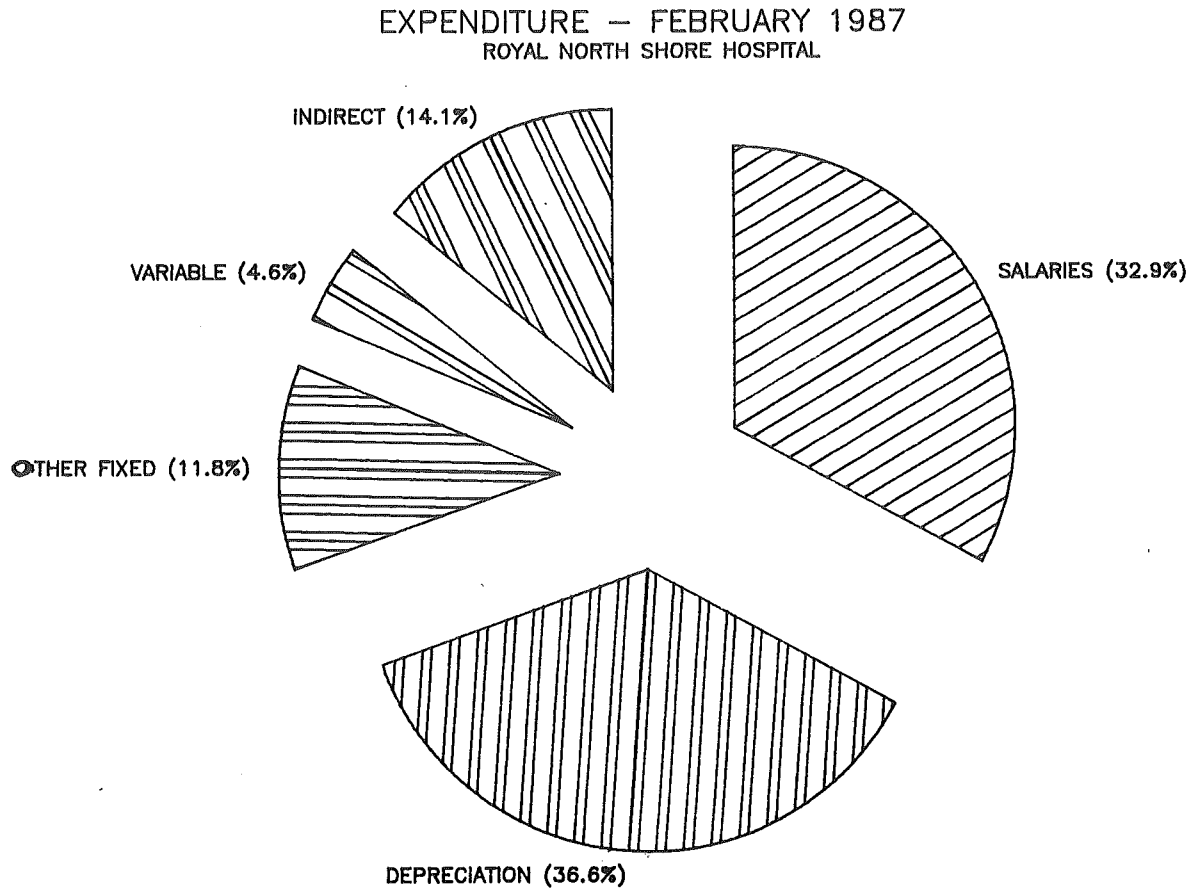
Expenditure on salaries at the RNSH MRI unit was $42,892 during the month or 32.9% of total expenditure. This amount reflected the operation of the MRI unit on a two shift basis and provided for superannuation, holiday and sick pay, workers' compensation and a private practice allowance for radiologists.

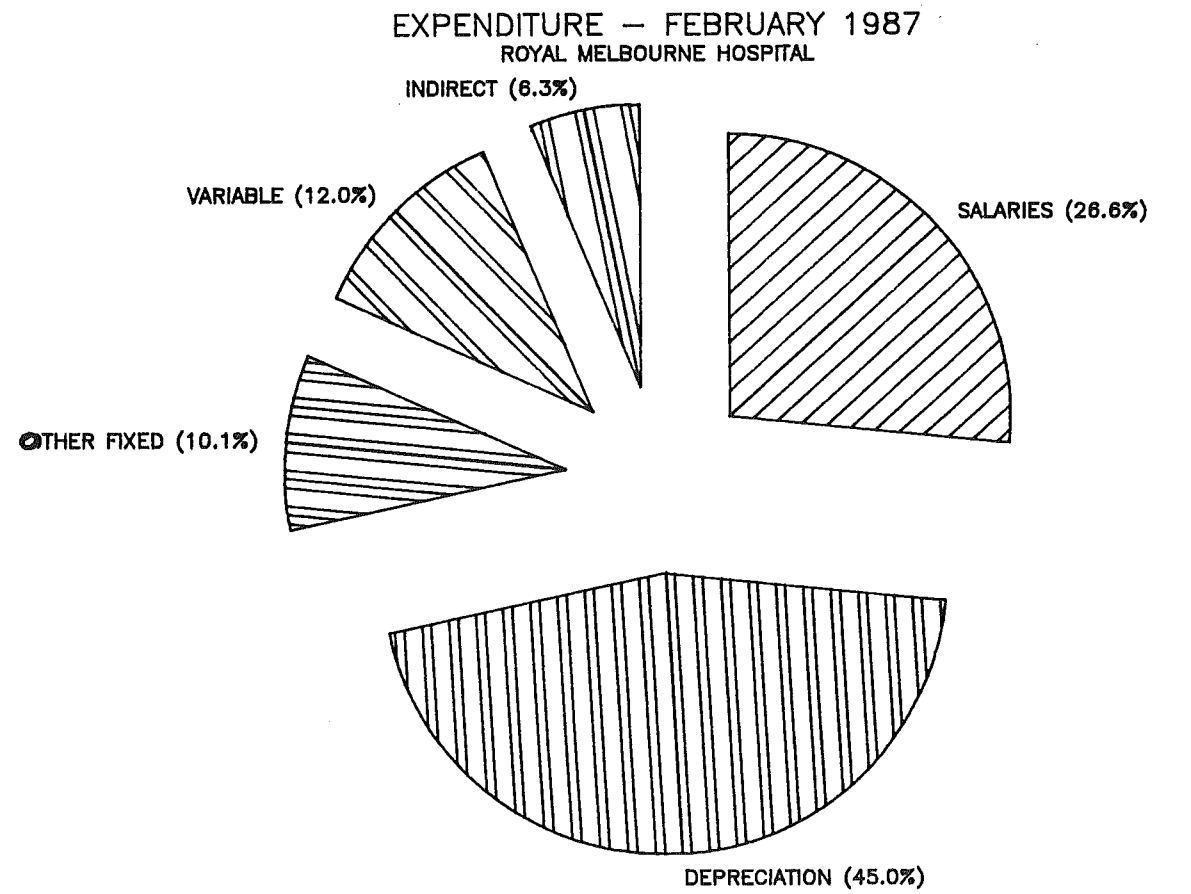
Variable costs (the proportion of expenditure that varies with each patient) represented a relatively small proportion of MRI operating expenditure amounting to less than 5% ($6,006) of the total for the month in relation to 204 patients. Components were:

Film	$4046
Film Processing	$ 379
Electricity	$ 494
Computer Supplies	$ 126
General Stores	$ 901

No allowance has been made for cryogens as these were the responsibility of the equipment supplier, pending the installation of a re-liquifier.

Figure 2


EXPENDITURE – FEBRUARY 1987
ROYAL NORTH SHORE HOSPITAL
INDIRECT (14.1%)
VARIABLE (4.6%)
SALARIES (32.9%)
OTHER FIXED (11.8%)
DEPRECIATION (36.6%)


EXPENDITURE – FEBRUARY 1987
ROYAL MELBOURNE HOSPITAL
INDIRECT (6.3%)
VARIABLE (12.0%)
SALARIES (26.6%)
OTHER FIXED (10.1%)
DEPRECIATION (45.0%)

Indirect costs were estimated at $90.36 per MRI patient and represented a total of $18,433 (14.1% of total expenditure) for the month of February 1987. These costs, based on an approach agreed with the consultants, represent an allocation of overheads associated with the operation of the MRI unit in a public hospital environment.

RMH

Expenditure at RMH for February 1987 totalled $107,201 for 165 patients. Depreciation on site and equipment was $48,538 (45%), maintenance was $8,333, notional rent $1,667 and cleaning was $594. The total amount related to equipment was $59,132 or 55.1% of expenditure.

Expenditure on salaries at RMH MRI unit was $28,496 (26.6%) including allowances. Variable costs were $12,830 (12.0% of total) as follows:

Electricity	$1668
Film	$5707
Supplies	$4850
Sundry	$ 606

Indirect costs were $6,743 or $40.87 per patient and represent 6.3% of the total expenditure for the month.

In summary the expenditure patterns for February 1987 at RNSH and RMH were as follows:

	RNSH		RMH	
	$	%	$	%
Depreciation on equipment & site plus maintenance	63,059	48.4	59,132	55.1
Salaries & allowances	42,892	32.9	28,496	26.6
Variable costs	6,006	4.6	12,830	12.0
Indirect costs	18,433	14.1	6,743	6.3
	$130,390	100.0	$107,201	100.0

Discussion - Cost Data for 1986/87

The first two MRI units (RNSH and RMH) have now been collecting cost data for twelve months. Over the course of the year a number of changes to the cost data protocol were implemented, including the identification of the first year's maintenance costs and the inclusion of a private practice component in radiologists' salaries.

As this is the first major costing exercise relating to high cost diagnostic technology to be conducted in public hospitals in Australia, there have been a number of areas which have had to be defined by discussion with the hospitals and through experience gained during the data collection process. There have been a number of problems with both hardware and software which have led to periods of decreased throughput (for example at RNSH May & June 1987). It is expected that the cost data for the second year of operation will tend to become more stable.

Having regard to the above qualifications, preliminary cost data for 1986/87 are as follows:

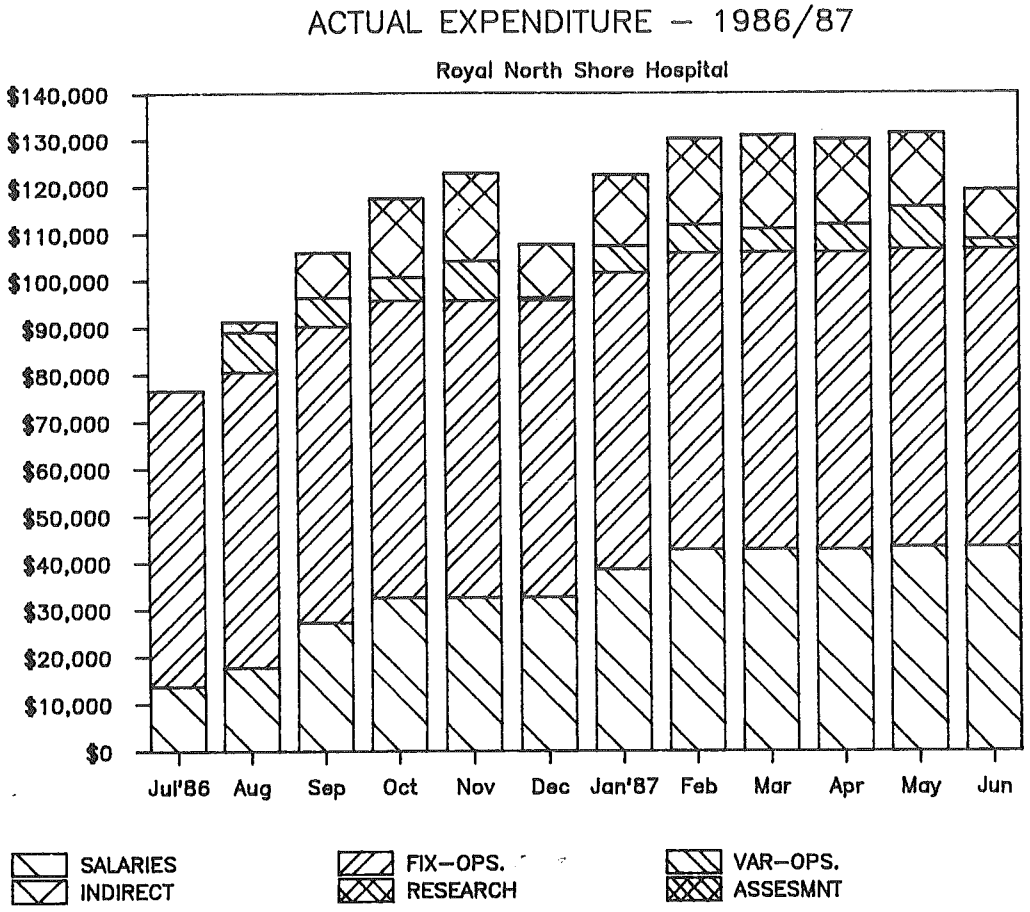
	RNSH	RMH
	$	$
Salaries & allowances	411,586	250,100
Depreciation on equipment & site plus maintenance	756,783	706,329
Variable costs	62,159	74,438
Indirect costs	157,220	78,004
	$1,387,748	$1,108,871

From the month to month expenditure data, the cost per patient varied during the first year of operation from $596 to $1029 at RNSH and from $528 to $738 at RMH (Figures 3 and 4).

In Figure 5 the cost experience of the RNS and RMH units is shown for April 1987, which was the last complete month before unscheduled downtime was encountered. The costs are shown both with and without a capital component in the operational expenses.

The expenditure patterns at RNSH and RMH are different and reflect the approaches at each hospital to staffing and to equipment procurement and maintenance.

Figure 3


ACTUAL EXPENDITURE – 1986/87
Royal North Shore Hospital
$140,000
$130,000
$120,000
$110,000
$100,000
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Jul'86
Aug
Sep
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
Jun
SALARIES
INDIRECT
FIX–OPS.
RESEARCH
VAR–OPS.
ASSESMNT

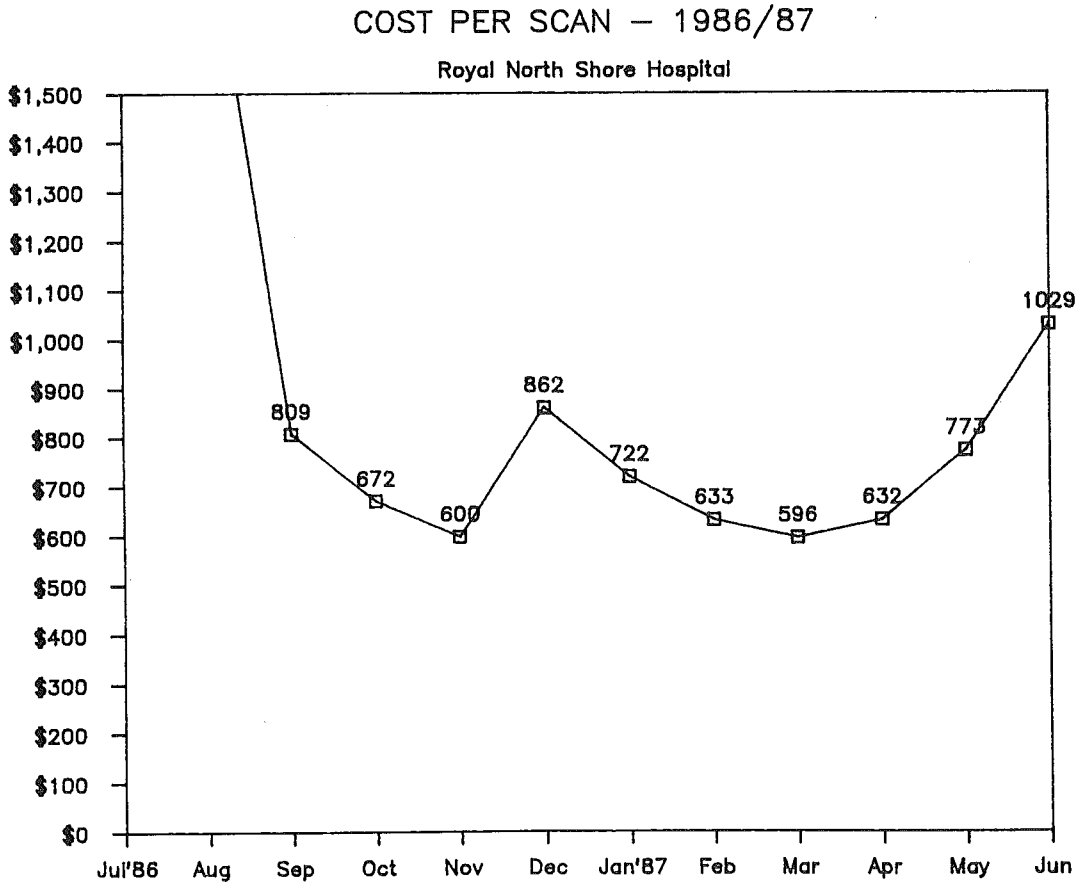
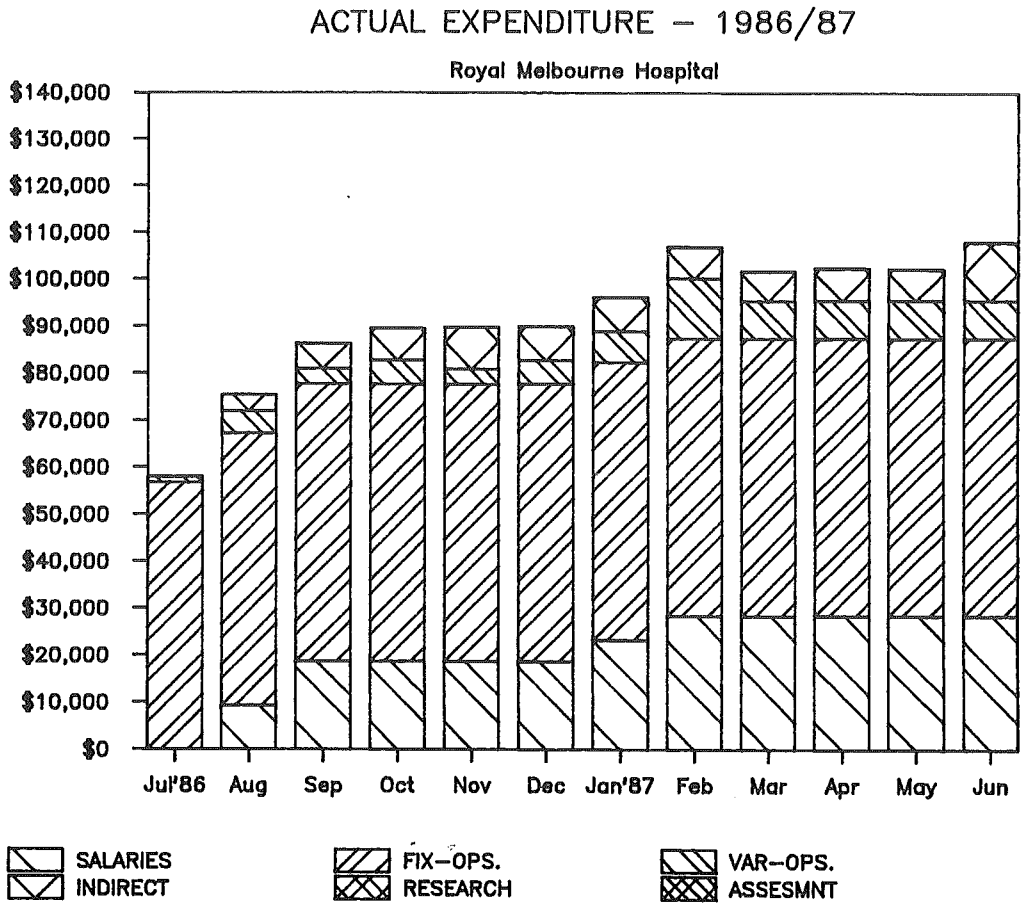

COST PER SCAN – 1986/87
Royal North Shore Hospital
$1,500
$1,400
$1,300
$1,200
$1,100
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
809
672
600
862
722
633
596
632
773
1029
Jul'86
Aug
Sep
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
Jun

Figure 4


ACTUAL EXPENDITURE – 1986/87
Royal Melbourne Hospital
$140,000
$130,000
$120,000
$110,000
$100,000
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Jul'86
Aug
Sep
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
Jun
SALARIES
INDIRECT
FIX–OPS.
RESEARCH
VAR–OPS.
ASSESMNT

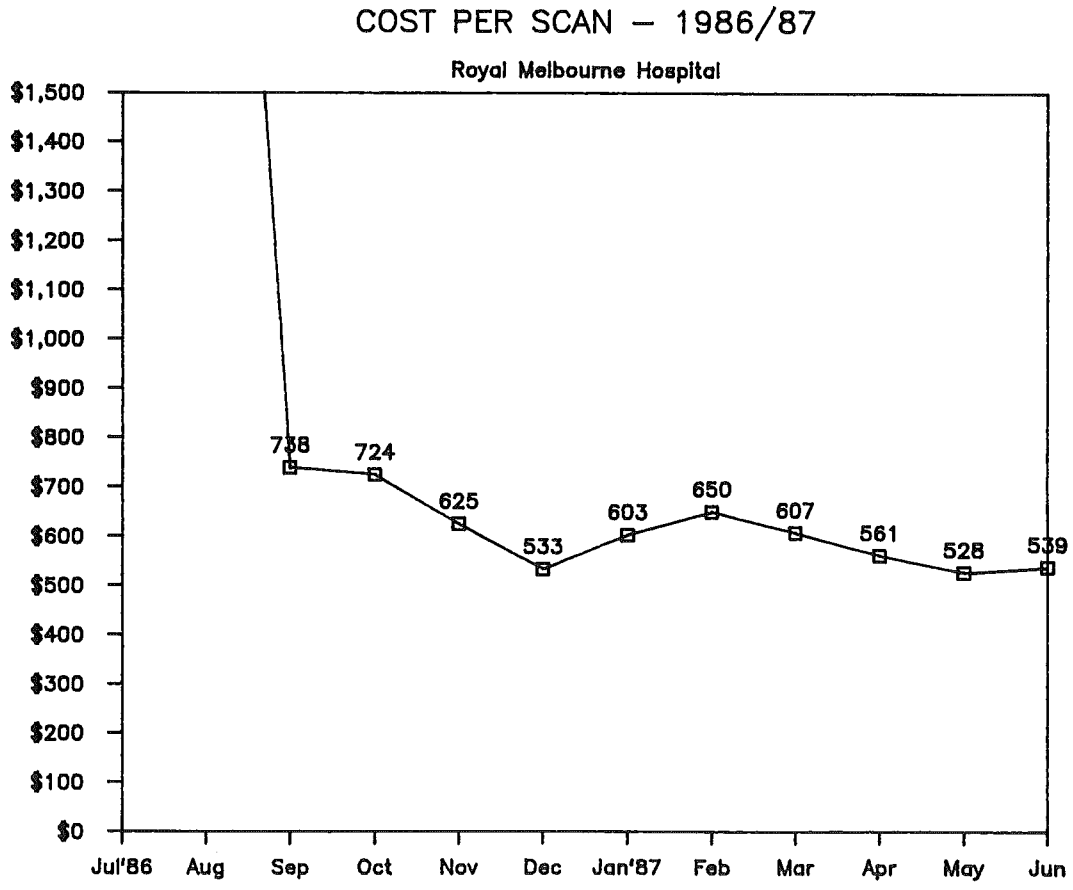
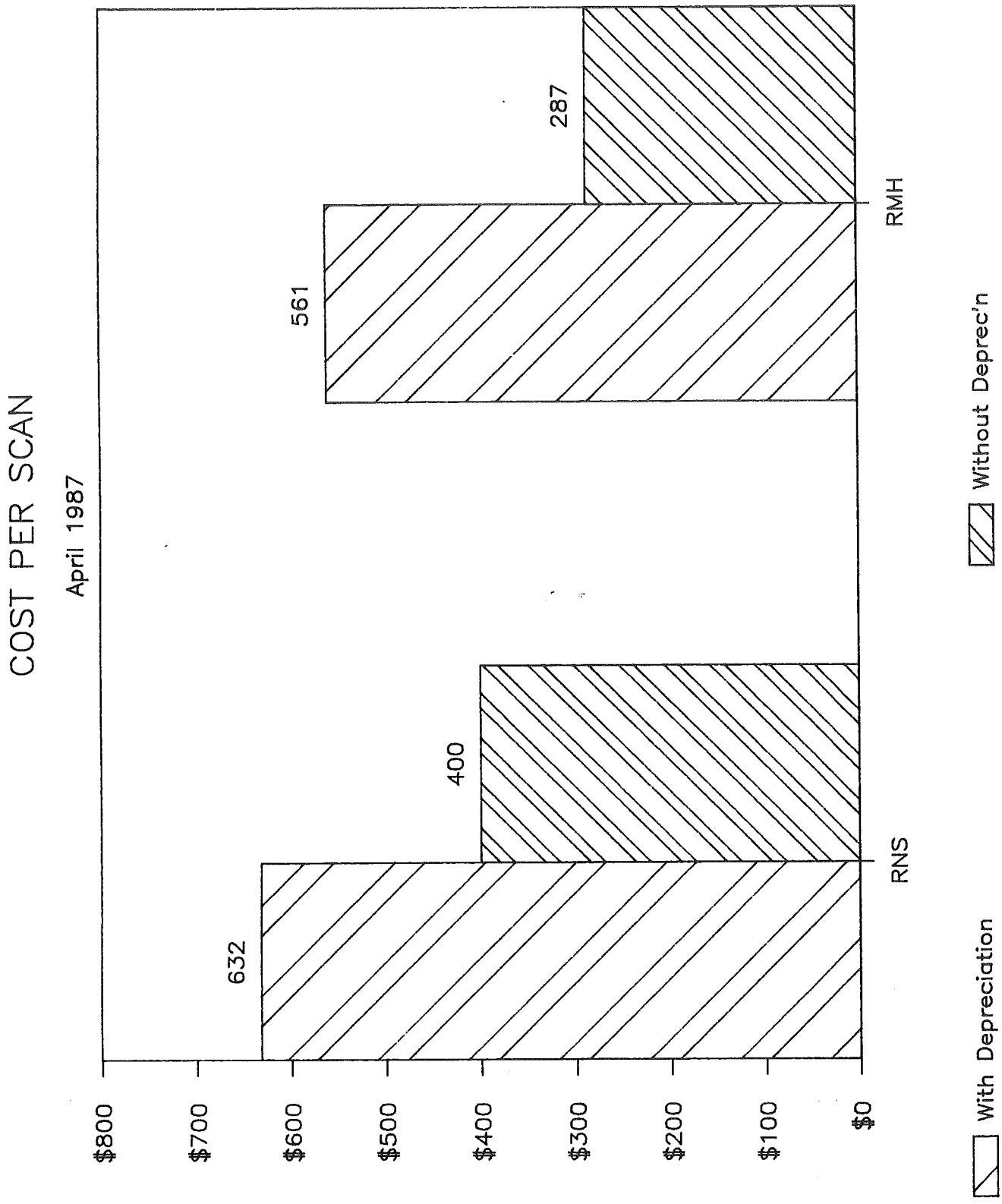

COST PER SCAN – 1986/87
Royal Melbourne Hospital
$1,500
$1,400
$1,300
$1,200
$1,100
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
738
724
625
533
603
650
607
561
528
539
Jul'86
Aug
Sep
Oct
Nov
Dec
Jan'87
Feb
Mar
Apr
May
Jun

Figure 5


COST PER SCAN
April 1987
$800
$700
$600
$500
$400
$300
$200
$100
$0
632
400
561
287
RNS
RMH
With Depreciation
Without Deprec'n

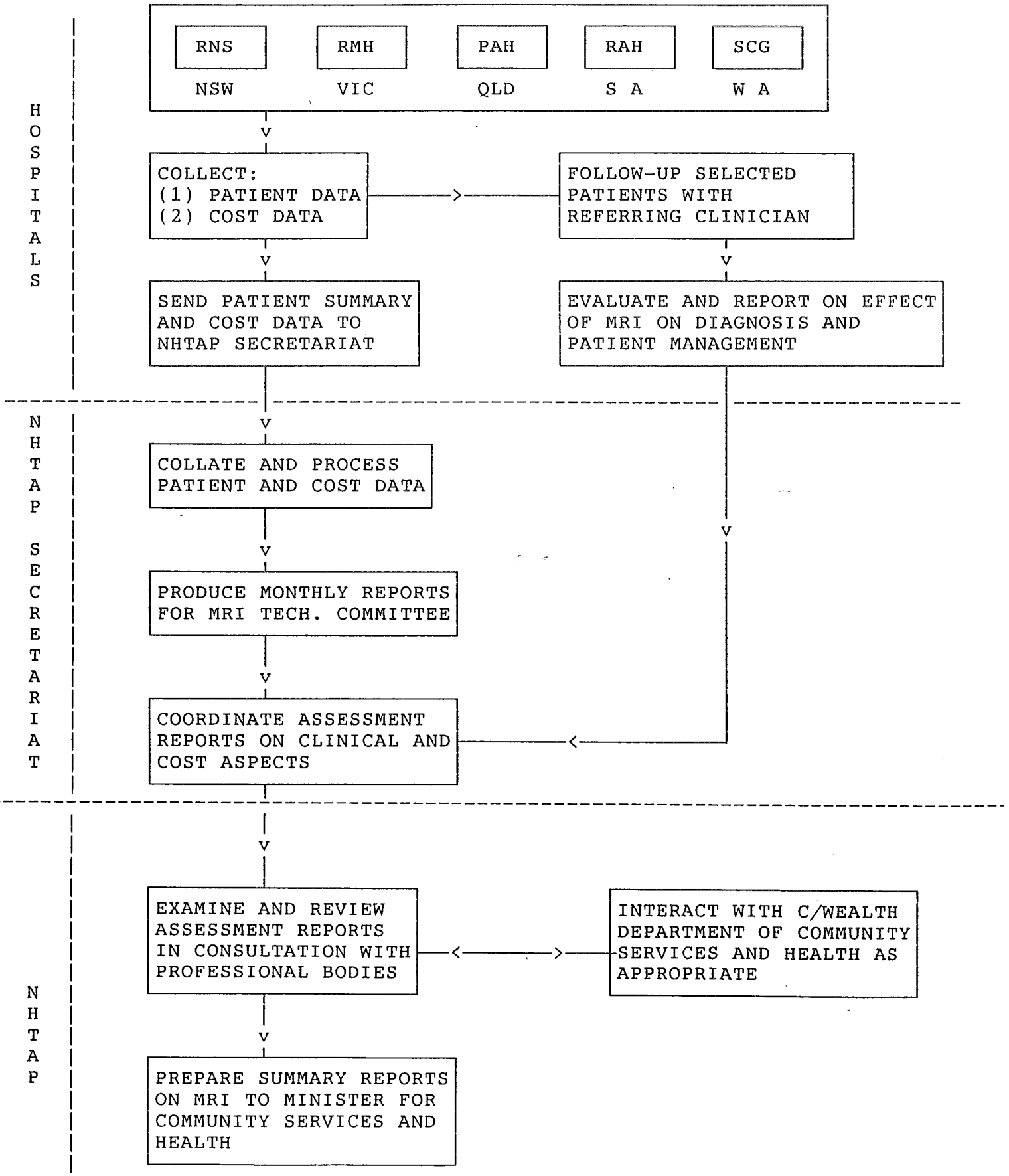
FOLLOW-UP STUDIES

A number of follow-up studies on specific conditions, called vertical studies, have been commenced or are proposed at RNSH, RMH and RAH. The MDS is being used as a source of information for some vertical studies, and is proving to be of assistance in the follow-up of patients already examined at the units.

The objectives of the vertical studies are to determine the accuracy and usefulness of MRI as a diagnostic modality for specific conditions and, where possible, to document any effect of the MRI diagnosis on patient management. The studies conducted at each MRI site depend on the type of equipment being used and the particular skills and sub-specialities at each institution. Current areas of interest include cerebral tumours, posterior fossa infarcts, multiple sclerosis and acute spinal cord trauma. Details of the vertical studies will be given in future reports from the Technical Committee.

APPENDIX A

MRI ASSESSMENT PROJECT



NATIONAL HEALTH TECHNOLOGY ADVISORY PANEL
MRI ASSESSMENT PROGRAM

1 MAR 1987

APPENDIX B

Patient's Name

NB : Retain form in MRI unit at hospital

SURNAME INITIALS

A. HOSPITAL IDENTIFICATION DATA

1. Patient's hospital record number: RM 2 [ ][ ][ ][ ][ ][ ][ ]

2. Date of MRI examination: (For example 01/07/86) [ ][ ] / [ ][ ] / [ ][ ]

3. Number of previous MRI examinations: (0-9)
(ie has this patient been scanned before, if so how many times) [ ]

4. Name of examining radiologist: . . . . . [ ][ ][ ]
(Please use BLOCK LETTERS)
please enter initials

5. Name of referring clinician: . . . . . .

specialty: . . . . . [ ][ ][ ]
(Please use BLOCK LETTERS)
3 digit specialty code, eg 009
see alphabetical master list

B. PATIENT DATA

6. Patient status:
(Please tick appropriate box)

Victoria's first hospital
THE ROYAL MELBOURNE HOSPITAL

THIS HOSPITAL [ ] 1	OTHER HOSPITAL [ ] 2	NON-HOSPITAL [ ] 3
PUBLIC PATIENT [ ] 1	PRIVATE PATIENT [ ] 2	
IN-PATIENT [ ] 1	OUT-PATIENT [ ] 2	

7. Is patient entitled to:

	YES	NO
Worker's compensation	[ ] Y	[ ] N
Third party	[ ] Y	[ ] N

8. Patient's address, Suburb: . . . . . .

State: . . . . . Postcode [ ][ ][ ][ ]

9. Patient's age: (for example 09) [ ][ ]

10. Patient's sex: (Enter M or F) [ ]

11. Patient's health at time of examination: (Please tick one box)

- Full activity (Work/Home/School/Retired) ☐ 1
- Limited activity due to illness ☐ 2
- No activity due to illness, but manages self ☐ 3
- No activity due to illness, needs domestic support ☐ 4
- No activity due to illness, needs health aid (community nurse etc.) ☐ 5
- Institutional health care ☐ 6

12. Patient mobility: (Please tick one box)

- Walking ☐ 1
- Wheelchair ☐ 2
- Stretcher ☐ 3

13. Regions to be examined: (More than one region may be examined, up to 3 regions. Please score one region if only minor overlap occurs.)

CODE	H=Head S=Spine N=Neck C=Chest A=Abdomen P=Pelvis L=Limbs

Region1 ☐
Region2 ☐
Region3 ☐

14. Was MRI examination completed: (Please tick one box)

- Yes ☐ 1 → GO TO Q.16
- No ☐ 2

15. Reason for non-completion: (Please tick one box and then go to Q.16 and then go to Q.26)

- Patient too ill ☐ 1
- Claustrophobia ☐ 2
- Other ☐ 3

16. Total patient time in the room: (for example 1:05) ☐:☐☐

C. PATIENT HISTORY

17. Test indication:
(Please indicate MAJOR reason for MRI examination)

- Rule out disease, patient possibly normal ☐ 1
- Disease present, diagnosis uncertain, test for further information ☐ 2
- Diagnosis already established, more information required for treatment ☐ 3

Please give description and ICD number from ICD codebook. Please use BLOCK LETTERS.

18. Major symptom relevant to exam: (If none please code 0.0)

. . . . . .ICD-9-CM ☐☐☐.☐☐

Major sign relevant to exam: (If none please code 0.0)

. . . . . .ICD-9-CM ☐☐☐.☐☐

19. Pre MRI studies:(Only comment on the report from relevant studies)

STUDY	DONE		AVAILABLE		REPORTED FINDINGS		
	YES	NO	YES	NO	NOR	ABNOR	EQUIVOCAL
	(Tick one box)						
	Y	N	Y	N	N	A	E
Ultra Sound	☐	☐	☐	☐	☐	☐	☐
Nuclear Med	☐	☐	☐	☐	☐	☐	☐
X-Ray ☐	☐	☐	☐	☐	☐	☐	☐
CT	☐	☐	☐	☐	☐	☐	☐

X-Ray type	no.
Plain	1
Contrast	2
Myelogram	3
Mammogram	4
Angiogram	5

Please give description and ACR code from ACR codebook. Please use BLOCK LETTERS.

20. Pre MRI diagnosis: Differential Diagnosis

. . . . . .ACR1 ☐☐☐.☐☐☐☐

. . . . . 2 ☐☐☐.☐☐☐☐

. . . . . .

. . . . . 3 ☐☐☐.☐☐☐☐

D. MR IMAGING STUDY

21. MRI study:

STUDY	REPORTED FINDINGS			WITH CONTRAST	
	NOR	ABNOR	EQUIVOCAL	YES	NO
	(Tick one box)				
	N	A	E	Y	N
MRI	☐	☐	☐	☐	☐

Please give description and ACR code from ACR codebook. Please use BLOCK LETTERS.
(If unable to determine probability, please enter 0 for Prob Code)

22. MR Imaging report study:

	Differential Diagnosis	Prob Code
. . . . .	ACR1 ☐☐☐.☐☐☐☐	☐
. . . . .	2 ☐☐☐.☐☐☐☐	☐
. . . . .	3 ☐☐☐.☐☐☐☐	☐

23. Other diagnoses:

	Other Diagnosis
. . . . .	ACR1 ☐☐☐.☐☐☐☐
. . . . .	2 ☐☐☐.☐☐☐☐

SUBJECTIVE ASSESSMENT AT TIME OF MRI DIAGNOSIS

24. Comparison with CT study: (Please tick one box In relation to Q.17)

MRI greatly superior	☐ 1	CT superior	☐ 4	
MRI superior	☐ 2	CT greatly superior	☐ 5	
Equal	☐ 3	CT not done or CT technically inadequate	☐ 6	

25. Aid to examining radiologist in diagnosis: (Rate the effect of MRI in terms of assistance in arriving at a diagnosis. Please tick one box)

Indispensable	☐ 1	None	☐ 3
Helpful	☐ 2	Misleading	☐ 4

26. MRI Director please sign: . . . . . ☐☐☐

please enter initials

HOSPITAL USE ONLY

Please give description and ACR code from ACR codebook. Please use BLOCK LETTERS.

27. Final diagnosis:

. . . . .	ACR1 ☐☐☐.☐☐☐☐
. . . . .	2 ☐☐☐.☐☐☐☐
. . . . .	3 ☐☐☐.☐☐☐☐

28. How final diagnosis determined: (Please tick one box)

Clinical	☐ 1	Surgery	☐ 3
Pathology	☐ 2	Autopsy	☐ 4

APPENDIX C

MRI ASSESSMENT PROJECT

MINIMUM DATA SET

ANALYSIS OF ACTIVITY TO 30 JUNE 1987

1. STATISTICAL DATA ON NUMBER OF SCANS

1.1 Total MRI Scans by Hospital

	RNS	RMH	RAH	
1986				
August	179 (a)	24 (b)	-	
September		117 (b)	-	
October	175 (b)	124 (b)	-	
November	205	144	-	
December	125	169	-	
1987				
January	170	160	39 (b)	
February	206	165	52 (b)	
March	220	168	108 (b)	
April	206	183	74	
May	170 (c)	194	130	
June	116 (c)	201	120	
	1593	1649	523	3765 (d)
	1772	1649	523	3944 (Scans)

(a) Data were not collected on 179 scans at RNSH during Aug/Sept 1986.

(b) The first three months of operation at each unit are considered to be "pilot".
RNSH and RMH were pilot during Aug/Sept/Oct 1986
RAH was pilot during Jan/Feb/Mar 1987

(c) Unscheduled downtime.

(d) Total number of scans on which data were collected (MDS Forms).

MDS Forms are the Minimum Data Set collected during each scan.

1.2 Number of "Active" MRI Scans x Hospital

	RNS	RMH	RAH	
1986				
November	209	144	-	
December	125	169	-	
1987				
January	170	160	(Prelim)	
February	206	165	(Prelim)	
March	220	168	(Prelim)	
April	206	183	74	
May	170	194	130	
June	116	202	120	
	1422	1385	324	3131

Active scans are defined as those performed after the initial period of pilot operation.

1.3 Number of Repeat Scans
(% x Hospital)

Patients with	RNS %	RNS Nos	RMH %	RMH Nos	RAH %	RAH Nos	Total %	Total Nos
1 scan	95	1266	95	1286	96	301	95	2853
2 scans	5	64	5	46	4	14	5	124
3 scans	-	5	-	6	-		-	11
4 scans	-	1	-	2	-		-	3
Not stated	-	1	-		-		-	1
	100%	1337	100%	1340	100%	315	100%	2992

The number of patients examined was 2992.

N.B. A patient may require more than one scan, therefore the number of patients examined is less than the total number of scans.

1.4 Scans Completed

	RNS		RMH		RAH		Total	
	%	Nos	%	Nos	%	Nos	%	Nos
MRI Completed	97	1381	97	1342	97	313	97	3036
* Not Completed	3	41	3	43	3	11	3	95
	100%	1422	100%	1385	100%	324	100%	3131

* Analysis of Scans Not Completed

	Nos	Nos	Nos	Total
Patient too ill	6	13	1	20
Claustrophobia	11	12	8	31
Other	24	18	2	44
	41	43	11	95

2. PATIENT STATUS ANALYSIS

2.1 Inpatient/Outpatient

	RNS %	RMH %	RAH %
Inpatient	37	32	30
Outpatient	63	68	70
	100%	100%	100%

2.2 Source of Referral of Patients

	RNS %	RMH %	RAH %
This Hospital	24	21	43
Other Hospital	42	34	29
Non-Hospital	34	45	28
	100%	100%	100%

2.3 Public/Private Patients

	RNS %	RMH %	RAH %
Public	48	52	46
Private	52	48	54
	100%	100%	100%

2.4 Workers' Compensation Cases

	RNS % (nos)	RMH % (nos)	RAH % (nos)	Total % nos
Workers Comp.	1 (17)	6 (90)	2 (7)	4 114
Third Party	0 (3)	2 (27)	-	1 30
Other	99	92	98	95 2987
	100%	100%	100%	100% 3131

2.5 Patient Mobility Status

Status	RNS %	RMH %	RAH %	Total %
Walking	77	78	81	78
Wheelchair	10	12	11	11
Stretcher	13	10	8	11
	100%	100%	100%	100%

2.6 Patient Activity Status

Status	RNS %	RMH %	RAH %	Total %
Full activity	50	46	66	50
Limited activity	42	41	22	40
No activity, manages self	3	5	1	4
No activity, domestic support	3	5	0	4
No activity, health aid	1	1	0	1
Institutional health care	1	2	11	1
	100%	100%	100%	100%

2.7 Age of Patients

Age	Males %	Females %	Total %
0	0 (1)	0 (5)	0
1- 9	4	3	3
10-19	12	11	11
20-29	13	15	14
30-39	17	20	19
40-49	18	21	20
50-59	16	13	15
60-69	13	11	12
70-79	6	5	5
80-89	1	1	1
	100%	100%	100%
	(1616)	(1515)	(3131)

3. ANALYSIS OF PATIENT EXAMINATIONS

SUMMARY

3.1 Majority (70%) of examinations under 1 hour.

3.2 Most common test indication (ie. reason for examination) is "Disease present, diagnosis uncertain, test for further information" (58%).

3.3 Region studied Head 61% Spine 23% Other 16%

3.4 The radiologists opinion was that MRI superior to CT in 50% of scans.

3.6 MRI findings normal in 32% of cases.

3.7 MRI as aid to radiologist - 89% of exams were either "Indispensable" or "Helpful" at the time of examination.

3.1 Patient Time in Room
Percentage by Region Examined

1. Head

Time(mins)	RNS %	RMH %	RAH %	Total %
0-30	18	8	9	12
31-60	68	69	80	71
61-75	9	17	8	12
76 +	5	6	3	5
	100%	100%	100%	100%

2. Spine

Time(mins)	RNS %	RMH %	RAH %	Total %
0-30	4	4	2	4
31-60	49	62	45	53
61-75	26	18	24	23
76-90	13	12	15	13
90 +	8	4	14	7
	100%	100%	100%	100%

3. Total

Time(mins)	RNS %	RMH %	RAH %	Total %
0-30	12	6	7	9
31-60	62	58	72	60
61-75	15	19	11	17
76-90	7	11	5	9
90 +	4	6	5	5
	100%	100%	100%	100%

3.2 Test Indication (%)

	RNS %	RMH %	RAH %	Total %
Rule out disease	26	27	25	26
Disease present, diagnosis uncertain, more information	57	60	47	58
Plan management	17	13	28	16
	100%	100%	100%	100%

3.3 Region Studied by Hospital (%)

	RNS %	RMH %	RAH %	Total %
Head	64	55	74	61
Spine	28	21	13	23
Other	8	24	13	16
	100%	100%	100%	100%

3.4 Comparison with CT (%)

	RNS %		RMH %		RAH %		Total %	
MRI greatly superior	11	52%	21	47%	13	55%	15	50%
MRI superior	41		26		42		35	
Equal	22		7		32		17	
CT superior	2		4		3		3	
CT greatly superior	0		1		-		-	
* CT not done	24		41		10		30	
	100%		100%		100%		100%	

* Analysis of "CT Not Done"

	RNS	RMH	RAH	Total
Head	16%	30%	6%	20%
Spine	42%	54%	25%	46%

3.5 Region by CT Availability (%)

1. Head

	RNS %	RMH %	RAH %	Total %
CT available	74	69	83	73
CT not available	14	5	7	10
CT not stated	12	26	10	17
	100%	100%	100%	100%

2. Spine

	RNS %	RMH %	RAH %	Total %
CT available	50	45	63	49
CT not available	9	3	7	7
CT not stated	41	52	30	44
	100%	100%	100%	100%

3.6 Region by MRI Findings (%)

1. Head

		RNS %	RMH %	RAH %	Total %
MRI	Normal	30	36	41	34
	Abnormal	67	63	57	64
	Equivocal	3	1	2	2
		100%	100%	100%	100%

2. Spine

		RNS %	RMH %	RAH %	Total %
MRI	Normal	30	26	32	29
	Abnormal	66	73	66	69
	Equivocal	4	1	2	2
		100%	100%	100%	100%

Total

		RNS %	RMH %	RAH %	Total %
MRI	Normal	30	32	39	32
	Abnormal	66	67	60	66
	Equivocal	4	1	1	2
		100%	100%	100%	100%

3.7 Aid to Radiologist

	RNS %		RMH %		RAH %		Total %	
Indispensable	14	86%	50	92%	17	92%	30	89%
Helpful	72		42		75		59	
No assistance	14		8		8		11	
Misleading	0		0		0		0	
	100%		100%		100%		100%	