

# Managing Medical Technology in Australia's Health Care Systems – Planning, Prioritisation and Procurement

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**Abstract**—The management of medical technology raises a range of complex issues including those associated with planning, prioritisation, and procurement. In Australia there is a significant and developing interest at National, State, and Hospital levels in issues relating to the effective management of medical technology, with drivers including service planning & cost management, access & equity, and factors associated with the ongoing use of old equipment. Surveys undertaken by the authors and reported elsewhere have now been used to develop a 5 year equipment replacement and procurement model to predict required funding levels. Survey data is also used to assist in the prioritisation of equipment and to identify centralised purchasing opportunities. The data also provides metrics to record the effectiveness of funding programs.

## I. INTRODUCTION

This paper outlines issues identified within medical equipment management in Australian public hospitals. The authors report on work undertaken in relation to equipment replacement planning in two Australian States, and in a number of Australian hospitals. In particular the authors discuss issues that arise in the planning, prioritisation and procurement phases of equipment management.

## II. EXISTING PLANNING SYSTEMS

Our experience with two recent extensive state-wide capital equipment reviews in Victoria [1] and Western Australia [2], and undertaking reviews for three major metropolitan health services in Melbourne, has given us a detailed insight into existing capital equipment planning practices and systems. Recent government audit reports in Victoria [3], the UK [4] and Scotland [5] show that there are isolated examples of good planning, but generally all areas would benefit significantly from improved planning. Our experience with State government departments and hospitals supports this view [6], [7].

## III. STAKEHOLDERS

In Australia, health care delivery involves a number of stakeholders. At the highest level is the Commonwealth Department of Health and Ageing, who frequently fund equipment indirectly through funding service provision.

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Health services are operated more generally on a State level by the State and Territory Health Departments, and the arrangements for how health services are operated vary from State to State. Some States use a high level of centralisation, while others use a more decentralised approach in which health service boards of management are responsible for service planning and for day to day operations. These stakeholders and equipment levels by hospital department and equipment type have been discussed previously [9].

## IV. FIVE YEAR EQUIPMENT REPLACEMENT PLANNING

A medical equipment management plan provides a means to control the state of the equipment stock across the organisation, so that service needs are adequately met and costs are managed [8], [9]. This work needs to be ongoing, and provides a governance framework to ensure service commitments are met. A five year planning period is considered adequate in most cases as this is a practical limit for service and funding predictability.

## V. ESTABLISHING FUNDING REQUIREMENTS

It is relatively simple to create a model to determine the impact of various funding levels on the equipment stock. The model is based on survey data which determines the variation in funding requirements from year to year. Fig. 1 shows that the model can be used to predict the level of funding required in order to reduce the unfunded component to manageable levels after 5 years. This model is based on actual data (derived from the survey of major equipment) and caters for the separate requirements for the:-

- a) pre-existing backlog (unfunded items);
- b) routine replacement of existing major items (varies from year to year);
- c) additional major items expected to be required within the 5 year planning period (varies from year to year); and
- d) minor items (an annual allowance).

Additional complexities can be modeled, such as the impact of single-year funding injections, revenue raised from various sources, annual growth in service demand, the introduction of new technology, and leasing options.

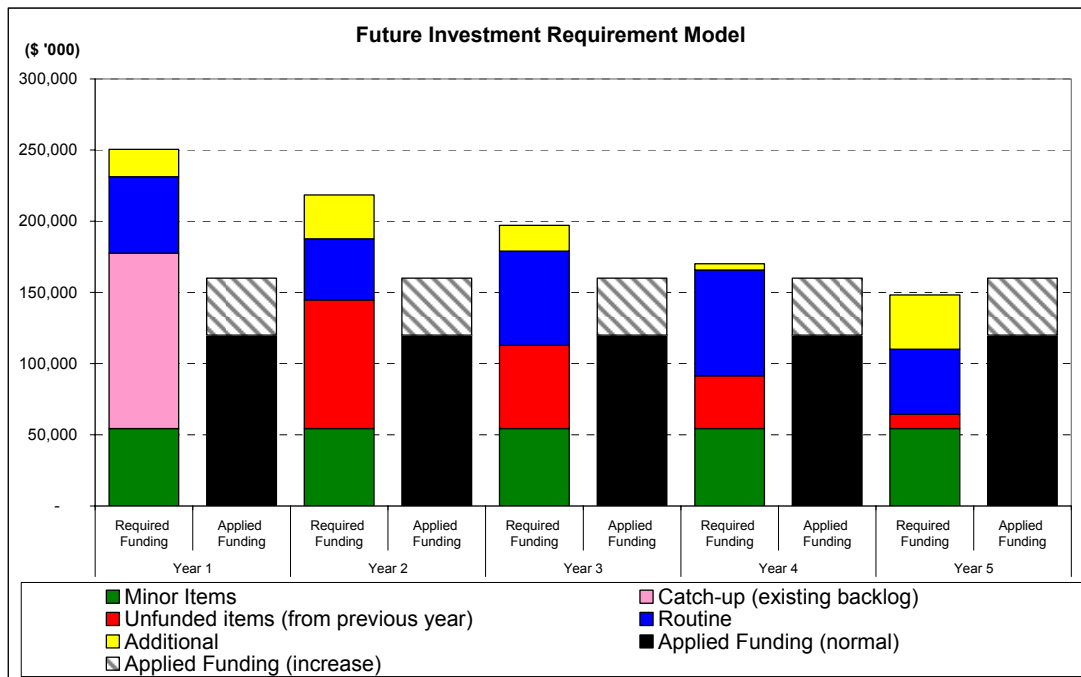


Fig. 1. Funding scenario showing the impact of additional funding (cross hatch area), indicating that unfunded items (red area) is expected to be eliminated after the 5th year.

## VI. PRIORITISED EQUIPMENT REPLACEMENT

Prioritisation is required when requirements exceed available funding. If the aim is to establish medical equipment replacement requirements across an organisation and to apply a uniform prioritisation model to some thousands of items, then a fairly simple model is needed.

A number of different attributing factors will influence the relative priority of medical equipment replacement. The model we have used at both a State and Hospital level provides an objective prioritisation based on information provided by a number of medical equipment stakeholders who can include the equipment users, hospital level planners and State level planners. The model simply provides a mechanism for bringing together the input from various stakeholders. It establishes a priority ranking for each equipment item which is then defined as Normal Priority (middle third of distribution), Above Normal Priority (right hand third of distribution), and Below Normal Priority (left hand third of distribution).

Attributing factors fall into a number of categories that include:-

- equipment age;
- patient, operator, and business risk factors;
- support status;
- operational efficiency and cost; and
- strategic factors at an enterprise and State level.

Our approach when allocating funding for major items is to plan to replace high priority items when they are due, and

to extend the life of lower priority items. This approach is shown in Figs. 2 and 3.

Fig. 2 shows the baseline case in which all items are replaced when they are due, assuming no limit to available funding. Fig. 3 shows the impact of replacing only high priority items (Above Normal Priority) in their scheduled replacement year, and delaying the replacement of other items by one year. This approach will consume fewer funds, but will create a backlog of items that are overdue for replacement. However, it will also ensure that this backlog consists of lower priority items.

## VII. CENTRALISED PURCHASING OPPORTUNITIES

Surveys undertaken suggest that no single centralised purchasing option would suit the wide range of medical equipment items that need to be purchased annually according to the five year equipment acquisition and replacement plan. The model below (Fig. 4) suggests five possible options that can be considered in relation to the various types of equipment. These options are

- a) Status Quo Position,
- b) Ad Hoc Purchasing Groups,
- c) Centrally Negotiated Contracts,
- d) Preferred Suppliers, and
- e) Centralised Purchasing Body.

The best fit purchasing model for each equipment category was determined by reviewing each category against the specific criteria:

- number of suppliers in the market;
- frequency of purchase;

purchase value of equipment;

- level of variability required across different hospitals; and
- level of control required by health service.

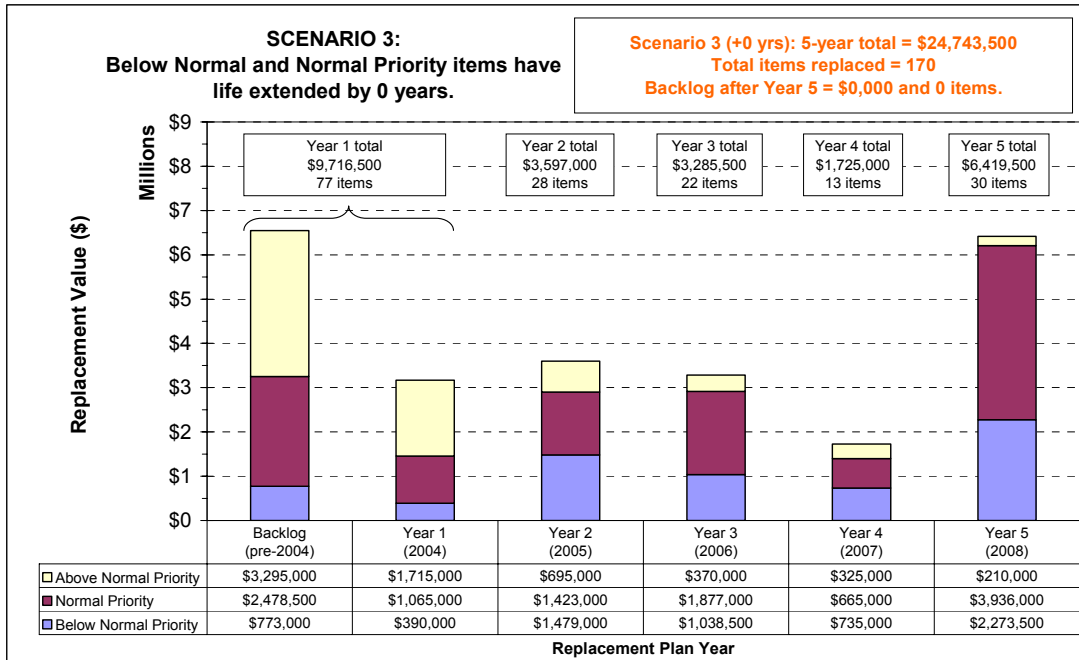


Fig. 2. Survey results, showing 5 year funding requirements for a single health service. 5-year total expenditure = A\$24.7M.

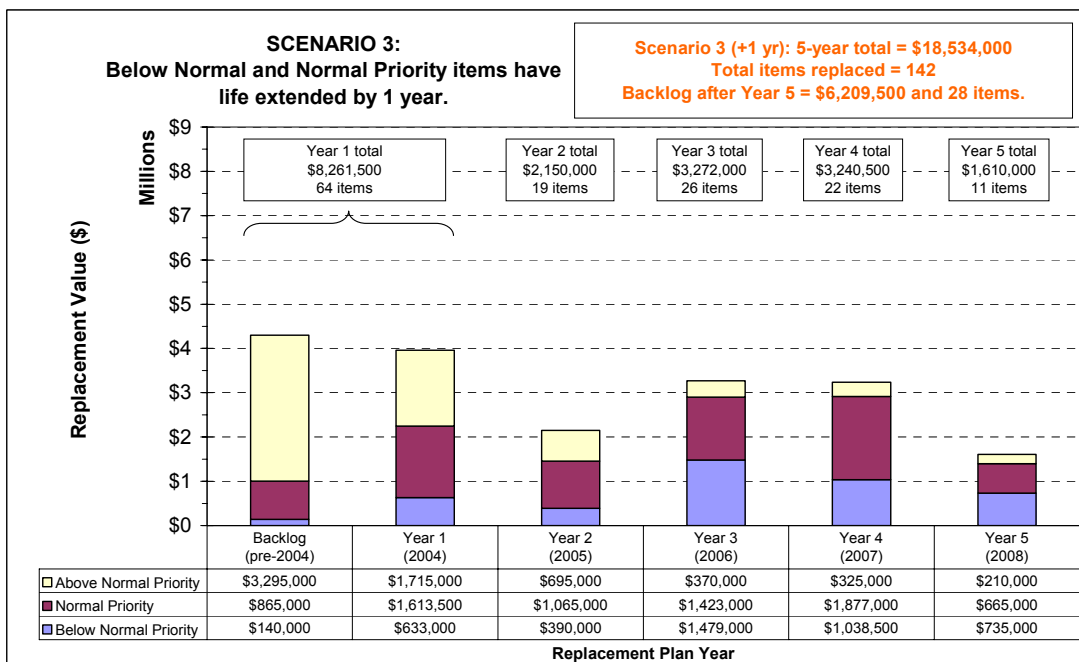


Fig. 3. Scenario to deal with funding shortfall by extending life (ie. delaying replacement) of lower priority items. 5-year total expenditure = A\$18.5M

## IX. CONCLUSIONS

In the context of this work a number of issues have been dealt with. These include:-

- The establishment of a forward looking planning process that can account for fluctuating equipment replacement requirements and varying service levels. In the case of Australian hospitals such a process is required at both a State and Hospital level and ideally the two should be compatible.
- A prioritisation model that can be applied across a number of hospitals and hospital campuses, and applied to thousands of equipment items.
- Procurement models that most effectively and efficiently suit the diverse range of medical equipment items.
- Suitable metrics that measure the effectiveness of funding program.

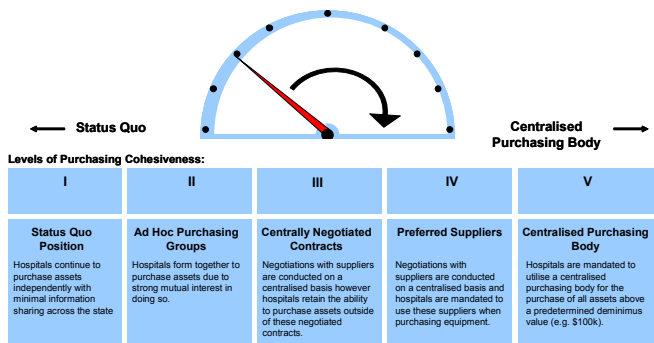


Fig. 4. Centralised purchasing options with increasing levels of centralised control.

The results of this analysis suggest that a combination of options would provide the best outcome for the state health service. This would allow the generation of increased value to the health service whilst maintaining a balance of control and flexibility at a local level.

## VIII. MEASURING THE IMPACT OF FUNDING

Fig. 5 shows the sum of replacement costs that were recorded in a Statewide capital equipment review, for the years 2004 and 2005.

This diagram shows the age profile of the equipment stock of the hospitals in the survey and is a useful metric for monitoring equipment age by hospital.

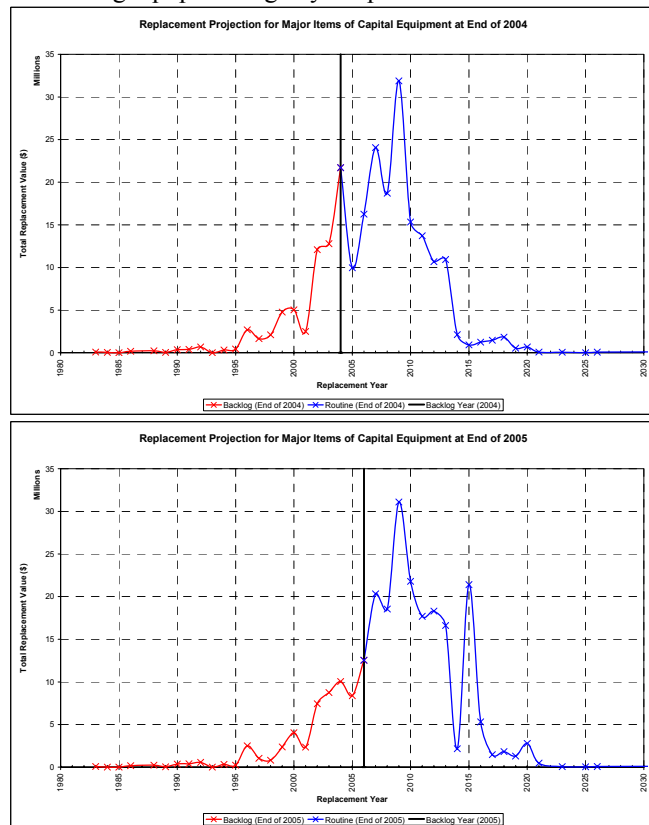


Fig 5. Histogram of replacement years, showing the replacement cost required year by year for major items of medical equipment in a Statewide capital equipment review, by Replacement Value [2], for years 2004 (top) and 2005 (bottom). The impact of the one year's funding can be seen in the changing shape of the curve.

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