CHERE
CENTRE FOR HEALTH ECONOMICS RESEARCH AND EVALUATION

UNIVERSITY OF TECHNOLOGY SYDNEY

UTS:CHERE

CHERE
CENTRE FOR HEALTH ECONOMICS RESEARCH AND EVALUATION

AN ECONOMIC EVALUATION OF THE PRISON METHADONE PROGRAM IN NEW SOUTH WALES

Project Report

Emma Warren, Rosalie Viney

Project Report 22
January 2004

The Centre for Health Economics Research and Evaluation (CHERE) was established in 1991. CHERE is a centre of excellence in health economics and health services research. It is a joint Centre of the Faculties of Business and Nursing, Midwifery and Health at the University of Technology, Sydney, in collaboration with Central Sydney Area Health Service. It was established as a UTS Centre in February, 2002. The Centre aims to contribute to the development and application of health economics and health services research through research, teaching and policy support.

CHERE's research program encompasses both the theory and application of health economics. The main theoretical research theme pursues valuing benefits, including understanding what individuals value from health and health care, how such values should be measured, and exploring the social values attached to these benefits. The applied research focuses on economic and the appraisal of new programs or new ways of delivering and/or funding services.

CHERE's teaching includes introducing clinicians, health services managers, public health professionals and others to health economic principles. Training programs aim to develop practical skills in health economics and health services research.

Policy support is provided at all levels of the health care system by undertaking commissioned projects, through the provision of formal and informal advice as well as participation in working parties and committees.

ACKNOWLEDGEMENTS

Funding was provided by the National Health and Medical Research Council. We are grateful to clinical, custodial and administrative staff at NSW Corrections Health Service, the NSW Department of Corrective Services and our particular thanks for the support and advice of Dr Richard Matthews and Ms Sharon Barton at NSW Corrections Health Service. The views expressed in this report do not necessarily reflect those of the funders, the NSW Corrections Health Service, the NSW Department of Corrective Services or anyone who provided assistance to the study.

COLLABORATING COLLEAGUES

NDARC (National Drug and Alcohol Research Centre)
University of New South Wales, Sydney
Kate Dolan
Marian Shanahan
Bethany White
James Shearer

St Vincent's Hospital, Sydney
Alex Wodak

EXECUTIVE SUMMARY

Objectives

The aim of this study is to evaluate the costs and consequences of the provision of the prison methadone program in NSW, compared with no prison methadone.

Methods

This study has measured the costs involved in the provision of the prison methadone program in NSW. The overall cost of the prison methadone program was estimated from a governmental perspective, incorporating the costs associated with the administration of the program, staffing requirements, methadone syrup and consumables. Both bottom-up and top-down costing approaches have been used. Both the total cost of the program and the cost per inmate in treatment are presented.

The study is based on a follow-up study of a randomised trial of prison methadone in the NSW prison system (Dolan, Shearer et al. 2003). Although methadone is available to prisoners in many NSW prisons, the aim of the trial was to determine the impact of prison methadone on a range of health and social outcomes. Participants were randomised to receive prison methadone immediately or to be waitlisted. Waitlisted inmates were offered methadone after a four month delay. The cohort recruited by Dolan et al is now the subject of a four year follow-up study. Since all subjects had been offered methadone at the conclusion of the RCT, this could no longer be treated as controlled study. This limits the utility of the study outcome data for the economic evaluation.

In the absence of comparative outcome data, a threshold analysis has been performed to determine what magnitude of outcomes is required to render the prison methadone program cost-neutral from a governmental perspective. The threshold analysis assumes that, through the provision of prison methadone, patients will gain from the benefits associated with continuous methadone treatment. Thus future criminal activity will be reduced and re-incarceration may be avoided. The analysis determines how many days of re-incarceration must be avoided to offset the annual cost of the methadone program. Firstly the analysis estimates what additional resources are required in the prison system to deliver prison methadone. Secondly, potential cost savings associated with avoided re-incarceration are estimated. The costs of the prison methadone program are then compared with the cost savings accrued by avoided days of re-incarceration and the level of effectiveness required to equate costs and savings is identified. A second threshold analysis assumes that, in addition to avoiding days of re-incarceration, prison methadone also avoids incident cases of Hepatitis-C. Given the cost of the program and the number of avoided cases of Hepatitis-C, the threshold analysis identifies the level of effectiveness, in terms of avoided re-incarceration, at which methadone treatment becomes cost neutral.

Results

The total cost of providing prison methadone to 900 inmates in 21 prisons in NSW is $2.9million per annum. The cost per person year is $3,234. Given that the average daily cost of incarceration is $176, the annual cost of prison methadone is offset by avoiding 20 days of re-incarceration once the inmate is released. If avoided incident cases of hepatitis-C are included in the analysis, the annual cost of prison methadone is offset by avoiding 19 days of re-incarceration once the inmate is released.

Conclusions

This analysis shows that, despite significant barriers to efficiency, prison methadone compares favourably to community based methadone on the basis of cost alone. The analyses suggests that, irrespective of whether avoided cases of Hepatitis-C are included, approximately 20 days of re-incarceration must be avoided to offset the annual cost of methadone treatment. There appears to be no evidence in the literature to prove or disprove the feasibility of prison methadone maintenance avoiding such a period of re-incarceration.

AN ECONOMIC EVALUATION OF THE PRISON METHADONE PROGRAM IN NEW SOUTH WALES

1. INTRODUCTION

Methadone maintenance has been found to reduce heroin use, reduce drug-related crime, prevent HIV infection and reduce mortality among IDUs (Schoenbaum, Hartel et al. 1989; Caplehorn, Dalton et al. 1994; Hall, Ward et al. 1998). Methadone therapy has been shown to be most efficacious at reducing heroin use and associated harms when treatment is continuous. Evidence suggests that continued methadone therapy is associated with better outcomes (Simpson 1979; French, Zarkin et al. 1993). These studies suggest that heroin use and criminal activities are reduced in patients undergoing longer periods of methadone therapy. In addition, arbitrary termination of methadone therapy has been shown to be associated with poor treatment outcomes (Anglin, Speckart et al. 1989).

By this rationale, cessation of methadone therapy on entry into prison is likely to be associated with poor outcome prognosis. Thus a case exists for methadone maintenance therapy to be made available in prisons in order to maximise the potential treatment outcomes associated with continuous methadone therapy.

Prison methadone programs are relatively rare and little is known about their effectiveness or cost-effectiveness. There are no published studies detailing the effectiveness or cost-effectiveness of prison methadone programs. However, there are several economic evaluations of community methadone programs. The majority of these economic evaluations are US based (Barnett 1999; Zaric, Barnett et al. 2000). Both studies used modelling techniques and found community methadone programs to be cost-effective.

The aim of the current study is to examine the costs and consequences of the New South Wales (NSW) prison methadone maintenance program. The NSW prison methadone program began in 1986 as a pre-release program which targeted IDUs with multiple periods of incarceration. In the late 1980s, the prison methadone program underwent a rapid expansion. The NSW prison methadone program has since moved beyond pre-release towards offering methadone maintenance therapy. In 2003, there were 24 prisons in NSW, 21 of which provided methadone maintenance treatment to inmates. In NSW in 2003, the total number of inmates receiving methadone per day was approximately 1000. However ten percent of these received methadone in police and court cells etc. Thus approximately 900 inmates receive daily methadone treatment in NSW prisons.

Economic evaluations can assist policy makers to determine which programs should receive priority given these limited resources. An economic evaluation proceeds by identifying, quantifying and valuing the costs and consequences of the program under review. The main types of economic evaluations in health services are: cost minimisation analysis (CMA), cost-effectiveness analysis (CEA), cost-utility analysis (CUA) and cost-benefit (CBA). The majority of economic evaluations performed in the health economics setting have been cost-effectiveness analyses. By definition, a cost-effectiveness analysis requires the identification of a single outcome e.g. cost per life year saved or cost per event avoided. However, with prison methadone programs, it is possible to identify several outcomes associated with treatment; reduced heroin use, the prevention of communicable diseases such as HIV and HCV and a reduction in re-incarceration rates. Therefore, a key challenge when performing an economic evaluation of prison methadone programs is the identification of the appropriate outcomes to be used in the analysis. A further challenge is the limited data available on the outcomes of prison methadone programs.

The study is based in part on the results of a randomised trial of prison methadone conducted in NSW (Dolan, Shearer et al. 2003). This report provides a summary of the trial, describes the resource utilisation associated with the NSW prison methadone program and estimates the cost of such utilisation. A threshold analysis is used to determine the level of outcome required to render the prison methadone program a cost-effective treatment option. Section two of the report provides details of the first randomised controlled trial of methadone maintenance treatment within a prison community (Dolan, Shearer et al. 2003). Section three details the methods used in the economic analysis. Sections four and five report the results of the costing and the threshold analyses respectively.

2. EFFECTIVENESS OF PRISON METHADONE

Dolan et al (Dolan, Shearer et al. 2003) details the results of a randomised controlled trial of methadone maintenance treatment within the NSW prison community. The aim of the trial was to examine the impact of prison methadone on a) prevalence and frequency of heroin injecting, b) heroin use, c) incidence of HIV and hepatitis C (HCV) and d) re-incarceration. The study was an open, two-group, randomised controlled trial.

382 inmates were either randomised into treatment or control conditions. Inmates in the treatment group joined the prison methadone program immediately. Inmates in the control group were placed on a four-month waitlist for the prison methadone program with guaranteed access after that period. The trial was constrained to this design because at the time of the study the waitlist for the prison methadone program was six months. Subjects were reinterviewed four months after their first interview.

At baseline, recruits in both groups were comparable on all key demographic characteristics, prison histories, injecting drug use and sharing of injecting equipment. The mean age in both groups was 27 years and daily injecting had commenced at mean age 19. Baseline HIV was zero for both groups. Baseline HCV prevalence was 76% and 72% for treated and control subjects. Further details on the Dolan trial can be found elsewhere (Dolan, Shearer et al. 2003).

The cohort recruited by Dolan et al in 1997/98 is now the subject of a four year follow-up study (Dolan, Shearer et al. (manuscript in preparation)). Since all subjects had been offered methadone at the conclusion of the RCT, this could no longer be treated as controlled study. This limits the utility of the study outcome data for the economic evaluation.

When analysing the follow-up study by original randomisation group, the incidence of hepatitis-C was lower in the treated group, 24 versus 32 cases per 100 person years (Personal communication). This suggests that prison methadone reduces the incidence of HCV. However, this difference was not statistically significant. Although not statistically significant, it is notable that the difference in HCV incidence has persisted through the four years of follow-up, despite the fact that the difference in methadone treatment was only four months. This provides support for the argument that prison methadone, as part of an overall program of methadone provision, is an important part of a harm minimisation strategy. At follow-up, the prevalence of HIV was 3% and 1% in the treated and control groups. This difference was not statistically significant.

One likely reason for the finding of no significant difference between the treatment and control groups is the relatively high prevalence of HCV and low prevalence of HIV in the NSW prison population. A further reason is the constraint placed on the trial design by the need to use a waitlist control. Inmates in the control arm had guaranteed access to methadone after four months. This resulted in a large proportion of the control arm receiving methadone therapy relatively soon after randomisation. Approximately 70% of the total cohort had received methadone treatment within 6 months of randomisation. In addition, the sample size of the trial was designed to detect a difference in heroin use. Thus the original trial was not sufficiently powered to detect a significant difference in HCV or HIV incidence (Dolan, Shearer et al. 2003).

The difference in re-incarceration results did not reach statistical significance when analysed by original randomisation group. However the difference in re-incarceration rates did reach statistical significance when the cohort was divided into those with continuous treatment and those without (Personal communication). Continuous treatment represents those currently in their one and only treatment episode (i.e. those who never started methadone, those who started methadone but have since stopped treatment and those who have had more than one treatment episode would be in the non-continuous group).

Table 1: Rates of re-incarceration

	CONTINUOS	NON-CONTINUOUS	P VALUE
Mean wks to first re-incarceration	82	53	0.001
Mean total wks in prison (sd)	52 (58)	71 (57)	0.002

3. OVERVIEW OF METHODS

This study models the cost and health consequences of the NSW prison methadone program. The analysis is based on data from the current program. This analysis estimates the cost of providing a methadone program to relatively non-transitory inmates. As described above, this represents 90% of the population currently receiving prison methadone in NSW, that is, those inmates who are not in police and court cells. Therefore the model estimates the cost of providing daily methadone to a pool of 900 inmates in NSW prisons, taking into account the rate of entry and exit to this pool.

The economic evaluation is performed from a government perspective. The provision of most of the services involved in the NSW prison methadone program is funded by the NSW government, but the provision of the methadone syrup itself is funded by the Commonwealth government through the Pharmaceutical Benefits Scheme (PBS).

The resources employed in the provision of prison methadone include the administration of the program, staffing requirements, methadone syrup and consumables. This study identifies and costs these resources. The analysis uses a combination of both the bottom-up and top-down approach when estimating the total cost of the program. The assessment of Corrections Health Service (CHS) administration costs uses a top-down approach whilst the assessment of costs associated with nurse/doctor time uses a bottom-up costing approach. The bottom-up costing is based upon observation visits to four prison clinics and interviews with nurses, doctors and CHS staff. It is assumed that the observed clinics are typical, and that those clinics not observed operate in a similar manner.

In most economic evaluations of healthcare interventions it is standard practice to include an analysis of the treatment outcomes. Therefore, an economic evaluation of prison methadone ideally would incorporate treatment outcomes such as avoided re-incarceration once inmates are released or avoided incidence of HCV.

For the reasons discussed above, the results from the NSW prison methadone follow-up study (Dolan, Shearer et al. (manuscript in preparation)) cannot be used in an analysis assessing the cost-effectiveness of methadone when compared with no treatment. In addition, there is little evidence in the literature relating to HCV incidence and re-incarceration rates for those patients receiving methadone maintenance therapy in prison. Therefore, a threshold analysis has been performed to determine what societal benefits must be accrued by prison methadone to render the NSW prison methadone program a cost-effective treatment option. A model was constructed that identifies the level of effectiveness required from methadone treatment, in terms of avoided cases of HCV and avoided re-incarceration, to offset the costs of the treatment itself.

Cost of management and administration of the prison methadone program

Two levels of administration within Corrections Health Service (CHS) are involved in the management of the prison methadone program and hence should be included in the cost analysis. The first level is general CHS administration, including the Chief Executive Officer of CHS and the finance, payroll and IT departments. The second level is the administration of the methadone program itself.

The NSW prison methadone program comes under the supervision and management of the drug and alcohol department within CHS. There are six members of CHS staff involved in the management and administration of the NSW prison drug and alcohol program of which the methadone program is a major component: the Director of the drug and alcohol department, 3 clinical nurse consultants (CNC), one administrative officer and one information officer. One clinical nurse consultant works solely on the methadone program, and 100% of salary costs are attributed to the methadone program. The duties of the two remaining clinical nurse consultants, one for drug and alcohol and one for pharmacotherapy include all drug and alcohol related issues. Therefore, it is likely that they also perform some methadone-related work.

Both the methadone clinical nurse consultant and the administrative post work in the liaison office. The liaison office at the NSW remand and reception facility deals with the administration of all exits from prison and locates community methadone programs for soon-to-be released inmates. For those inmates who cannot be placed on a community methadone program, the liaison staff organise the extension of methadone prescriptions. This involves obtaining a prescription from a prison doctor and sending it to a community pharmacy.

Cost of general CHS administration

The cost of CHS administration accounts for 8% of the total CHS annual budget (CHS Finance Department). It is assumed that the administrative costs of the methadone program will be in proportion to that of other CHS activities, and therefore that 8% of the total methadone budget represents methadone-related administration. Because this administration covers both transient and non-transient inmates, it is assumed that only 90% of this cost is attributable to the delivery of prison methadone.

The annual CHS methadone budget is $1.76 million (CHS Finance Department). The amount of CHS administration costs attributable to non-transient methadone inmates is $126,720.

Cost of managing the methadone program

As previously described, there are six members of CHS staff involved in the management and administration of the methadone program. The model assumes that the Director of the drug and alcohol department, the two non-methadone clinical nurse consultants and the information officer spend 50% of their time on methadone-related issues. Thus 50% of their annual salaries are attributed to the program. Since one clinical nurse consultant works solely on the methadone program, 100% of the salary is attributed to the program costs.

The work performed in the liaison office is performed by one part-time clinical nurse consultant and one full-time administrative post. The nurse spends approximately 95% of her time is methadone-related work (5% is spent on buprenorphine). The hourly rate of the CNC is $35.98. The administrator in the liaison office works full-time and attributes 95% of her time to methadone-related issues. The salary of the liaison administrator is $31,000. The hourly rate of the liaison administrator is $15.69.

Ten percent of this administration cost is excluded to represent the 100 transient inmates receiving daily methadone in police and court cells.

The liaison office uses two computers, a FAX machine, a photocopier and sends 100 pages through FAX per working day. The unit costs associated with this equipment are shown in Appendix 1. These costs have not been included in the analysis since IT and equipment is included in the CHS administration budget.

Cost of nurse time

In addition to the CNCs, registered nurses assess inmates and administer the methadone. The assessment of nurse time is based upon observational visits to the four prison clinics and interviews with nurses, doctors and Corrections Health staff.

Methadone parade

The process of dosing varies between the different prisons. However, there are some similarities. Dosing requires two nurses (one to dose and one to record the dosage). Preparation for and closing of the dosing parade, which includes counting and recording remaining methadone and keeping the records, requires two nurses for approximately 30 minutes at the beginning and 30 minutes at the end of each dosing parade. Since two nurses are involved and 21 clinics are performing this activity on a daily basis, a total of 15,330 nursing hours per year are spent on this activity.

The dosing itself is either performed at the central clinic, at satellite clinics or in the wings themselves. The total dosing time ranged from approximately 50 minutes to 3.5 hours for this work.

The following table shows the number of nurse hours, per day and per inmate, associated with dosing in each of the observed clinics. Based on an observation of four prison clinics, average dosing requires six minutes and 15 seconds of nurse time per inmate.

Table 2: Nurse hours associated with dosing

PRISON	NO. PATIENTS	DURATION	NO. NURSES	NURSE HOURS	NURSE HOURS PER INMATE	MINUTES PER INMATE
A	41	2	2	4	0.098	5 mins 53 sec
B	100	3.5	2	7	0.070	4 mins 12 sec
C	61	3.5	2	7	0.115	6 mins 54 sec
D	13	0.875	2	1.75	0.135	8 mins 6 sec
Total	215				0.104	6 mins 15 sec

Notes: 1. The times reported here exclude preparation time.
2. Night dosing that occurs at the remand centre has been excluded.

There are approximately 900 inmates receiving methadone on a daily basis. Assuming that dosing of methadone requires six minutes and 15 seconds nurse time per inmate, the total daily number of nurse hours associated with the methadone parade is 93.81 per day. This equates to 34,240 nurse hours per year (or 17 full time equivalent nurses).

The central estimate assumes that dosing requires an average of six minutes and 15 seconds of nurse time per inmate. However, it is evident from Table 2 that the duration of required nurse time ranges from 4 minutes to 8 minutes per inmate depending on the prison. Therefore, the sensitivity analysis was used to determine the effect of varying the average duration of dosing from 4 to 8 minutes.

It should also be noted that the use of a weighted average was deemed inappropriate. The averaging method used in this report gives equal weighting to all prisons. Since it is unknown whether the four clinics observed are a representative sample of the NSW prison system, a simple average was considered more appropriate than a weighted average, which would give more weight to those prisons with higher numbers of inmates on methadone.

Buprenorphine is also dosed during this time. However, at the four clinics observed, few patients received buprenorphine. Since the dosing of buprenorphine is unlikely to have a significant effect on the total number of nurse hours associated with the dosing of methadone, it was decided that the dosing duration observed would be used in the analysis.

Ongoing management of patients

In addition to the methadone parade nurses have other responsibilities. If an inmate requests an increase or decrease in dose outside the range defined by the Medical Officer, the nurse prepares the paperwork so that the doctor can amend the treatment sheet. This process requires approximately 10 to 15 minutes of nurse time. If an inmate is transferred to another prison, the role of the nurse is to transfer all the details relating to the treatment and dosing of the inmate to the new prison. The gathering and sending of information requires about 30 minutes per inmate.

The majority of the prisons (except the reception / remand centre) do not have a nurse specifically allocated to methadone treatment. The reception / remand centre is the only prison with a full-time methadone nurse. All methadone duties are performed by the same nurse at this prison. The main reason why this prison requires a full-time methadone nurse is due to the reception/remand nature of the prison. Since the prison is a reception centre, there are approximately 3-5 new receptions per night on a methadone program. It is the job of the methadone nurse to check the inmate's details so that they can be dosed. During the standard interview by a nurse during reception, new inmates are asked whether they were enrolled in a methadone program in the community. If new inmates were receiving methadone, details relating to their prescribing clinic, dose and duration of treatment are taken. The process of confirming all the details can take between 5 and 30 minutes. If the details are correct, the inmate is eligible for methadone and can be dosed the next day.

Table 3 shows the number of nurse hours per week spent on paperwork for each of the observed clinics. The use of a weighted average when estimating the number of hours per inmate was, again, deemed inappropriate.

Table 3: Nurse hours associated with paperwork

PRISON	NO. PATIENTS	HOURS PER WEEK	HOURS PER INMATE PER WEEK	MINUTES PER INMATE
A	41	10	0.244	14 mins 38 secs
B	100	11.25	0.113	6 mins 45 secs
C	61	3	0.049	2 mins 56 secs
D	13	2	0.154	9 mins 14 secs
Total	215		0.140	8 mins 25 secs

Since 900 inmates are regularly receiving methadone, a total of 126 nurse hours per week are spent on paperwork. This equates to 6546 nurse hours per year.

Assessments

If an inmate applies to commence methadone treatment, the inmate undergoes an assessment interview to assess their eligibility. This assessment is usually performed by a nurse. The duration of this assessment ranges from 20 minutes to one hour. If the nurse is satisfied that the inmate is eligible for methadone treatment, the inmate has a consultation with the doctor.

When an inmate on methadone is soon to be released from prison, the nurse performs an exit interview. The interview requires one nurse and the duration is approximately 30 minutes.

In 2001, 762 inmates commenced methadone treatment whilst in custody and 1,828 inmates were released from prison on methadone (CHS Annual Report). Therefore, excluding any assessments due to other reasons, nurses performed 2590 assessments in 2001. Since each assessment requires approximately 30 minutes, entry and exit assessments require 1295 hours of nurse time per annum.

The estimate of total number of nurse hours per annum spent on Methadone across the various jails was 57,411 as is seen in Table 4. The annual number of nurse hours was multiplied by the hourly rate to determine the total annual cost of nurse time attributed to the prison methadone program. The vast majority of nurses involved in the methadone program are grade RN8 with an hourly rate of an RN8 in Correction Health of $28.12.

Table 4: Nurse hours associated with methadone-related issues

NURSING ACTIVITY	NURSING HOURS
Methadone parade (preparation, clear up and dosing	49,570
Assessment	1,295
Paperwork	6,545
Total nursing hours	57,411

Cost of doctor time (including cost of drug and alcohol staff specialist)

Doctors' involvement

Most prisons do not have a doctor who is solely responsible for drug and alcohol problems. The majority of the prisons have a Medical Officer (MO), visiting or career, who deals with all health issues. Approximately 90% of the Medical Officers in NSW prisons are Visiting Medical Officers and most are also methadone prescribers. However, some MOs do not have the authority to prescribe methadone. In this situation, either the prison does not offer methadone to its inmates or prescriptions may be written by another doctor in another prison (usually the drug and alcohol doctors at reception / remand prison). New scripts detailing increases/decreases in dose will also be received from the drug and alcohol doctors at reception / remand prison.

Usually methadone-related work is a small proportion of the VMO/CMO's total work load. In general, the VMO/CMO at a prison has very little methadone-related face-to-face contact with inmates other than the initial interview when an inmate commences methadone. The majority of the doctor's involvement in prison methadone is administrative. VMOs spend approximately 1 hour per week on methadone-related work and two thirds of this time is spent on paperwork i.e. checking and writing scripts (Personal communication with clinic VMO).

The reception / remand prison has a full-time drug and alcohol staff specialist to deal with the high volume of new inmates and prescriptions. It is estimated that this staff specialist spends approximately 90% of their time on methadone-related work.

The hourly rate for a Visiting Medical Officer is $146.75 whilst the hourly rate for a Career Medical Officer is $56.14. It is assumed that medical officers at each clinic spend 1 hour per week on methadone-related work. Therefore a total of approximately 983 VMO hours and approximately 109 CMO hours are attributed to the methadone program per year.

Since the drug and alcohol staff specialist spends 90% of her time of methadone-related work, 34 hours per week are spent on methadone issues. The hourly rate for a drug and alcohol staff specialist is $54.62.

Cost of correctional officers

Correctional officers transport inmates to and from the clinics and supervise the methadone parade. However, the costs associated with the correctional officers' time have not been included in the central estimate. The number of correctional officers employed in any one prison is based on the security needs of the prison (based on the number of inmates). Thus the correctional officers working on the methadone parade would still be employed at the prison if the methadone program was not operational. Therefore the opportunity cost associated with correctional officers' time is zero. For this reason, the costs associated with the correctional officers' time have been excluded from the cost of the methadone program in the central estimate. However, the sensitivity analysis examines the effect on the total cost of including the costs associated with correctional officers' time in the analysis.

Cost of pharmacy (including the cost of courier)

Long Bay Correctional Centre houses the pharmacy for NSW prisons. The prison clinics order methadone once a week and methadone is delivered by courier weekly. The estimated time spent in handling methadone over a twelve month period is shown in Table 5 (Personal communication with Pharmacy staff).

Table 5: Pharmacy methadone-related hours

TASKS	APPROX. HOURS - YEARLY
Ordering – place order every three weeks _ hour	8.5
Storage – every three weeks 20 minutes	5.5
Auditing – pharmacy daily	52.0
Dispensing – filling orders for all clinics and wards	208.0
Packing – orders to all clinical and wards weekly	208.0
Data entry weekly	26.0
Auditing – twice yearly of S8 registers	26.0
Total	534.0

326 hours of pharmacist time and 208 hours of dispenser time are attributed to the methadone program per annum. The hourly rate of a pharmacist and dispenser is $29.81 and $16.35 respectively.

It was estimated by the NSW prison pharmacy that annual courier costs for transporting the methadone to the prison clinics are $5500. This is based on a transportation cost of $2.00 per kilogram.

Cost of methadone

The unit cost of methadone syrup was obtained from the Pharmaceutical Benefits Schedule (PBS) (PBS). The NSW prison pharmacy distributed 18747 200ml bottles and 232 litre bottles of methadone to prison clinics in 2002. Therefore the total cost of methadone syrup in 2002 was $147,080.

Cost of disposables

The unit costs of the disposables used in the dosing of methadone are given in Appendix 1. It is assumed that each methadone recipient uses one plastic cup per day. Each clinic administering methadone uses one pair of gloves per day and two record books, one compete pump and one water jug. The night safe used to store the methadone has a life of approximately 15 years (personal communication with CMI Safe Co., supplier of drug safes to NSW Health). Therefore the annual cost of the night safe is $67.

Salary on-costs

Twenty-six percent salary on-costs have been added to all salaries of Corrections Health Service personnel (CHS finance department).

Where appropriate, a 38 hour working week has been used.

Overheads

Overheads such as rent and electricity were excluded in this analysis. The methadone program accounts for a relatively small proportion of total clinic time. The exclusion of overhead costs is unlikely to have a significant effect on the overall cost of the program.

Unit costs

Unit costs have been collected from a range of sources including Corrections Health Service, Department of Corrective Services and the Pharmaceutical Benefits Schedule. It should be noted that CHS employees who come into frequent contact with inmates receive an additional environmental/productivity allowance. The hourly rate of such staff is $2.11 above their NSW Health department counterpart. Unit costs are shown in Appendix 1.

4. RESULTS

Total cost of the program

The total cost of the prison methadone program in NSW is shown in Table 6.

Table 6: Total annual cost of the NSW prison methadone program

COMPONENT	COST ($)
Nurse time	2,034,131
MO / DA doctor time	311,842
General CHS Admin	126,720
Management of the methadone program	246,284
Pharmacy + Courier	22,030
Disposables	22,702
Total CHS cost	2,763,709
Commonwealth costs (methadone)	147,080
Total cost of program	**2,910,789**

The total cost of the NSW prison methadone program is $2.9 million annually. It is important to note that while different government bodies are responsible for the financing of the NSW prison methadone program, the Commonwealth is responsible only for the cost of the methadone itself (5%) and the NSW government, through CHS, is responsible for the remainder. The cost of the methadone program to NSW Health is approximately $2.8 million.

Cost per person year

This costing is based on the assumption that 900 inmates are receiving methadone maintenance treatment in 21 NSW prisons. Therefore the annual cost per person year is $3,234, the NSW Health portion of this is $3,071.

Average cost per inmate

It is also possible to estimate the average cost per inmate. The average cost per inmate was calculated by multiplying the daily cost of treatment by the average sentence duration.

The NSW prison methadone study data was analysed to determine the average sentence duration for inmates receiving methadone. The median sentence duration in the study was 60 weeks (1.2 years). However, it is likely that the average sentence duration of inmates in the study cohort is greater than that of the general prison methadone population. One of the selection criteria of the NSW methadone study was that inmates had a sentence duration great than four months. Therefore it is likely that the study data were biased towards longer sentence duration.

To estimate the average cost per inmate correctly, it is necessary to re-examine the issue of assessments. When estimating the overall cost of the program, 2590 nurse assessments and 762 doctors' consultations were included in the analysis, despite the fact that only 900 inmates receive methadone on a daily basis. These extra assessments and consultations were included in the analysis because of the high number of inmates commencing or exiting the methadone program during a 12 month period.

To estimate the cost per inmate correctly, the model should allow for the fact that each inmate on methadone receives an assessment by a nurse, at entry and at exit and one doctor consultation during his/her sentence. Thus the average cost per inmate, based upon sentence duration of 1.2 years and a total of three assessments, is $3,708.

Sensitivity Analysis

The costs presented in Table 6 are the central estimate of the cost of the provision of the NSW prison methadone program. Due to the variability in the provision of methadone, it is important to examine the effect on the total cost of varying some of the assumptions used in the analysis.

One of the key assumptions to be varied in the sensitivity analysis is the exclusion of costs associated with correctional officers' time. The costs associated with the correctional officers' time have not been included in the central estimate. However, the sensitivity analysis examines the effect on the total cost of including the costs associated with correctional officers' time in the analysis. Correctional officers are involved in the methadone parade and the transportation of inmates to the clinic for consultations.

The sensitivity analysis examines that impact on the total cost of assuming that either two, three or four correctional officers are occupied with the methadone parade in one hundred percent of prisons. At least two correctional officers are present at the methadone parade in each prison. The number of correctional officers present at the methadone parade will depend on both the security level of the prison and how methadone is administered within that prison. It is usual for at least one correctional officer to be present at the site of dosing and at least one officer to transport the inmates from their cells/yard to the dosing. In two of the clinics observed, two officers were present at the site of dosing and two officers were involved in transporting the inmates to and from dosing. In the other two prison clinics observed, one officer was present at the site of dosing and one officer transported the inmates to and from dosing. Therefore, it is usual for either two or four officers to be supervising the methadone parade for the whole duration of the parade.

Table 7 shows the number of correctional officers' hours, per day and per inmate, associated with the dosing of methadone in each of the observed clinics. As already discussed, the use of a weighted average was deemed inappropriate.

Table 7: Hours of correctional officer time associated with dosing

PRISON	NO. PATIENTS	DURATION	NO.OFFICERS	OFFICER HOURS PER DAY	OFFICER HOURS PER INMATE	MINUTES PER INMATE
A	41	2	4	8	0.195	11 mins 42 secs
B	100	3.5	4	14	0.140	8 mins 24 secs
C	61	3.5	2	7	0.115	6 mins 54 secs
D	13	0.875	2	1.75	0.135	8 mins 6 secs
Total	215				0.146	8 mins 46 secs

In 2003, 900 inmates received methadone daily. Assuming an average of three correctional officers, a total of 131.51 hours per day of correctional officers' time is spent supervising the methadone parade. It is estimated that, in total, 48001 hours of correctional officers' time per annum is spent transporting inmates to and from the methadone parade.

It is estimated that correctional officers transport inmates to 3352 methadone-related assessments per year. In 2001, 762 inmates commenced methadone whilst in custody (CHS Annual Report). These inmates would require both a nurse assessment interview and a doctor consultation. In addition, 1,828 inmates were released into the community on methadone. These inmates would also require an assessment with a nurse. It is estimated that each assessment interview with a nurse requires 45 minutes of one correctional officer's time (30 minutes for the assessment and 15 minutes for transportation) and each doctor consultation requires 25 minutes of one correctional officer's time (10 minutes for the consultation and 15 minutes for transportation). Therefore 2260 hours per year are spent transporting inmates to assessments. The annual salary of a correctional officer grade 5/6 is $57,123. Therefore the hourly rate of a correctional officer is $28.91. Thirty-two percent salary on-costs have been added to all salaries of personnel from the Department of Corrective Services (DCS recruitment).

As can been seen in Table 8, variation in the resource use in terms of time and number of staff present makes a significant difference to the cost.

Table 8: Sensitivity analysis

ASSUMPTION		TOTAL COST ($)	PERCENT CHANGE (%)	COST PER PERSON YEAR ($)
Total cost of the NSW prison methadone program		2,910,789		3,234
Include all CHS administration costs		2,952,234	1%	3,280
Nurse minutes per inmate (dosing)	Low estimate: 4 mins per inmate	2,512,350	-14%	2,792
	High estimate: 8 mins per inmate	3,624,418	25%	3,627
Nurse minutes per inmate (paperwork)	Low estimate: 3 mins per inmate	2,760,430	-5%	3,067
	High estimate: 14 mins per inmate	3,083,314	6%	3,426
Correctional officers present at dosing	Two Officers present at dosing	4,303,611	48%	4,782
	Three Officers present at dosing	4,828,716	66%	5,365
	Four Officers present at dosing	5,610,194	93%	6,234
Officer minutes per inmate (dosing)	Low estimate: 7 mins per inmate	4,435,501	52%	4,928
	High estimate: 12 mins per inmate	5,442,933	87%	6,048

Comparison with community methadone programs

The annual cost of the NSW prison methadone program has been shown to be $3,234 per person year, the NSW Health portion of this is $3,071.

This analysis suggests that the NSW prison methadone program compares favourably to community methadone programs. There are several reasons why prison methadone programs are likely to be more costly than community methadone programs. These reasons relate to the administration of the program and operational set-up of a prison facility. Prison methadone programs are likely to have higher operating costs than community methadone programs due to the type of patients receiving treatment, the setting in which treatment is given and the high turnover of patients (due to entry and exit from prison and transfers between prisons).

Access

Costs associated with nursing time are likely to be higher for prison methadone due to the additional security requirements surrounding the provision of methadone in a prison setting. Due to the high security within prisons, it is not possible for methadone patients to simply present at the clinic freely to collect their treatment. There are several reasons why the dosing parade takes up a large proportion of the morning. Firstly, in some prisons the nursing staff move around the prison since dosing is performed in satellite clinics or in the wings themselves. Therefore a significant amount of time is spent moving from one dosing area to the next. Secondly, there is often a substantial amount of time spent waiting for the inmates to arrive at the dosing area. The nursing staff are required to wait whilst the officers return the inmates from one wing and collect the inmates from the next wing. In some prisons this waiting time between wings can be as much as 10 minutes. Such issues are likely to increase nurse time and thus increase operating costs.

Administration costs of entries, exits and transfers

During any one year, there is a high turnover of patients on prison methadone programs. New inmates are continuously entering prison and existing patients are continuously being released from the prison environment. In addition, inmates are regularly transferred between prisons. It was estimated that the NSW prison methadone program has a turnover rate of nearly 20% per month (Personal communication, Chief Executive Officer of CHS). Such high level of patient turnover is associated with a significant amount of administrative work and thus increases operating costs.

Management of transitory inmates

The NSW prison methadone program also provides nightly methadone to detainees in NSW police cells. This group of inmates are very transitory and thus a significant amount of work is associated with providing methadone to these inmates. The administrative costs of the NSW prison methadone program could be significantly reduced if this group of inmates was not included in the program. Even though these inmates are not directly included in this analysis, the cost of providing methadone to these inmates will cause the administration costs of the program to be greater than if these inmates were not included in the program.

However, in spite of these complications, the NSW prison methadone program compares favourably to community methadone programs. NSW Health estimates that the cost per year in 1999 dollars for community methadone is $3098 (personal communication, NSW Health), and the National Evaluation of Pharmacotherapies for Opioid Dependency (NEPOD) found that the cost per year for methadone at selected specialist clinics was $3861 in 1998 dollars (Mattick, Digiusto et al. 2001). If the Health Price Index is used to inflate these costs to 2003 dollars, the annual cost of providing methadone in the community is $3,514 per client and $4,493 per client in specialist clinics.

5. COST OFFSET ANALYSIS (THRESHOLD ANALYSIS)

In the context of methadone treatment, there are several possible treatment outcomes that could be included in a cost-effectiveness analysis. Firstly, there appears to be the general consensus that heroin use is linked with higher levels of criminal activity (Hall 1996). Therefore, it is assumed that regular methadone treatment, and hence reduced heroin use, will reduce drug-related crime and thus result in fewer episodes of re-incarceration once inmates are released (Hall, Ward et al. 1998).

Secondly, prison methadone treatment may, through reduced needle sharing, reduce the incidence of HCV within the IDU population. Therefore, an economic evaluation of prison methadone ideally would incorporate either avoided incidence of HCV or avoided re-incarceration, once inmates are released, as the outcomes associated with treatment.

However, there is little evidence in the literature relating to HCV incidence and re-incarceration rates for those patients receiving methadone maintenance therapy in prison. In addition, the effectiveness data from the NSW prison methadone follow-up study was not suitable for comparing the cost-effectiveness of methadone since there was no control arm.

In the absence of any definitive outcomes data relating to HCV incidence and re-incarceration rates of prison methadone recipients, a threshold analysis was undertaken. A threshold analysis identifies the effectiveness threshold that is required, given the cost of the intervention, to render the intervention cost-effective relative to the comparator. In this analysis, the threshold analysis was undertaken to determine the point at which the methadone program would be cost neutral to government.

The two possible treatment outcomes associated with prison methadone, avoided HCV and avoided re-incarceration, are measured in substantially different units. It is not possible to combine avoided cases of HCV and avoided days of re-incarceration in the same analysis without converting these benefits into one single measure (usually measured in monetary units).

Therefore, a threshold analysis which includes two outcomes that are usually measured in different units will need to convert the treatment outcomes into monetary units. In the context of this report, the benefits associated with prison methadone treatment are the savings that are accrued by avoiding cases of HCV and avoiding re-incarceration once the inmate is released.

A model was constructed that identifies the level of effectiveness required from methadone treatment, in terms of avoided cases of HCV and avoided re-incarceration, to offset the costs of the treatment itself. The model was based on the NSW methadone program for 1000 inmates receiving methadone treatment for one year. The model produces two separate calculations. Firstly it calculates the number of incarceration days per patient that one year's methadone treatment must avoid in order to offset the cost of the treatment. Secondly, the model combines avoided cases of HCV and avoided re-incarceration to determine the number of re-incarceration days that must be avoided to offset the cost of the methadone treatment if the number of incident cases of HCV avoided by methadone treatment is fixed.

Cost of incarceration

The daily cost of incarceration is shown in Table 9. The percentage of the NSW trial cohort in minimum, medium, maximum and unknown security was 18%, 13%, 15% and 54% respectively (Dolan, Shearer et al. 2003). The average daily cost of incarceration was calculated by multiplying the unit cost for each security level by the proportion of the cohort in each particular security level. It was assumed that those inmates with unknown security level in the trial were housed in medium security prisons. The average daily cost of incarceration was estimated at $176.23.

Table 9: Unit cost of incarceration

TYPE OF PRISON	COST PER DAY	YEAR
Maximum security	$208.13	2001/2
Medium security	$168.59	2001/2
Minimum security	$165.14	2001/2

Source of data: DCS Annual report

Cost of treating HCV

A literature search was performed to identify the cost savings associated with avoiding incident cases of HCV. In the core analysis, the threshold analysis assumes that one year of methadone treatment has the potential to prevent cases of HCV. This assumption was based on the fact that, although not statistically significant, the difference in HCV incidence seen in the Dolan study has persisted through the four years of follow-up, despite the fact that the difference in methadone treatment was only four months. Thus in the core analysis, the cost savings associated with avoiding a case of HCV is equal to the lifetime cost of treating a person with HCV. In the sensitivity analysis, it is assumed that one year of methadone treatment does not avoid seroconversion but simply delays seroconversion by one year. Thus in the sensitivity analysis, the cost savings associated with delaying a case of HCV by one year is estimated by deferring the lifetime cost by one year.

The lifetime cost of treating HCV is taken from Shiell et al (Shiell and Law 2001). The Shiell paper assumes that not all newly diagnosed HCV patients incur expensive healthcare costs; that, for every 1000 people infected, 250 will incur no healthcare costs, 642 people will suffer chronic infection but have no substantial long-term problems and that 108 people will develop severe complications and have extensive healthcare requirements (Shiell and Law 2001), and includes only direct healthcare costs.

Shiell estimates that the discounted lifetime cost of treating HCV is $6000. It is likely that Shiell's estimate is conservative relative to current costs. All costs in the paper are expressed in 1996 Australian dollars. If the Health Price Index (AIHW) is used to inflate to 2002 dollars, the cost increases to $7067. Secondly, HCV is assumed to be treated with interferon monotherapy. Current treatment is usually a combination of pegylated interferon plus ribavirin. Combination interferon is known to be more expensive than monotherapy.

In the sensitivity analysis, in order to determine the cost savings associated with delaying seroconversion by one year, the lifetime cost (Shiell and Law 2001) was deferred by one year. The cost savings is equal to the difference between the current lifetime cost and the deferred lifetime cost, discounted by 5%. Thus the cost savings associated with delaying seroconversion by one year is approximately $286.

Since it is possible that the Shiell paper underestimates the current lifetime cost of treating HCV, the sensitivity analysis also examines the effect of doubling the Shiell estimate.

Single-outcome threshold analysis - avoided re-incarceration

The annual cost of methadone treatment per inmate year is $3,234. The model assumes that 1000 inmates receive prison methadone treatment for one year. The model identifies the number of re-incarceration days that must be avoided to offset the cost of the methadone treatment. In other words, the model compares the cost of methadone treatment with the cost savings realised from avoiding days of re-incarceration. The model then identifies the number of days of re-incarceration that must be avoided to equate the cost of treatment with the cost savings accrued.

Data from the NSW prison methadone follow-up study suggests that 7.3 percent of the cohort were not released in the study timeframe and therefore were unable to be re-incarcerated. Therefore those never released from prison are excluded from the re-incarceration analysis. Thus it was possible for methadone treatment to avoid re-incarceration in 92.7% of the cohort. Of those 1000 inmates receiving methadone, 927 will be released from prison and thus have the chance of re-incarceration. Assuming a daily incarceration cost of $176.23, methadone treatment must avoid 18352 days of re-incarceration to offset the annual cost of treatment for 1000 inmates or, to put it another way, if re-incarceration is delayed by 20 days for every inmate on the methadone program who is released from jail, the cost of the methadone program for 1000 recipients is offset. That is, for a year of prison methadone for an inmate to be cost-neutral, on average 20 days of re-incarceration would need to be avoided (which may result from reduced rates of re-offending or from a delay in re-offending).

Combined-outcome threshold analysis - avoided re-incarceration and avoided HCV incidence

An additional outcome from methadone treatment is avoiding incident cases of HCV. The NSW prison methadone data suggests that the incidence of HCV in the methadone treated cohort is approximately half that of the untreated cohort. The data suggests that the incidence of HCV in methadone treated inmates is 24 per 100 person years. The incidence of HCV in non treated IDU is 32 per 100 person years. Thus methadone treatment avoided 8 cases of HCV per 100 person years.

If cases of HCV are avoided through methadone treatment, there are also cost offsets from this. This reduces the required number of days of re-incarceration avoided for the program to be cost neutral.

The combined-outcome threshold analysis assumes that 1000 inmates receive methadone treatment for one year and that methadone treatment avoids both days of re-incarceration and cases of HCV. In the model, the number of incident cases of HCV avoided by methadone treatment is fixed, and the number of re-incarceration days that must be avoided to offset the cost of the methadone treatment is calculated. In other words, the model compares the cost of methadone treatment with the cost savings realised from avoiding days of re-incarceration and avoiding a given number of cases of HCV. The model then identifies the number of days of re-incarceration that must be avoided to equate the cost of treatment with the cost savings accrued.

The combined-outcome threshold analysis assumes that the difference in HCV incidence as seen in the NSW prison methadone study is representative of prison methadone treatment and that the control arm of the trial is comparable to no treatment (i.e. a delay in methadone treatment can represent no treatment). Thus, the model assumes that the reduction in HCV incidence is fixed at the level observed in the NSW prison methadone study data. Therefore it was assumed that methadone avoids 0.8 HCV cases per person year. The threshold analysis identifies the number of avoided re-incarceration days required, when combined with this level of avoided HCV incidence, to offset the cost of the program.

The NSW prison methadone data suggests that 71.7 percent of the cohort is already HCV positive at the time of starting prison methadone and thus it is only possible for methadone treatment to avoid seroconversion in 28.3% of the cohort. Therefore those inmates who are already HCV positive are excluded from the HCV analysis.

Of those 1000 inmates receiving methadone, 283 will be HCV negative at the time of starting prison methadone treatment and thus have the chance of avoiding seroconversion. Since methadone avoids 0.8 cases per person year, the model assumes that one year's methadone treatment avoids approximately 23 incident cases within the year. Assuming the discounted lifetime cost of treating HCV is $6,000 and the daily cost of re-incarceration is $176.23, the model predicts that methadone treatment must also avoid in total 17581 days of re-incarceration to fully offset the cost of treatment. This equates to approximately 19 days avoided re-incarceration per inmate (able to be re-incarcerated) per year to offset the cost of the program.

Threshold analysis – Sensitivity analysis

The central estimate assumes that one year of methadone treatment has the potential to prevent cases of HCV. In the sensitivity analysis, it is assumed that one year of methadone treatment does not avoid seroconversion but simply delays seroconversion by one year. Thus in the sensitivity analysis, the cost savings associated with delaying a case of HCV by one year is estimated by deferring the lifetime cost by one year. Assuming the cost savings associated with delaying seroconversion by one year are $286, 20 days of re-incarceration must be avoided to offset the cost of the program.

In addition, the sensitivity analysis examines the effect of doubling the Shiell estimate. Assuming the cost savings associated with avoiding a case of HCV are $12,000, 18 days of re-incarceration must be avoided to offset the cost of the program.

Conclusions drawn from the threshold analysis

The results from the combined-outcome threshold analysis are not substantially different to the results from the single-outcome threshold analysis. The single-outcome threshold analysis suggests that, per 1000 recipients, it is necessary to avoid 20 days of re-incarceration per inmate (able to be re-incarcerated) in order for the total costs of the treatment to be offset. The combined-outcome threshold analysis suggests that, per 1000 recipients, if 12 month's methadone treatment avoids approximately 23 incident cases of HCV, it is necessary to avoid 19 days of re-incarceration per inmate (able to be re-incarcerated) in order for the total costs of the treatment to be offset. Thus both analyses show that, irrespective of whether avoided cases of HCV are included in the analysis, approximately 20 days of re-incarceration must be avoided to offset the cost of methadone treatment.

A literature review was performed to determine the feasibility of prison methadone avoiding 20 days of re-incarceration once inmates are released. No evidence relating to the effectiveness of prison methadone could be identified in the literature. However, a small number of papers relating to community methadone programs have examined the effectiveness of methadone in avoiding criminal activity and re-incarceration. Hall reviews evidence from 5 randomised controlled trials, 4 comparative observational studies and 4 pre-post treatment studies (Hall, Ward et al. 1998). The findings of the review suggest that the relationship between methadone maintenance and a reduction in criminal behaviour, in terms of both self-reported behaviour and official records of convictions, is a reasonably strong one. It was concluded that "a relationship between methadone treatment and reduced drug use and criminal behaviour has been consistently observed in controlled trials, quasi-experimental studies, comparative studies, and pre-post studies in the USA, Sweden, Hong Kong and Australia".

There appears to be no evidence in the literature regarding the likelihood that the provision of methadone maintenance will result in 20 days of re-incarceration being avoided. However, there is reasonably strong evidence to suggest that criminal behaviour among methadone recipients is significantly less than their untreated counterparts. Therefore it is not unreasonable to assume that a well managed methadone maintenance program has the ability to significantly reduce the costs associated with re-incarcerating this group of individuals.

6. DISCUSSION

This study represents the first appraisal of the costs and cost-effectiveness of a methadone maintenance program within a prison setting. Several issues arose whilst performing this analysis that prevented the completion of a 'standard' cost-effectiveness analysis. However, the costing analysis suggests that the annual cost of the NSW prison methadone program compares favourably to community methadone programs.

This study was performed using a government perspective, rather than the broader societal perspective. If a societal perspective were taken, other costs, such as costs of crime, would be included in the analysis. Cost of crime, such as court costs, policing costs and costs to victims of crime could be substantial. It is likely that these costs of crime would dominate even the healthcare costs. Thus it is possible that a cost-effectiveness analysis of prison methadone performed using a societal perspective would result in a favourable cost-effectiveness ratio.

In this analysis, the annual cost of the methadone program is based on observational visits to four prisons. There was considerable variability among prisons in relation to how the methadone was administered. The actual dosing of methadone was either performed at the central clinic, at satellite clinics or in the wings themselves. In addition, the number of correctional officers present also varied between prisons. Therefore the cost of administering the methadone program will vary depending on which model is being costed.

This variability amongst prisons may reduce the generalisability of these results. Since most of the costs of the program are incurred at the point of methadone administration, the relative cost-effectiveness of each program will depend on the methods of administration and organisational arrangements of the program being assessed. The organisational arrangements and administering of methadone varies considerably between prison and no doubt between programs. Thus prison methadone programs could be more or less costly in different settings.

The relative cost-effectiveness of methadone will depend upon the prevalence of HCV within the population being studied. The results from the Dolan follow-up study suggest that methadone treatment prevents HCV seroconversion (although this difference was not statistically significant). It is likely that this difference did not reach statistical significance due to the high baseline prevalence of HCV in the study population. In the Dolan trial baseline HCV prevalence was high (above 70%). As a result, there was only a small chance of preventing HCV seroconversion. In a younger population prevalence of HCV would be lower. Thus methadone treatment would have the potential to avoid more cases of HCV seroconversion. Therefore it is likely that an assessment of prison methadone in younger inmates would result in a more favourable cost-effectiveness ratio.

APPENDIX 1: UNIT COSTS

CATEGORY	ACTIVITY	UNIT	UNIT COST	YEAR	SOURCE
Practicing medical staff	Nurses pay (RN8)	Per hour	28.12	2003	NSW + allowance
	Medical Officers (CMO)	Salary	110,942	2003	NSW + allowance
		Per hour	56.14	2003	Based on above
	Visiting Medical officer	Per hour	146.75	2003	NSW + allowance
	Drug and Alcohol staff specialist	Salary	107,929	2003	Based on below
		Per hour	54.62	2003	NSW + allowance
Program management and administration	D+A director	Per hour	62.11	2003	Estimated from NSW Health
	Liaison nurse (CNC)	Per hour	35.98	2003	CHS
	D+A CNC	Per hour	35.98	2003	CHS
	Pharmacotherapy CNC	Per hour	35.98	2003	CHS
	Liaison administrator	Per hour	15.69	2003	Estimated from NSW Health
	Information officer	Per hour	21.76	2003	CHS
Other	Pharmacist	Per hour	29.81	2003	CHS finance dept
	Pharmacy dispenser	Per hour	16.35	2003	CHS finance dept
	Courier	Per annum	5500	2002	CHS pharmacy
	Correctional officers	Salary	57,123	2003	DCS
		Per hour	28.91	2003	Based on above
CHS Admin budget	IT, payroll, finance	Per annum	3,693,040	2002	8% of total CHS
Salary on-costs	CHS On-costs	Percent increase	1.26		CHS finance dept
	DCS On-costs	Percent increase	1.31		CHS finance dept
Administration of methadone	Methadone	200ml bottle	7.4	2003	PBS
	Methadone	1 Litre bottle	36	2003	PBS
	Plastic cups	Per item	0.0354	2003	CHS stores
	Plastic gloves	Per item	0.0515	2003	CHS stores
	Compete pump	Per item	395	2003	CHS stores
	Record books	Per item	20	2003	CHS stores
	Water jug	Per item	6.84	2003	CHS stores
	Safe, small size	Per item	1000	2003	CHS stores
Equipment	2 computers	Per item	2000	2003	Office suppliers
	FAX machine	Per item	800	2003	Office suppliers
		Per sheet	0.1	2003	Office suppliers
		Per call	0.4	2003	Office suppliers
	Photocopier	Per item	8000	2003	Office suppliers
		Per sheet	0.1	2003	Office suppliers

All unit costs where the source is cited NSW Health are taken from http://www.health.nsw.gov.au/er/human_resources/hs_awards/hsawards_index.html

REFERENCES

AIHW Health Price Index, Australian Institute of Health and Welfare.

Anglin, M. D., Speckart, G. R., et al. (1989). Consequences and costs of shutting off methadone. Addictive Behaviours 14: 307-326.

Barnett, P. G. (1999). The cost-effectiveness of methadone maintenance as a health care intervention. Addiction 94(4): 479-88.

Caplehorn, J. R., Dalton, M. S., et al. (1994). Retention in methadone maintenance and heroin addicts' risk of death. Addiction 89(2): 203-9.

Dolan, K., Shearer, J., et al. (2003). A Randomised Controlled Trial of Methadone Maintenance Treatment versus Wait List Control in an Australian Prison System. Drug and Alcohol Dependence 72: 59-65.

Dolan, K., Shearer, J., et al. ((manuscript in preparation)). Results of a four year follow up of imprisoned male Australian heroin users: mortality, re-incarceration, hepatitis C seroconversion and methadone retention.

French, M. T., Zarkin, G. A., et al. (1993). The effects of time in drug abuse treatment and employment on posttreatment drug use and criminal activity. American Journal of Drug and Alcohol Abuse 19: 19-33.

Hall, W. (1996). Methadone Maintenance Treatment as a Crime Control Measure, NSW Bureau of Crime Statistics and Research, Crime and Justice Bulletin Number 29.

Hall, W., Ward, J., et al. (1998). The Effectiveness of Methadone Maintenance Treatment 1: Heroin Use and Crime. Methadone Maintenance Treatment and Other Opioid Replacement Therapies. J. Ward, R. P. Mattick and W. Hall. Singapore, Harwood Academic Publishers.

Mattick, R. P., Digiusto, E., et al. (2001). National Evaluation of Pharmacotherapies for Opioid Dependence: Report of Results and Recommendations. Sydney, National Drug and Alcohol Research Centre.

PBS, Pharmaceutical Benefits Schedule.

Schoenbaum, E., Hartel, D., et al. (1989). Risk factors for human immunodeficiency virus infection in intravenous drug users. New England Journal of Medicine 321: 874-879.

Shiell, A. and Law, M. G. (2001). The cost of hapatitis C and the cost-effectiveness of its prevention. Health Policy 58: 121-131.

Simpson, D. D. (1979). The relation of time spent in drug abuse treatment to posttreatment outcome. American Journal of Psychiatry 136: 1449-1453.

Zaric, G. S., Barnett, P. G., et al. (2000). HIV Transmission and the Cost-Effectiveness of Methadone Maintenance. American Journal of Public Health 90(7): 1100-1111.

UTS:VISUAL COMMUNICATION UNIT / JOB 9767 / JAN 2004 / UTS:CRICOS PROVIDER CODE 00099F