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Drug addict rehabilitation: a burden on society?

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A model of the economics of drug addiction and rehabilitation of drug addicts is proposed and compared with the alternative of not investing in rehabilitation. Data from ten clients in the process of rehabilitation were input in a 15-year investment-analysis of public spending. Drug-related expenses before entering rehabilitation were used as an estimate of the revenue in the investment projects. Two scenarios – the consequences of investing or not investing in rehabilitation – are compared for two hypothetical groups. In scenario (a) the former ten clients are considered to be the successful one-third of a group of 30 clients. In scenario (b) no investment in rehabilitative activities is assumed. The cost-containment aspect of public spending strongly indicates increasing the rehabilitative measures taken.

Die Rehabilitation Drogensüchtiger : eine Belastung für die Gesellschaft?

Ein Modell der ökonomischen Aspekte der Drogensucht und der Rehabilitation Drogensüchtiger wird vorgeschlagen und mit der Alternative des Nichtinvestierens in die entsprechende Rehabilitation verglichen. Daten von zehn Klienten im Rehabilitationsprozeß wurden im Rahmen einer 15 Jahre umfassenden Investitionsansalyse öffentlicher Ausgaben eingebracht und verarbeitet. Drogenbezogene Ausgaben vor Beginn der Rehabilitationsmaßnahmen wurden benutzt als eine Schätzgrundlage der Einkünfte/Einsparungen in dem Investitionsprojekt. Zwei Szenarios – die Konsequenzen von Investitionen bzw. Nicht-investitionen in Rehabilitationsmaßnahmen – werden verglichen in bezug auf zwei hypothetische Gruppen. Im Szenario (a) werden die ehemaligen zehn Klienten betrachtet als das erfolgreiche Drittel aus einer Gruppe von 30 Klienten. In Szenario (b) wird angenommen, daß keine Investitionen in rehabilitatitive Maßnahmen vorgenommen wurden. Der Kostendämpfungsaspekt in bezug auf öffentliche Ausgaben weist in starkem Maße hin auf die Steigerung der bestehenden Rehabilitationsmaßnahmen.

La réadaptation des toxicomanes: un fardeau pour la société?

Un modèle en économie est présenté sur la toxicomanie et la réadaptation des toxicomanes et comparé au choix de ne pas investir dans une prise en charge de réadaptation. Les données provenant de 10 patients, pris en charge dans un processus de réadaptation étaient utilisées pour une analyse des investissements des dépenses publiques portant sur 15 ans. Les dépenses en rapport avec la drogue avant le début du processus de réadaptation étaient utilisées comme estimation de la contribution aux investissements à réaliser pour les projets. Deux scénarios se rapportant aux conséquences d'investissements ou de non-investissements dans une réadaptation sont comparés pour deux groupes hypothétiques. Dans le scénario (A) les 10 précedents patients sont traités comme réussites à raison de 1/3 d'un groupe de 30 clients. Dans le scénario (B) aucun investissement dans des activités en rapport avec la réadaptation n'est pris en compte. Pour ce qui concerne le contrôle des dépenses des deniers publics il apparaît à l'évidence que la réadaptation constitue une fonction croissante.

La rehabilitación del adicto a la droga: una carga para la sociodad?

Se propone un modelo sobre la economía de la drogadicción y de la rehabilitación de los adictos a la droga y se compara con la alternativa de no invertir en su rehabilitación. Se introdujeron los datos de diez clientes en proceso de rehabilitación en un análisis de 15 años de inversión con presupuestos

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públicos. Los gastos relacionados con la droga antes de iniciar la rehabilitación se usaron como estimación de la ganancia en los proyectos de inversión. Se comparan dos escenarios – las consecuencias de invertir o no invertir en rehabilitación – el relación con dos grupos hipotéticos. En el escenario (a) los antiguos diez clientes son considerados como el tercio con éxito de un grupo de 30 clientes. En el escenario (b) se asume que no hay inversiones en actividades de rehabilitación. El incremento de las medidas de rehabilitación adoptadas acentúa fuertemente el aspecto de contención del gasto público.

Keywords: vocational rehabilitational, drug addiction, economics of disability

Introduction

Drug addiction is of major concern to practitioners of social medicine, health planners and politicians in modern western societies. The individual human suffering, and political and moral issues involved are a challenge to all aspects of medicine.

The use of addictive drugs has been rising since the 1960s (Parker *et al.*, 1987). Recently though some countries report a decline in young people's illegal use of drugs (Bachman *et al.*, 1988; Skog, 1990). Even if this is a lasting trend, public spending on the consequences of drug-related behaviour will continue to rise, both in the short and long run. The aim of this study is (i) to evaluate an investment-analysis approach of the economics involved in rehabilitation of drug addicts, and (ii) to compare this approach in two scenarios, investing or not investing at all, in rehabilitative activities.

From an economic point of view, resource allocation should be cost-effective (Drummond, 1989). Drug addiction and drug-related behaviour implies resource expenditure whether action is taken against it or not (Godfrey and Maynard, 1989).

The value of the rehabilitative activities to society is calculated on the basis of human-capital theory as a measure of quality of life (Mooney, 1986). This way of reasoning may be criticized as it puts little weight on the value of life of elderly and handicapped people not able to attain normal employee status. As a proxy in this study, the value of the person's productive output is used to make calculations simpler.

Rehabilitation is the complex, time consuming and dynamic process of changing drug addicts into people who use less drugs and public resources. It is difficult to evaluate the rehabilitation process, as can be seen by the different uses of the concept 'rehabilitation' (Anthony *et al.*, 1982).

In this study we define rehabilitation as "the process of medical treatment and social and vocational training by which a drug addict is brought to his/her optimal level of vocational and social functioning" (Gogstad, 1987).

Subjects and methods

Stensløkka Ressurs Senter (SRS) is an institution aiming at rehabilitating drug addicts who, after previous treatment in another facility, are in further need of follow-up activities. More than 700 clients have been treated at SRS since it was founded in 1970.

Ten of about 40 current inhouse and polyclinical clients as of May–June 1989 were chosen for a semistructured interview lasting 3–4 h. Information from the interview was supplemented with client record data.

The ten clients were chosen in a non-random manner. Their mean age was 27.1 years

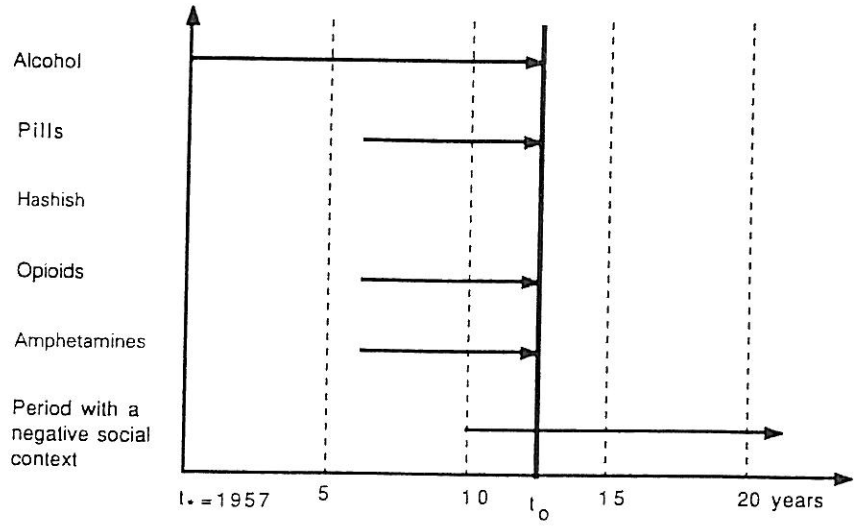

Fig. 1. Drug consumption profile and time with a negative social context for one of the clients.

Table 1. The costs to society of one client's drug related behaviour in the year t_0

Nine months in-patient status in different institutions and in custody in jail. Mean cost per day 1500 Nkr for 270 days	= 405 000 Nkr
Social welfare payments[a] for 3 months 3500 Nkr × 3 months	= 10 500 Nkr
The client's use of illegal drugs in the period outside institutions absorbs the equivalent of 1600 Nkr a day 1600 Nkr × 90 days	= 144 000 Nkr
Costs to the public sector sums up to	= 559 500 Nkr
This cost is reduced by: · 10% (probability of self cure) 25% (probability of dying in the 15-years of investment, the probability is set separately for each client according to the severity of his drug abuse)	
Risk-adjusted sum of costs for client 1	= 363 675 Nkr

[a] A transfer payment, but the resource expenditure on behalf of the agency handling the payment, exceeds the transfered amount.

(ranging from 19–50), while the mean age of the whole group of clients (700) was 29.0. Three out of ten were female in both groups.

The mean duration of the ten clients' drug addiction was ten years prior to admission to SRS. They all used several legal (alcohol) and illegal addictive drugs. The type of drug and quantities consumed, varied between clients, depending on age at onset and the availability in different periods of their drug abusing careers. An example is given in Fig. 1.

During the interview, the clients were questioned on the duration of earlier treatments, periods of imprisonment, their receipt of social welfare payments and benefits from the National Health Insurance (Table 1).

Illegal drug-use was discussed in detail and daily drug expenses were estimated. Knowledge of prices from other sources, and inter-client control of estimates were used to minimize inaccuracies in estimates of expenses (O'Malley *et al.*, 1983; Hoekstra and Swart, 1990).

Each client's development of drug use over time was drawn up in a figure during the interview. The figure gives an immediate impression of how many drugs – legal and illegal – each person used at any moment in time throughout his/her career (Fig. 1).

The figure also illustrates time-periods when the client had only a negative social network. A period with a negative social context was defined as the non-existence of 'one or two people outside the abusing milieu whom the client had lasting confidence in'.

The year when drug consumption started, t^*, was identified. The drug in question may have been alcohol, and t^* was not necessarily the year the client got addicted. The year the client indicated was checked with the client-record and no discrepancies were found.

The investment analysis used another year, t_0, as the starting point for investment in rehabilitation. This year differed between clients, and was designated as the year the client him/herself considered that rehabilitation had started. All clients experienced significant events this year e.g. the death of a close relative or friend, or some convincing episode of treatment (Table 2).

A case history

The client – a man – was 30 years old when he was admitted to SRS. Except from a bout of pleuritis as an only child, he had suffered from no major somatic disorders. He grew up with both his parents. Intellectually he performed slightly above average.

He started using alcohol, and later also addictive pills, opioids and amphetamines, for a period of 6–7 years. He was addicted to drugs 12–13 years prior to his entry to SRS. He was

Table 2. Age at t_0, 1989 and present value of investment for ten clients at SRS

Client no./sex	*Age at t_0*	*Age in 1989*	*Present value (PV)*
1/m	30	49	3 307 759 Nkr
2/m	18	35	4 933 880 Nkr
3/m	29	35	6 354 962 Nkr
4/f	27	37	2 062 666 Nkr
5/f	23	30	3 062 281 Nkr
6/f	27	38	4 840 230 Nkr
7/m	30	37	6 036 565 Nkr
8/m	20	37	5 256 131 Nkr
9/m	19	34	4 948 904 Nkr
10/m	46	60	4 027 568 Nkr

Mean PV = 4 483 095 Nkr
Total PV = 44 830 946 Nkr

considered to be heavily addicted, and without any positive social network. At the age of 30 he considered disability pension to be the only feasible solution to his problems. He was a leading figure in the abusing community.

The years before t_0 (entrance to SRS) he had spent 9 months in detoxification clinics and prisons. He subsequently finished secondary education and earned a craft certificate. He spent 3 years at SRS. His rehabilitation period ended with a personal crisis, after which he spent a year in a psychiatric hospital. He has subsequently stayed with the same employer for 11 years and lives today (1989) in his own apartment as a total abstainer.

The investment assumption

A difference between investment in our ten clients and an ordinary investment in a factory, is the degree of uncertainty. When investing in a new factory, future revenues are unknown. Since this study was done in retrospect, a mean of 10.5 years of the period of investment of 15 years were already known to the authors. Consequently the level of uncertainty was much lower.

The costs per day in the different institutions and prisons were known quantities; likewise social welfare payments. Costs arising from damages caused by crimes of gain pertinent to drug abuse were arbitrarily doubled, thus giving a crude estimate of the expenditures of police, insurance companies and others in tracking down the crimes of gain. The value of the stolen goods 'transfered' from owner to thief was not included.

Somatic health care expenditure was not included. Neither the loss of productivity due to the fact that the clients' were not working nor the loss of productivity of relatives, nor an estimate of the value of increased suffering were included (Johansen *et al.*, 1989).

The sum of the costs were then reduced to account for two factors (i) the probability of

Table 3. Data for the investment analysis on one client at SRS

Year in project	*Inpatient at SRS*	*Inpatient at psychiatric hospital*	*Value of work effort*	*Drug-related expenses forgone* (Nkr)	*Cash-flow* (Nkr)
t_1	−365 000			363 675	−1 325
t_2	−365 000			363 675	−1.325
t_3	−365 000			363 675	−1.325
t_4		−912		363 675	−548 325
t_5			163 330	363 675	527 005
t_6			163 330	363 675	527 005
t_7			175 000	363 675	538 675
t_8			186 600	363 675	550 275
t_9			198 320	363 675	561 995
t_{10}			198 320	363 675	561 995
t_{11}			198 320	363 675	561 995
t_{12}			198 320	363 675	561 995
t_{13}			198 320	363 675	561 995
t_{14}			198 320	363 675	561 995
t_{15}			198 320	363 675	561 995

NV = 3 307 759 Nkr

self-cure – arbitrarily set at 0.1 for all clients; (ii) the probability of dying during the 15-year investment-period. This probability is internationally estimated to be 2–3% per year among young drug addicts (Haastrup and Jepsen, 1988; Tunving, 1988). On the basis of interview and client records, this probability was determined individually. The probability ranged from 10 to 50% for the whole investment period depending on the severity of the person's drug abuse in year t_0.

The resulting risk-adjusted sums of costs were then used in a cash flow analysis. An example of the amounts involved for one client are shown in Table 3.

The opportunity cost assumption

Society invests money in its citizens through the provision of public goods. Suppose by some measure or the other, or a sequence of measures, the drug addict stops taking drugs and stops incurring costs through his drug related behaviour, then society may use these amounts for other purposes.

We considered the treatments, time in prison and social welfare benefits to be society's investment in our ten clients for a period of 15 years from year t_0. We then calculated the present value of the investment, i.e. the difference between incurred revenues and costs (Gravelle and Rees, 1984).

The expenditures

Society's investments require expenditures on social and psychiatric treatment, custody, education and other rehabilitative expenses for each client from year t_1 to t_{15}. The costs of inevitable relapses were also included.

The revenues

Revenues from the investments are twofold: first the wages clients earn when the rehabilitating measures have had some effect and secondly the calculated risk-adjusted costs of drug addiction not incurred when drug consumption stopped; i.e. from year t_1, the start of rehabilitation.

The rate of discount used in the calculations was 5%, which is somewhat more conservative than 7%, which is currently used by the Norwegian Central Bank in public investment projects.

Results

Evaluation of the model of the economics of rehabilitation of drug addicts

In the year before t_0 and during the 15 year investment-period a total of 14 million Nkr was invested in ten clients of a rehabilitation centre. Of the 14 million Nkr, 1.5 million Nkr from the National Insurance scheme was spent on education and rehabilitation aid. The cost incurred in the year t_0, including the calculated risk-adjusted costs of drug addiction that year, was 5 657 000 Nkr.

The ten investment projects produced cash flows as shown in Fig. 2. The present value of each project is indicated in Table 2. The mean present value was 4 483 095 Nkr and thus the total present value 44 830 946 Nkr.

In the process of rehabilitation, nine out of ten clients started working. Their mean income was 160 000 Nkr. Assuming production at marginal cost, an employer's fee was

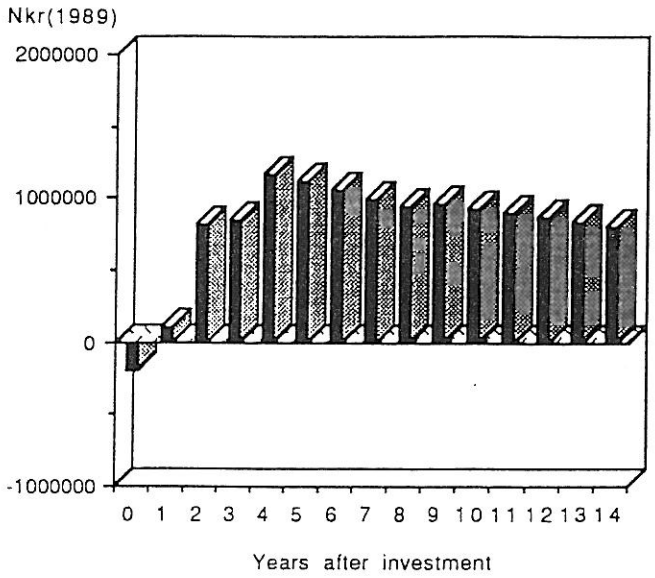

Fig. 2. Cash flow for ten clients at SRS with 15 years of investment in rehabilitation.

included when estimating the value of their work effort. Capitalizing income for all clients at 5% gave 19 374 892 Nkr of which an assumed 50% was paid in taxes and VAT.

Alternatively, if it is assumed that the ten clients continued their drug related behaviour and consumption at the level of the year t_0, with a 0.23 probability of dying (mean of the ten clients) and a 0.10 probability of self-cure, public spending would amount to 39 342 172 Nkr.

The calculated return on investment then was 250% at 5% rate of discount.

The cash-flow of the ten clients showed considerable variability until years 5–6. The results for three clients are shown in Fig. 3.

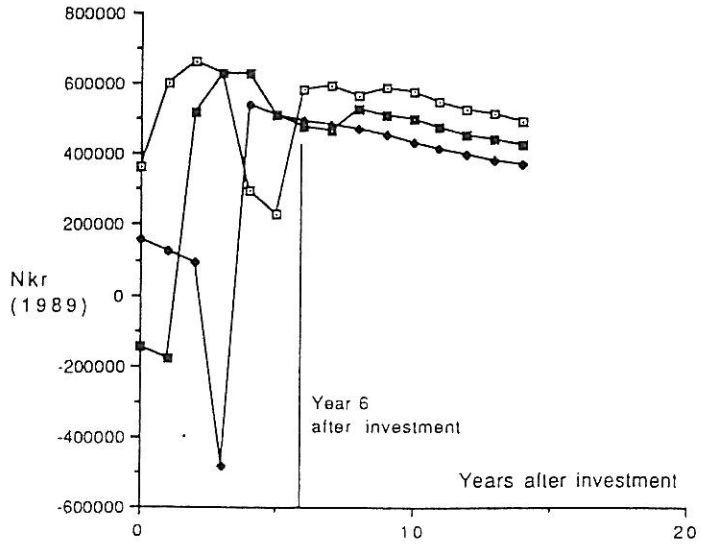

Fig. 3. Cash flow for three clients showing the great divergence of initial cash flow in the investment projects.

Comparison of the model with a scenario of not investing at all in rehabilitational activities

Suppose the ten clients analysed above represent one third of a population of 30 drug addicts, who would have been rehabilitated, even *without* the actions taken. Another third of the 30 addicts are assumed not to benefit from rehabilitative efforts at all (i.e. would continue their drug related behaviour in spite of treatment) and the last third would die during the investment-period.

We compared the cash-flows associated with this group of 30 addicts with another group of 30 addicts under the following two scenarios.

Scenario (a) No rehabilitative efforts are undertaken for 30 drug addicts. Their use of drugs continues for 15 years at the level of t_0. Though treatment is not given to them, society incurs costs through crime of gain and the necessary law enforcement activities. At the start of the period of investment, three times the amount invested on the ten clients discussed earlier (19.6 million Nkr) is – as an alternative to investment in rehabilitation – transferred to a bank account at 10% interest.

Scenario (b) 30 drug addicts are subjected to the same type of investment in rehabilitation as the ten clients from SRS. We assume that ten of these 30 clients benefit from investment in rehabilitation. The remaining 20 incur costs to society, but do not give any revenue. Since *ex ante* we do not know who the ten benefactors from rehabilitation will be, we calculate the expenses of these 20 clients as an inevitable cost to scenario (b).

The rehabilitated ten are assumed to reach the level of average wage of an industrial worker for a period of ten of the 15 years of investment.

The results of the calculations were:

Scenario (a): 19.6 million Nkr are transferred to the bank account and yield 40.7 million Nkr after 15 years. Public spending on 30 drug addicts amounts to 114 million Nkr.

Scenario (b): 92.5 million Nkr are used on public spending on the 20 addicts not helped by the process of rehabilitation. The ten helped by the process reduce public spending by 30.3 million Nkr.

The difference between scenario (a) and (b) is 11.1 million Nkr, reflecting reduced public spending under scenario (b).

Discussion

Rehabilitation of drug addicts may be viewed as an investment in decreasing public spending over time. The alternative of doing nothing will certainly maintain, and probably increase public spending over time.

Our results indicate that the costs of maintaining today's level of rehabilitation are high. The comparatively small investments necessary for the process of habilitation or rehabilitation of the addicts give a positive present value even at very pessimistic assumptions on the outcome of treatment.

The rate of return on investment was far above 200%. Sensitivity analysis with rates of discount (2–10%) did not change the magnitude of the rate of return appreciably.

The cash flow charts indicate that rehabilitation should continue for at least 5–6 years. The implication for rehabilitation programmes is that the institutions responsible for the programmes should follow up their clients for a longer period of time than is presently

done. Another consequence is that the process of rehabilitation may be difficult to evaluate after a shorter period of say one or two years.

The choice of t_0 may seem arbitrary. To check this, an alternative analysis using 15 years of age at t_0 was done. The results did not differ significantly. Prolonging the investment period until the age of retirement for the clients (i.e. up to 50 years) increases uncertainty and makes interpretation of calculations difficult.

Losses in productivity due to the fact that our clients didn't work before rehabilitative efforts started, should have been taken into account. This would have increased the rate of return. We chose not to do this due to the uncertainties involved.

The costs of somatic treatments of the addicts were also omitted, though indications are strongly towards increased consumption of health care among addicts.

The level of drug abuse decreased sharply in year t_0 for all our clients, but they did not stop using drugs completely at that time.

All clients had been admitted to many institutions with varying rehabilitative effects during their careers. The design of this study cannot answer the question of the efficacy of any of the many institutions separately or the probable importance of the order of institutions visited.

An area of interest for future research is to determine which institutions contribute significantly to the overall rehabilitation of the clients. This study indicates that each institution contributes but a fraction to the total outcome of rehabilitation.

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