

An investigation of the nature of research into dental health in prisons: a systematic review

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IN BRIEF

- Provides an overview of the oral health of inmates, based on epidemiological research undertaken in this area.
- Details why such research is necessary, the problems involved in conducting such research, and informs on methods of good practice.
- Highlights the lack of available information on service delivery and organisation in prison institutions.

Objectives To establish the nature of research into dental health undertaken in prisons. **Data sources** Databases were searched electronically. This process was supplemented by hand searching of references. **Data selection** Two independent reviewers made initial selections and subsequently carried out full text screening. Discrepancies were discussed with a third reviewer and disagreements were resolved by consensus. **Data extraction** Fifty potentially relevant studies were identified and further screened for inclusion. Of this number, 29 studies were excluded; the remaining 21 were deemed appropriate to include in the review. The primary focus of the papers identified was the oral health status of inmates, assessed by clinical examinations of decayed, missing and filled teeth (DMFT) and periodontal status, and self-report measures of oral health behaviours and service utilisation. Attempts were made to reduce sources of bias by selecting random samples of inmates and standardising measurement techniques, and addressing potential confounding effects. Few studies considered the potential impact of socio-economic status on disease levels. In some studies the oral health of inmate populations was compared to that of non-institutionalised individuals. Studies report high prevalence of oral disease, though precise levels differ according to the composition of the samples. **Conclusions** The heterogeneity of populations studied and methods of assessment precludes simple generalisation, but the consistent trend appears to be that the oral health status of inmates is poor and also poor in comparison with non-institutionalised individuals where appropriate comparisons have been made.

INTRODUCTION

Since the feasibility of carrying out dentally-related research involving inmate populations was established in the late 1960s and early 1970s, many studies have been carried out relating to the dental health of these individuals. The earliest studies showed that dental research could be combined with

existing dental screening programmes for new inmates, in order to provide fundamental and valuable information on the dental characteristics and service utilisation needs of prison inmates. The number of studies of prevalence of oral diseases as assessed primarily by measures of decayed, missing and filled teeth/surfaces (DMFT/DMFS) and by self-report measures as components of general health surveys have increased greatly in recent times, expanding from the United States to Australia,¹ Europe,²⁻⁵ China⁶ and South Africa.⁷

The increased volume of dental research with inmates can be viewed at least in part as a corollary of state and worldwide initiatives into oral health. The Global Oral Health Programme (WHO), one of the technical programmes within the Department of Chronic Diseases and Health Promotion has recently been re-oriented according to the new strategy of dental disease prevention and promotion of oral health. An important goal of this

programme was to reduce oral disease, especially in poor and marginalised populations, by promoting healthy lifestyles and reducing risk factors to oral health arising from environmental, economic, social and behavioural causes. In the United Kingdom in 2003, the Chief Dental Officer in England launched the 'Strategy for modernising dental services for prisoners in England'.⁸ This strategy documented the urgent need to improve dental care within prisons, making recommendations in a number of key areas.

Improving the oral health of inmates is a difficult task. As service users, inmates are more likely to have disadvantaged backgrounds or come from localities with increased levels of social exclusion, with a high proportion unemployed prior to sentencing. As a consequence, oral health requirements of prisoners at admission may be particularly high with a significant amount of unmet treatment needs. Dental

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problems may be severe, sometimes associated with drug abuse.⁹ Many challenges exist in delivering services in the prison system, including: service provision with respect to security procedures; recruitment and retention of dental staff compared with strong demand and lucrative remuneration for dentists in private practice; and declining prison budgets with decreasing finance available for facilities, equipment and staffing.⁹ In addition, there is currently no standardised system of assessment and prioritisation of the dental needs of prisoners and their dental needs do not appear to be met during their admission time. The reasons for this are probably multiple, however the mobility of prisoners within the prison system, the restricted number of dental sessions provided in prisons and perhaps the lack of flexibility due to security concerns are all contributors.

In light of these issues, the aim of this review was to establish the nature of oral health research carried out in prison institutions. No restrictions on the institution type were made, nor on the study design, though due to the difficulties inherent in carrying out research within an institutionalised setting it was anticipated that retrieved studies would be cross-sectional in design, aiming to capture a 'snapshot' of the prison population at a particular point in time. The rationale behind the review was that only once this information has been arrived at can the 'gaps in knowledge' and priorities for future dental research be determined. Additionally such information could provide budget holders with the information to more accurately predict future dental treatment needs, resource requirements and allocations within their institutions.

METHOD

Data sources

An electronic search strategy (Table 1) was carried out on the following databases: Medline 1950 to April 2007, EMBASE 1980 to 2007, Medline in Process to April 2007, CINAHL 1982 to April 1997 and SSCI 1956 to present. Hand searching reference lists of obtained articles was also employed.

Data selection

Potentially relevant studies were identified and screened for retrieval by two independent reviewers. Primary criteria for inclusion were journal articles where the content referred to research with a dental health focus undertaken in prisons, correctional centres and detention centres worldwide. Only articles published from 1990 onwards were included. Any discrepancies were discussed with a third reviewer and disagreements resolved by consensus.

Data extraction

Data were extracted and verified by the two independent reviewers. The STROBE statement¹⁰ was used as an aid in documenting the observational studies. Study characteristics, possible sources of bias and attempts to control for confounding, particularly regarding the comparability of institutionalised and non-institutionalised samples were considered.

RESULTS

From the initial database search and hand searching, 50 potentially relevant papers were identified. Upon examination it was apparent that the search term 'inmates' had resulted in a number of articles involving residents of care homes or hospital units, cited as 'inmates'. Research involving political refugees fell into this category. The search also retrieved studies concerning facets of health other than dental. At this stage, 29 studies were excluded, and 21 studies retrieved for more detailed evaluation (Fig. 1). All of these papers were deemed appropriate to include in the review.

Study characteristics

For the retrieved studies, the rationale for the research was consistent, namely an attempt to document the dental needs of inmates and the extent to which those needs were being met, in order that appropriate resources could be devoted to them. The principal focus of the articles deemed suitable for inclusion was the prevalence of oral disease and dental service utilisation within an institution. Study characteristics are documented in Table 2.

All but four of the studies were cross-sectional in design, identifying themselves varyingly as surveys, prevalence

Table 1 Search strategy (Medline OVID example)

1	Prisons/
2	Prisoners/
3	prison\$.mp.
4	(remand\$ adj3 centre\$.mp. [mp=title, original title, abstract, name of substance word, subject heading word])
5	jail\$.mp.
6	(gaol or gaols).mp.
7	(convict or convicts).mp.
8	inmate\$.mp.
9	(correctional adj system\$.mp.
10	or/1-9
11	Dental Health Services/
12	exp Dental Care/
13	(dental\$ or dentist\$.mp.
14	exp Dentists/
15	teeth.mp.
16	Oral Health/
17	(oral adj health).tw.
18	or/11-17
19	10 and 18
20	(observational adj (study or studies or data)).tw.
21	(non-random\$ or nonrandom\$.tw.
22	(natural adj experiment\$.tw.
23	(non adj experiment\$.tw.
24	nonexperiment\$.tw.
25	intervention studies/
26	cohort studies/
27	Case-Control Studies/
28	cross-section\$.tw.
29	(cross adj section\$.tw.
30	(epidem\$ adj (study or studies or data)).tw.
31	prevalence.tw.
32	(survey or study).tw.
33	or/20-32
34	19 and 33

studies and cross-sectional surveys. Three studies were retrospective chart or medical record reviews,¹¹⁻¹³ and one was a qualitative study.¹⁴

More studies included male than female inmates and state than federal

prisons. Studies were carried out in Europe,^{2-5,12,14,15} South Africa,⁷ Australia¹ and China.⁶ The remaining eleven studies were carried out in the USA. Articles detailing prevalence in a single prison population were more common than those that compared the prevalence in 'comparative' non-institutionalised populations resulting from National Surveys.^{3,4,11,16-19} One study compared the oral health of present or former heroin addict inmates to non-drug addict inmates,¹⁵ another evaluated the health of female former substance abusers.²⁰

Due to the heterogeneous nature of the studies in terms of study design, institution type (state *vs* federal, single sex *vs* mixed), setting and population, data have not been synthesised. Rather, Table 3 documents the study characteristics and principal findings for the common outcome measures for the total sample.

Outcome measures of interest

The primary variables of interest were: clinical measurements of oral health as indicated by the number of decayed, missing and filled teeth or surfaces (DMFT/S) and periodontal health, and self-report measures of perceived oral health status and service utilisation by means of questionnaires. Degree of service utilisation was calculated as the number of dental visits as a proportion of length of incarceration to date,²¹ or simply as the mean or median number of visits to the dental service during the study period.¹³ Levels of decayed or unsound teeth were also considered as indicators of unmet treatment need, along with dentition judged to require treatment. Experiences and perceptions explored in the qualitative study¹⁴ included availability, access and dislike of dental services, diet and oral hygiene and aspects relating to appearance and self-esteem. Demographic information such as age and ethnicity, and information relating to detainment such as prison offence and length of incarceration were also routinely collected.

Potential bias

Methods of addressing bias are documented in Table 3. Where clinical measurements were taken, attempts were

made to standardise methods and procedures, eg with reference to published standards of use¹⁶ or guidelines,^{1,2,7,21,22} though the number of teeth examined (28 *vs* 32) and/or the use of radiographs in the examination was not always specified. The attempt to reduce potential bias by standardising procedures was particularly evident for the comparator studies,^{3,4,16} where assessment of the inmate population was closely related to the use of national or state studies. Despite standardisation and calibration measures being employed, only two studies explicitly reported reliability values.^{3,6}

Participant selection

Attempts were made to reduce potential sources of bias implicated in inmate selection. Where it was not feasible to examine entire prison inmate populations, either a random selection process was used to select a sample,^{1,2,4,11,16,19,21} or a consecutive series of inmates, considered to be similar in composition to the larger population, was sampled over a specific time period.^{5,12,18,22} Two small studies of older inmates were population-based, sampling all inmates.^{6,23} A further two studies involved pre-existing groups of inmates attending prison dental services³ and education.¹⁴ No information on selection was available for four studies.^{7,15,20,24} Where the rationale for the obtained sample size was stated, this focused on the practicality of carrying out the study. One study employed stopping rules.⁵

Where participation was voluntary, information on response rates was provided and missing data was accounted for. One study⁷ failed to document the response rate, stating only that the study population consisted of all inmates at a number of sites, though this number was not explicitly given, and the study sample consisted of all who gave written informed consent. Another failed to account for non-participants.² The potential bias arising from self-selection/voluntary participation in research programmes outside of compulsory screening^{6,7,21} and particularly with regard to monetary or other gain for participation in health surveys^{1,20,23} was not addressed, with the exception of one study.³

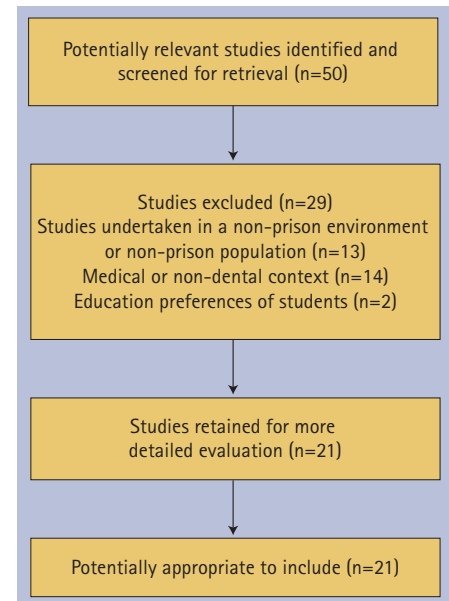


Fig. 1 Flowchart of included and excluded studies

Table 2 Characteristics of included studies

Characteristic	n = 21
Study design	
Cross-sectional	17
Retrospective chart review	3
Qualitative	1
Setting	
UK/Europe	7
US	11
Other	3
National survey data comparator	
Yes	7
No	14

Confounding

In consideration of oral health status, the potential confounding effects of age and/or ethnicity were acknowledged where appropriate and results presented accordingly. Three of the non-comparator studies compared presented results according to age and ethnicity;^{1,21,22} three of the comparative studies used age and ethnic group matched samples from the national surveys for comparisons.^{11,16,18} The categorical grouping of age, ethnicity and measures of oral health differed between studies. In only two studies was the possible influence of social economic status discussed^{16,18} and addressed explicitly in another.⁴

Analysis

Simple summary statistics and statistical methods were used to assess the prevalence of DMFT/S, periodontal health

Table 3 Oral health statistics for institutionalised and non institutionalised individuals

Study	Population/Setting	Examination/Outcome measure	Result (total sample)
Bécart, Hédouin <i>et al.</i> , 1997 ¹⁵	Prison inmates France (n = 93; 16-35 yrs) Results compared to non-drug addicts of the same prison population comparable in age, gender and social class	Single examiner DMFT	Heroin addicts mean D 6.8 (SD 5.2), M 2.9 (SD 2.6), F 3.3 (SD 3.1), DMFT 13.0 (SD 6.0) Non-drug addicts mean D 4.0 (SD 4.0), M 2.3 (SD 3.1), F 3.0 (SD 3.5), DMFT 9.3 (SD 6.3)
Colsher, Wallace <i>et al.</i> , 1992 ²³	Male inmates of state correctional facilities Iowa, USA (n = 119; 50+ years)	Standardised questionnaire of health status % missing all teeth % missing some teeth	38.7% missing all teeth 58.7% missing some teeth
Heng and Morse, 2002 ²²	Female inmates of the Federal Correctional Institution Danbury, Connecticut, USA (n = 500; 20-65 yrs),	Single examiner DMFT/S (Radike criteria) Level of unmet need DT/DFT, DS/DSF	Mean DT 3.5 (SD 3.6), MT 7.4 (SD 7.0), FT 6.0 (SD 5.2) DMFT 16.8 (SD 7.3) Mean DS 7.3 (SD 9.6), MS 36.8 (SD 35.1), FS 13 (SD 13.7), DMFS 57.0 (SD 36.5) DT/DFT 36.8%; DS/DFS 36.0%
Lunn, Morris <i>et al.</i> , 2003 ⁵	Prisoners attending for examination and treatment in an English prison UK (n = 127; 18-30 yrs)	Single examiner DMFT	Mean DT 3.8 (SE 0.31), MT 6.32 (SE 0.53), FT 4.23 (SE 0.32), DMFT 14.35 (SE 0.68)
McGrath 2002 ⁶	Male inmates of Hong Kong SAR elderly detention centre China (n = 64; 60+ yrs)	Single examiner (intra-examiner reliability 0.78 caries, 0.67 CPI) Mean DMFT (WHO criteria) Community Periodontal Index Oral Health Impact Profile (OHIP -14)	Mean DMFT 22.5 (SD 10.61) 75% prisoners in need of prosthetic treatment Modal CPI category of 2 (presence of calculus) 53% of prisoners claimed that their oral health impacted on their day-to-day living
Mixson, Eplee <i>et al.</i> , 1990 ²¹	Male inmates of federal maximum-security correctional facility Leavenworth, Kansas, USA (n = 191; 21-75 yrs)	Two calibrated examiners DMFT (NIDR criteria) Service utilisation	20-34 yrs: D 3.1 (SD 3.2), M 3.0 (SD 3.3), F 6.8 (SD 4.4), DMFT 12.9 (SD 6.0) 35-44 yrs: D 2.3 (SD 3.0), M 8.0 (SD 7.6), F 6.2 (SD 4.4), DMFT 16.4 (SD 6.8) 45+ yrs: D 1.5 (SD 2.6), M 14.0 (SD 10.2), F 6.6 (SD 6.3), DMFT 22.1 (SD 5.4)
Naidoo, Yengopal <i>et al.</i> , 2005 ⁷	Correctional centres, Cape Town, South Africa (n = 340)*	Number of examiners not stated DMFT Periodontal status (WHO guidelines)	Mean weighted DMFT <20 yrs 10.4 (SE 0.9), 20-34 yrs 10.9 (SE 0.4), 34-44 yrs 14.4 (SE 0.8), >44 yrs 21.4 (SE 1.3) Modal CPI category 1
Nobile, Fortunato <i>et al.</i> , 2007 ²	Penal institutions in Calabria, Italy (n = 544; 20-81 yrs)	Mean DMFT (WHO criteria) Periodontal status (WHO guidelines)	Mean DMFT 9.8, mean DMFS 37.6 Modal CPI category 2
Olivan Gonzalvo, 2002 ¹²	Delinquent female adolescents in a juvenile detention facility (n = 35; 14-17 yrs)	Health and nutritional status measured through clinical history and examination	Odontologic diseases (dental decay, periodontal loss) evident in 31% of sample
Osborn, Butler <i>et al.</i> , 2003 ¹	27 correctional centres across New South Wales Australia (n = 789 interview only, 334 interview and examination; 18-77 yrs)	Number of examiners not stated DMFT (National Oral Health Survey of Australia criteria) Community Periodontal Index of Treatment Need Self-perception of treatment needs	Mean D 3.4, DMFT 20.4, CPITN 2.2 93% of those examined required some form of dental treatment
Russell, White <i>et al.</i> , 2006 ¹⁴	Young offenders institution England (n = 31)*	Attitudes and perceptions of dental health and services prior to and during incarceration	Need for greater dental provision than was currently available Access to oral hygiene appliances was limited
Staton, Leukefeld <i>et al.</i> , 2003 ²⁰	Female inmates with a history of substantial drug abuse prior to incarceration Kentucky, USA (n = 60; 21-56 yrs)	Miami Health Services Questionnaire Addiction Severity Index	Dental problems were the second most common self-reported lifetime health problem (87%)
Young, 1998 ¹³	Females incarcerated in a state prison Washington (n = 129)*	Symptoms reported at initial health screening Service utilisation during four month study period	87% reported dental problems at initial screening Median dental services provided = 1 (range 0-15, total number of dental service visits = 321)
Badner & Margolin, 1994 ¹⁹	Females detained at Riker's Island correctional facility (n = 183)* Comparator: non-drug addicts of the same prison population; unmatched NIDR data from Oral Health of United States Adults 1998	Single examiner NIDR criteria DMFT, D/DFT, M/DMFT	Mean D 2.4, M 3.5, F 4.1, DMFT 9.9 (no standard deviations given) D/DFT 34.3%, M/DMFT 27.4%
Bolin & Jones, 2006 ¹¹	Juvenile detention centre Dallas, Texas, USA (n = 419; 12-17 yrs) Comparator: age group/race-ethnicity matched subjects from NHANES III	Review of dental records from a single dentist DMFT, D/DMFT Urgency of treatment need (Association of State and Territorial Dental Directors (ASTDD) manual of assessing oral health needs)	Detainees mean DMFT 3.6 (SE 0.2) D/DMFT 0.79 (SE 0.2) Detainees 80.7% low urgency, 13.1% moderate urgency, 6.2% high urgency of treatment need NHANES III mean DMFT 2.8 (SE 0.2)

Table 3 Oral health statistics for institutionalised and non institutionalised individuals

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Study	Population/Setting	Examination/Outcome measure	Result (total sample)
Boyer, Nielsen-Thompson <i>et al.</i> , 2002 ¹⁶	Inmates newly admitted to Iowa Medical Classification Centre (IMCC) Iowa prison system, USA (n = 174; 17-53 yrs) Comparators: previously studied inmate populations Age group/race-ethnicity matched subjects from NHANES III	Two examiners IMCC oral examination method and NIDCR criteria DMFT/S	Current male inmate population: DT 7.1 (SD 5.8), MT 4.1 (SD 4.5) Current female inmate population: DT 5.6 (SD 6.0), MT 5.1 (SD 2.9) DS overall 15.1 (SD 15.8) NHANES III DS 1.8 (SD 9.2)
Clare, 1998 ¹⁸	Adult felon admissions North Carolina Department of Correction, USA (n = 1,971 18-74 yrs) Comparator: similar in ethnic grouping, NHANES III	Multiple examiners (no reliability estimates) % DS/DFS, mean DS Periodontal Screening and Recording (PSR) scores Urgent treatment needs	DS/DFS 55.2%, mean DS 7.4 NHANES III DS/DFS 8.4%, DS 1.8 25% at least one extraction 23% at least one caries control procedure
Clare, 2002 ¹⁷	Follow-up study of original inmates still incarcerated (n = 257)* Comparator: follow-up of continuously incarcerated members of previous 1996 sample	Multiple examiners (no reliability estimates) % DS/DFS, mean DS	DS/DFS 30.5%, mean DS 3.6 18% at least one extraction 33% at least one caries control procedure 1996 sample (n = 257): DS/DFS 50.1%, mean DS 6.7 33% at least one extraction 40% at least one caries control procedure
Heidari, Dickinson <i>et al.</i> , 2006 ³	Male prisoners at HMP Brixton England (n = 78)*	Single examiner (reliability 0.71) DMFT (UK Adult Dental Health Survey criteria)	DMFT 14.2 (SD 7.5), D 3.5 (SD 2.7), M 6.2 (SD 7.6), F 4.5 (SD 7.5) 1998 UK ADHS: DMFT 16.3, D 1.0, M 7.2, F 8.1
Jones, Woods <i>et al.</i> , 2005 ⁴	Prisoners in the North West of England UK (n = 279 interview, 272 examined)* Comparator: UK Adult Dental Health Survey (1998)	Multiple examiners (no reliability estimates) DMFT (UK Adult Dental Health Survey criteria)	Mean decayed/unsound teeth: Male prisoners 4.2 (SD 6.9) Survey Males 1.7 Female prisoners 4.6 (SD 4.8) Survey females 1.2 Survey social class IV, V 1.9

*Age range not stated

and dental symptom reports for the total samples and by subgroups of age, sex and ethnic group where appropriate. More sophisticated statistical methods were occasionally employed to elucidate possible risk factors for these clinical measures.²

It is clear from the results presented in Table 3 that oral health as measured by clinical indices and self-report measures is poor. For the comparative studies, the oral health of inmates is consistently poorer than age/ethnic matched populations.

Of the studies included in the review, two are particularly methodologically sound. In the United States, the study population of current Iowa prisoners was compared to previous Iowa prisoners to determine whether improvements in dental health of US people over time was reflected in prison population, as well as to cross sectional matched non-institutionalised dentate US adults.¹⁶ In the United Kingdom, the oral health of

inmates in prisons in the North West of England was compared to those surveyed in the 1998 UK Adult Dental Health survey.⁴ One study assessing the health status of incarcerated adolescents was excluded from further evaluation due to the omission of demographic characteristics such as age, gender, ethnicity, low participation rate in county detention centres and lack of information relating to non-response bias, potential confounding factors and unspecified outcome measures.²⁴

DISCUSSION

The aim of this research was to systematically evaluate the nature and quality of oral health research that has been undertaken in prisons, correctional institutions and detention facilities worldwide. The search was restricted to articles published since 1990. It is acknowledged that this cut-off point is somewhat arbitrary. The decision to use 1990 was taken as research published

prior to this date has been carried out with individuals who are unlikely to have benefited from fluoridation to the same extent that individuals have today, and thus the results from studies prior to this date have limited usefulness as a source of information. It can be argued however that the widespread adoption of fluoride has taken place at different times worldwide, and articles published prior to this date may be of value.

The nature of the published studies identified has thus far focused primarily on the clinical assessment or self-reported oral health of inmates, and the extent to which dental treatment needs in this population are being met. Many aspects of good research practice have been adhered to in the research, such as the standardisation of procedures to reduce sources of bias and addressing the effects of confounding information. An area suitable for improvement includes the provision of full details of participants at all stages of the study,

with fully detailed reasons for non-response or refusal to participate. Caution should also be taken with respect to the retrospective chart reviews included in this review.¹¹⁻¹³ It is widely acknowledged that retrospective analyses are subject to problems with accuracy in documentation, quality and legibility of information contained therein. All else being equal, prospective studies are to be preferred.

As considerable heterogeneity exists among the studies, a statistical combination of studies would be ill-advised and as such, no formal data synthesis was undertaken. However the conclusion reached by the studies included in this review is consistent: inmates show more decayed, more missing and similar or slightly higher mean DMFT than the non-institutionalised population. Considerable numbers of inmates are presenting with oral symptoms on initial examination, imposing a significant burden on the dental services. Further research is required to investigate the implications of social class as an explanatory or confounding factor. The principal limitation of this review reflects the diversity of the included studies, namely the lack of generalisability of results. The results of individual studies cannot be extrapolated beyond the population to which they refer.

In short, the oral health status of inmates as assessed by clinical and self-report measures is poor and generally poorer than age-matched and ethnic-matched individuals. As the research in this review documents, prisons are failing with regard to the dental element of healthcare. Given that the studies cover both initial screening examinations upon entry and research carried out during incarceration, it is clear that significant treatment needs exist in the prison population, with the implication of considerable burden for treatment services. Consequently this poses considerable challenges in terms of providing effective and timely dental healthcare within the constraints of security provision and budget restrictions. A follow-up study in the US has shown, however, that it is possible to ameliorate the oral health of inmates.¹⁷ A re-examination of continuously incarcerated members

of the original sample revealed a reduction in the proportion of inmates with urgent treatment needs. Whilst the follow-up involved only a small number of the original sample, the results appear encouraging.

In terms of adequate resourcing, the difficulties inherent in the recruitment and retention of staff cannot be underestimated. This has to be addressed at the earliest possible point in the training programme of potential dentists. A recent study involving the students of private and public dental schools in the US indicated that the perceived value of prison dentistry as an extramural activity was low, rated as least important when compared to private dental practice.²⁵

This systematic review has identified the problems for prison health services in providing services for populations with very high treatment needs. It also demonstrates the paucity of knowledge to inform prison healthcare services how to address these problems. The majority of studies have been cross-sectional in nature, describing disease patterns in different populations. What is now required are intervention studies to look at the effectiveness of clinical intervention to prevent the onset and progression of disease in the prison environment, and also studies examining how changes to the delivery and organisation of services can improve the quality and cost-effectiveness of dental services for prisoners. However, before studies with more ambitious study designs are attempted, the particular difficulties of delivering research studies in prisons need to be identified and solutions to these barriers to successful completion of large studies need to be devised and disseminated.

CONCLUSIONS

The nature of research in prisons to date has focused primarily on the oral health of inmates, and the extent to which dental treatment needs in this population are being met. Sound research principles such as standardisation of techniques, consideration of sample selection and adjusting results for possible confounding effects have been adhered to. Well-executed research in this field is invaluable, in that it objectively documents the characteristics of the

population and provides evidence as to the nature and treatment required in such settings and is fundamental for informing policy making. Though the institutions and inmates studied differ in many ways, there is a general trend from the published research that oral health is poorer in institutionalised populations than non-institutionalised matched individuals, and that dental health is perceived as less important than other aspects of health.

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