Disabled Adults in Sheltered Employment: An Assessment of Dental Needs and Costs

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Abstract: In this dental survey of a multi-disability sheltered industry, 233 adults were examined. When compared to adjusted North Carolina values, the workers exhibited poorer oral hygiene with higher rates and severity of periodontal disease. DMF-T totals were equal to those statewide; however, workers had more decayed and fewer missing teeth. Significant unmet restorative and prosthodontic needs were found. Treatment cost estimates at 1983 fees were $421 per capita, with a median fee of $240. (*Am J Public Health* 1985; 75:661–663.)

Introduction

Approximately 218,000 disabled persons are now employed by 4,629 sheltered workshops.[1] No comprehensive studies of the medical or dental needs of this population exist. This investigation examines oral disease measures, treatment needs, and costs for employees in one large multi-disability workshop.

Methods

The workshop studied was established in 1966, and employs 334 workers. It is the largest such facility in the Research Triangle area of North Carolina. Worker records indicated that 53.0 per cent were White, and 46.1 per cent were Black. Workers were predominantly single (93.4 per cent), their own legal guardian (94.6 per cent), male (58.7 per cent), and had been employed four or more years (57.2 per cent). The median age was 30 years and the range was 17–70 years. The largest group was in the decade 20–29 years.

Many of the workers (46.4 per cent) had more than one diagnosis. One out of five had a primary diagnosis of a behavior disorder (autism, adaptive behavior problem, emotional disturbance), and three out of five had primary diagnoses of mild to moderate retardation.*

The workshop provides life insurance for 78.3 per cent of the workers and health insurance without dental benefits for 59.2 per cent. Workers with Medicaid had dental benefits (22.1 per cent). The average net salary was $1,462 with 29 per cent earning less than $500 per year. The maximum salary was $5,500 and 5 per cent of the workers earned over $3,500.

Two hundred and fifty workers (out of 334 total) were interested in dental screening, and this report is based upon 233 examinations. Several workers were unable to complete examinations due to anxiety, inability to remain seated, or inability to maintain oral opening. Comparisons of the sample to the total workshop revealed no important differences in gender, race, marital status, legal guardianship, or age.

Dental screenings, performed over three months, were preceded by a review of medical, psychiatric, and pharmacologic conditions. The four dentist-examiners received classroom training and practice in the DMF-T[2], Periodontal Index (P.I.)[3], and the Simplified Oral Hygiene Index (OHI-S).[4] Workers received a restorative, periodontic, prosthodontic, and head and neck examination without radiographs. These were conducted adjacent to work areas using semi-reclining chairs with high intensity lamps.

The cost of services was estimated using an individual tooth assessment indicating restorative or prosthetic needs. Surfaces requiring treatment and dental materials to be used were noted. Services were planned using North Carolina Medicaid guidelines. Services did not include operating room procedures, endodontics, precious metal restorations or bridges; possible alternatives were substituted. Treatment plans were conservative, corresponding to services provided by many North Carolina public health facilities. Estimates

TABLE 1—Overall Dental Findings-Sheltered Workshop (N = 233)

DMF-T (28 teeth)	Crude Sample Mean Value	% of Total DMF-T Score
		%
Decayed Teeth (D)	2.35	15.5
Missing Teeth (M)	7.36	49.3
Filled Teeth (F)	5.20	35.1
Total DMF-T	14.91	100.0

Periodontal Index Score	Care Evaluation	% of Sample
0.0–0.9	No periodontal care needed (normal/gingivitis)	16.5%
1.0–1.9	Incipient periodontitis	34.4%
2.0–4.9	Periodontitis	34.0%
4.9–	Advanced Periodontitis	15.1%

Oral Hygiene Index-S: Mean Scores	
Mean Debris Index	1.44
Mean Calculus Index	1.31
Mean OHI-S	2.75

TABLE 2—Decayed, Missing, and Filled Teeth (DMF-T): Comparison of North Carolina and Sheltered Workshop Means

	Sheltered Workshop (n = 233)		North Carolina** (n = 2530)
	Mean (28 teeth)	Adjusted Mean* (32 teeth)	Mean (32 teeth)
Decayed (D) teeth	2.35	2.68	1.77
Missing (M) teeth	7.36	8.39	10.96
Filled (F) teeth	5.20	5.93	5.45
DMF-T	14.91	17.00	18.18

*Mean and variance adjusted to 32 teeth to account for dental manpower study inclusion of third molars.

**Ages 15+ from the 1976 dental manpower study.

*Detailed data available on request to author.

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TABLE 3—Comparisons of Workshop and North Carolina Mean Periodontal Index by Age

Age	Workshop Mean P.I.	Workshop (N)	North Carolina (>15 yrs) Mean P.I.	North Carolina (>15 yrs) (N)
15–19	1.59	(15)	.40	(315)
20–29	1.95	(80)	.59	(581)
30–39	2.75	(61)	.99	(396)
40–49	2.96	(26)	1.26	(307)
50–59	3.64	(20)	1.79	(264)
60–69	3.38	(8)	2.15	(176)

TABLE 4—Oral Hygiene Index (OHI-S) by Age, Race and Gender: Comparison of North Carolina and Sheltered Workshop Means

	Sheltered Workshop	North Carolina
Age		
20–29	3.84 (82)	1.24 (576)
30–39	3.55 (66)	1.41 (371)
40–49	3.23 (31)	1.53 (284)
50–59	2.67 (27)	1.70 (236)
60–69	3.11 (9)	1.85 (143)
Race and Gender		
White male	2.38 (71)	1.34 (701)
White female	3.22 (53)	1.00 (807)
Black male	3.70 (61)	2.52 (202)
Black female	3.77 (44)	2.11 (263)

were based upon unadjusted 1979 modal dental fees.[5] Analysis was by the Statistical Analysis System (SAS) program.

Results

When compared to North Carolina norms (>15 years age) from the 1976–77 Dental Manpower Study,[6-8] males, Blacks and young adults were overrepresented in the workshop population. Overall dental findings are summarized in Table 1. Fourteen per cent of the sample were totally edentulous or required the extraction of all teeth.

When the workshop DMF-T was adjusted to 32 teeth to permit comparison with the statewide findings, the mean was 17.00 versus 18.18 for the state (Table 2). The age-specific DMF-T never differed significantly from statewide values, however. The workshop clients had significantly more decayed teeth and fewer missing teeth, but a comparable number of filled teeth. Blacks in the workshop had significantly more filled teeth than those statewide. Among females, Blacks had significantly fewer decayed, and Whites more decayed teeth than statewide.

The Periodontal Index (P.I.) revealed that 50.9 per cent had incipient or no periodontal disease and 15.1 per cent had advanced periodontitis (Table 1). Up to age 60, the mean P.I. increased with age and was significantly greater than statewide values (Table 3). Across gender and race groups, workers had higher P.I. means.

Race, gender, and age-specific oral hygiene scores (OHI-S) were significantly poorer than in the state, (Table 4). The workshop scores were higher in calculus and debris. Sixty-eight per cent of the workers had OHI-S worse than the state mean.

Table 5 shows treatment costs based upon examinations without radiographs and using the Medicaid criteria. One-fourth of the completely or partially edentulous workers had satisfactory dentures, and 87 dentures were needed. Using modal 1979 dental fees, the mean per capita cost for complete dental treatment was $299. The range of per capita cost was $10 to $1,300 with a median of $170; 10 per cent had costs over $900. The total 1979 cost of dental treatment for 234 workers was $69,575. Examination of the Consumer Price Index indicates that dental fees rose 40.9 per cent between 1979 and 1983.[9] When adjusted for inflation, the 1983 per capita cost was $421 (median was $240) and the total for the workshop was $98,031.

Discussion

These adults in sheltered employment expressed difficulty identifying dentists to provide care for them. Several were concerned about inappropriate referrals to children's dentists. Many fillings had been done prior to deinstitutionalization. Recent tooth decay reflected dietary changes and lack of care since deinstitutionalization. Reports have estimated that 75 per cent of dentists do not accept disabled individuals as patients,[10] and most dental schools offer no training in care for special populations.[11,12] This is unfortunate since community placement for disabled adults places responsibility on local professionals to provide care.

TABLE 5—1979* and 1983 (adjusted for inflation) Costs of Dental Treatment by Procedure**

Procedure	Total Workshop Sample Cost (N = 233) 1979	Total Workshop Sample Cost (N = 233) Adjusted 1983	% Total Cost	Per Capita Mean Cost 1979	Per Capita Mean Cost Adjusted 1983
Restorations (656)	$15,730	$22,164	22.6%	$ 68.	$ 95.
Extractions (297)	7,425	10,462	10.7%	32.	45.
Preventive and Periodontal	12,035	16,957	17.3%	51.	73.
Diagnostic	3,665	5,164	5.3%	16.	22.
Removable Prosthodontic (includes 46 complete dentures, 41 partial dentures, 14 relines)	29,270	41,241	42.1%	126.	177.
Other	1,450	2,043	2.1%	6.	9.
TOTALS	$69,575	$98,031	100%	$299.	$421.

*Based on ADA modal dental fees.
**Calculated with dental fee component of Consumer Price Index.

Sheltered workshops facilitate access to dental services and identify funding for workers with unmet, but manageable dental needs. Our experience revealed that anxiety, shortened attention, or motor limitations were management challenges, but most workers were able to be evaluated quickly and almost all were candidates for non-hospital-based outpatient dental care without general anesthesia. Such treatment is time consuming and demands close attention to behavioral aspects of care.

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Biomedical Applications of Cotinine Quantitation in Smoking Related Research

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Abstract: Two studies were undertaken to assess the variability of cotinine concentrations in different biological fluids and to determine the most desirable fluid to use for specific experimental protocols. For protocols validating smoking cessation, plasma or urinary cotinine determinations provided the most accurate indicators of compliance. In studies where smokers switched from high yield to low yield cigarettes, plasma cotinine determinations were good indicators of smoker behavior. Correct interpretation of smoker status is dependent on the biological fluid selected for cotinine analysis. (*Am J Public Health* 1985; 75:663–665.)

Introduction

Accurate determination of smoker status in smoking cessation programs, in experimental studies and in separating smokers from nonsmokers has, until recently, been difficult and only semi-quantitative. Since information obtained by self-report can be misleading, biochemical validation of smoking status presents a more objective alternative.[1–3] Plasma and saliva thiocyanate (SCN) and blood carboxyhemoglobin (COHb) are subject to dietary or environmental influences that compromise their reliability as indicators of smoker status.[4–6] Cotinine, the long-lived metabolite of nicotine, has been shown to be a reliable indicator of tobacco smoke exposure[1,7] and demonstrates a greater specificity in separating smokers from nonsmokers as well as in evaluating day to day smoking behavior. In the present studies, we compare plasma, saliva, and urinary cotinine values in order to determine the most useful biological fluid to evaluate in a given experimental situation.

Methods

Experiment I: Smoking Cessation

Eight individual smokers were asked to provide saliva and blood samples daily for five days. At day 5, our subjects quit smoking, and plasma as well as saliva samples were collected twice daily for eight days. Twenty-four hour urine collections were begun the day prior to smoking cessation. Blood samples were collected into vacutainers containing EDTA as the anticoagulant; all collected body fluids were frozen and analyzed for cotinine at the same time. Urinary creatinine concentrations were also determined.

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