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THE HEALTH OF NAVAL RECRUITS: PERIODONTAL DISEASES, (U)
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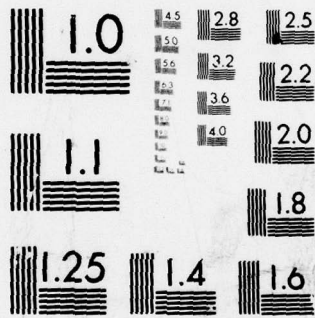
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Naval Medical Research and Development Command
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The Health of Naval Recruits:
Periodontal Diseases

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Periodontal diseases are generally considered to be so prevalent and widespread that studies of occurrence and distribution (epidemiology) must assess severity in order to determine the significance on a public health basis.¹ Epidemiologic studies might assess tooth mortality and its causes, or correlations with age, sex, race, hygienic practices or other habits, or relationship to diet, nutrition and systemic health, or the effects of variables in clinical trials. Studies have related periodontal diseases to socioeconomic factors, but recently there has been interest in the social and economic impact of periodontal disease² -- the dental care costs, emotional and physical strain on people, and the cost of absenteeism from work. The significance of dental and oral diseases in a naval population is related to their impact on the readiness of men and women for sustained operations in performance of the defense mission of the Navy.

The earliest reported studies of United States Navy personnel were concerned with treatment needs and the time required to provide the treatment. Further, it was believed important to determine if there were certain persons who could be identified as requiring more treatment than others, so that operational plans could be made appropriate to the work load. Schlack³ found in a survey of 71,015 naval personnel examined in 1942 that a small percentage of persons tended to have most of the cavities needing to be filled. He found that persons from New England had more filled teeth and more unfilled cavities than those from West South Central states (AR, LA, OK, TX). He concluded that the region of birth was more a determinant of treatment needs than the number of fillings already done. Application of naval dental standards to personnel entering the service in 1941 resulted in the rejection of 7 percent, and so only about 10 percent of the subjects in Schlack's study population needed any teeth extracted. Those persons from New England were assumed to need teeth extracted because of complications arising from dental caries, while those from South Central regions "possibly for periodontosis." No other consideration of periodontal diseases was reported by Schlack.

Massler, Ludwick, and Schour⁴ reported on 4,043 white recruits at Great Lakes, ages 17 to 21, who were predominantly from Central, Northeastern and Southeastern states, during the period 1949 to 1950. The DMF was found to be 11.3, and 66 percent were affected by gingivitis. Using the PMA index, the distribution of gingivitis was 4.05 P gingival units, 1.15 M, and no A units, with a P+M+A mean of 5.2. Of the 66 percent found to have gingivitis, the degree of severity was reported as: very mild 16.5%, mild 16.2%, moderate 15.5%, severe 8.6%, and very severe 8.9%. There was no significant relationship found between the prevalence of DMF and gingivitis in individuals. There was a significant relationship between dental caries experience and region, and again the Northeastern area had the highest prevalence. No geographic relationship was found for gingivitis. The community size of the subject's residence had no apparent relationship to dental caries or gingivitis. The ages were so close together that there was no significant effect shown on dental diseases.⁵ They also found no relationship between smoking and gingivitis.

Cross⁷ reported on the crew of a heavy cruiser, which had a cross-section of ages and ranks of personnel. Of the 1570 officers and enlisted men, those with less than 12 months of service (primarily recent recruits) had the largest number of surfaces to be restored. Sixty men (4%) required

the intervention of a dentist because of an acute soft tissue condition or a condition of extreme bone loss. Cross determined that gingival disease was related to oral hygiene. Those with mild gingivitis (15 to 25%) he believed could be made healthy by the individual's own effort to remove food film and debris on the teeth. He concluded that regular naval personnel with over four years of service had a better general dental condition than reserves recently recalled to active duty.

A survey of military women (WAVES) at Great Lakes⁸ reported that only about 15% were free of gingivitis. The mean scores found were P 8.47, M 9.64, A 0.02 and mean P+M+A was 18.29. There was no relationship found between their DMF and PMA.

Hellman, Ludwick, and Oesterling⁹ reported on dental needs and treatment of all Navy and Marine Corps recruits in 1956. There were 90.3% who needed fillings, 31.0% needed extractions, 6.8% needed some form of periodontal or gingival treatment, and 5.3% needed an essential prosthetic appliance. Recruits received about 5.1 periodontal treatments per 100 men. Navy-wide, 482,473 periodontal treatments were provided to personnel on active duty. The authors discussed the loss of dental standards in 1941, when dental officer strength was based on 2 per 1000 for the purpose of health maintenance, and how the lack of standards for enlistment created a situation whereby the total needs of personnel on active duty could not be met.

In a study of the effect of unsupervised toothbrushing on 154 naval recruits at Great Lakes¹⁰ the gingival health was found to be worse than previously reported in 1950.⁴ In 1954 the mean scores were P 6.0, M 3.3, A 1.3, and P+M+A 10.6. The authors ascribed the increase to lowered dental health standards for enlistment. There were 21% with no gingivitis, 45.4% with mild gingivitis, 29.2% moderate, and 3.8% severe gingivitis. They reported that only 11.8% of their subjects showed any significant improvement in their hygiene. The PMA of the group indicated no significant gingival improvement after 15 weeks.

Rovelstad, et al.,¹¹ studied the condition of 2027 naval recruits at Bainbridge, MD in 1956. The group studied was about a 13% random sample of new recruits in a six month period. Most subjects were from the Middle Atlantic region (PA, NJ, NY), and only 7.5% were high school graduates. Half the group claimed to have sought regular dental treatment, while one-fifth stated they never or hardly ever went to a dentist. Rovelstad found a DMFT of 13.6, with one-sixth having a DMFT over 20. The oral hygiene evaluation was 17.1% "poor" and 46.6% "excellent," with the rest given as "fair." The distribution of gingivitis was 20.8% none, 32% possible, 24.5% probable, 16% moderate, and 6.5% severe. The authors concluded the dental health of new recruits was deplorable.

Davies, et al.¹² surveyed 1209 young Navy enlisted men reporting for electronics school at Treasure Island (San Francisco). Using periodontal indices, and a detailed examination of every tenth subject, they allotted the men into four treatment classes. Class I (78.2%) were free of gingivitis and needed only a prophylaxis and hygiene instruction by auxiliary personnel, Class II (14.5%) had mild periodontal disease within the treatment capability of a general Dental Officer, Class III (6.4%) had moderate to severe

periodontal disease needing the services of a periodontal specialist, and Class IV (0.7%) were edentulous from or had non-manageable periodontal disease. There was no significant finding in regard to geographic origin. The authors concluded that there were a larger number of patients per capita with advanced periodontal disease than had been previously recognized, and that the disease started at a much younger age than was generally believed. They recommended a greater emphasis in periodontal training of the general practitioner.

Pridgeon¹³ described the developing programs in the Navy for training in periodontics. Though the programs were slow to get started, they were being driven by the overwhelming number of dental defects in naval recruits.

A survey of dental conditions in 2118 recruits at Great Lakes in 1966, similar to the previous study at Bainbridge, was conducted by Rovelstad.¹⁴ The DMFT was found to be 12.3, with the slight improvement in average caries experience (compared to 1956) due to fewer missing and decayed teeth. Oral hygiene was scored as good = 1, fair = 2, and poor = 3. The mean values for the group were 1.3. Scores were higher for those who did not brush, those who complained of bleeding gums and bad breath, and those who were from broken homes. Gingivitis was scored 0 to 4 for each of the ten anterior interdental papillae (0-40 range). There was a trend to lower scores when the parents were more educated, and for those who had a history of frequent dental visits. Subjects who didn't brush had a mean index of 23.9; brushing 1 x day, 18.0; 2 x day, 16.0; 3 x day, 16.3; and 4 x day, 14.9. The mean for all 2118 subjects was 17.5. Subjects with broken homes had a tendency to higher scores. Unfortunately, we have no analysis of the significance of the findings.

Shiller¹⁵ described the dental status of 298 men, a random sample of those reporting for submarine school at New London. Since they had received special attention for dental care during recruit training, they had few unfilled decayed teeth. Their Periodontal Index was 0.13. Shiller stated he had previously surveyed recruits and found a PI of 0.34. The Oral Hygiene Index was 1.779, while that of recruits had been 2.53. There was a significant relationship of hygiene with periodontal health. Besides the special dental care these men received, Shiller believed that their intelligence, educational level and learning ability might account for a better level of dental health.

Keene¹⁶ reviewed previous studies on recruits, and related he had found a DMFT of 11.2 during 1970-72. The prevalence of caries-free recruits was seen to be slowly rising and related to public water fluoridation. Periodontal diseases were not discussed.

Stepnick¹⁷ examined 477 naval recruits at San Diego. He reported that 20% had good oral hygiene, 46% fair, and 34% poor oral hygiene. Their means for OHI-S were 1.3 ± 0.6 (S.D.), DI-S 1.2 ± 0.5 and CI-S 0.2 ± 0.2 . These correlated well ($r = +0.50$, $p = 0.001$) with a PDI of 1.1 ± 0.8 . Periodontal disease was present in approximately 75% of the recruits examined. Their DMFT was 11.4, and did not have strong correlations with oral hygiene or periodontal disease. Stepnick concluded, as have all previous studies on naval recruits, that they have a high level of oral disease, including periodontal disease.

The Navy Periodontal Screening Examination was instituted in the naval service in 1969, and it was described in the literature by Grossman and Fedi in 1974.¹⁸ Elliott and Bowers¹⁹ used modifications of the Navy Periodontal Disease Index (NPDI) and Navy Plaque Index (NPI) in studies of oral physiotherapy at the U. S. Naval Academy. Although the standard NPDI and NPI were in common use in the Navy, the first investigation which used them was published in 1977.²⁰ That report found periodontal disease present in 98% of young enlisted men reporting for dental sick call. The correlation between the NPDI and NPI was $r = +0.55$, $p = 0.01$, while the gingival portion of the NPDI and the NPI had a correlation of $+0.75$, $p = 0.01$.

The purpose of this survey was to determine the present dental health status of the naval recruit which might be used to determine priorities of care, manpower development, and to establish or expand preventive and treatment services.

Methods and Materials

Naval recruits have always been volunteers for military service, thus this report presents data on a highly selected population. The naval recruits surveyed reported for training at the Naval Training Center, Great Lakes, Illinois from September 1975 to August 1978. Recruits were organized into companies of about 70 to 80 men as they arrived. One company a week was selected, and by a table of random numbers five subjects were selected for dental examination. In addition, ten subjects with the potential to attend a military specialty training school at Great Lakes following recruit training were selected for examination each week. All subjects were men, ages 17 to 27 years. Information on their city and state of residence, and whether they were a high school graduate were obtained.

On their third day, before any dental procedures, they received a dental and oral examination. Examiners used dental chairs and dental operating lights, dental mirrors, No. 23 dental explorers, and periodontal probes with Williams markings.* Gauze sponges and compressed air were used to dry tissue, as necessary. Dental posterior bite-wing X-rays, and panoramic and periapical X-rays, as indicated, were taken on each subject. The teeth were numbered from 1 to 16 in the upper arch, starting with the right third molar, and from 17 to 32 in the lower arch, ending with the right third molar. Findings for dental caries, missing teeth, restorations, periodontal diseases, mucosal lesions, plaque and calculus deposits were dictated to assistants and recorded on forms for each subject.

During the first year of the survey, all periodontal findings were observed by one examiner (MRW). An additional examiner (EBH) was then given theoretical and practical training until examination findings showed over 80% inter-examiner comparability. During the course of the survey, subjects were returned to the examiners in a blind order for repeat examinations to assess intra-examiner consistency.

*PW, Hu-Friedy, Chicago, IL 60618

The first portion of the examination was a diagnostic opinion of periodontal conditions, ordered into a hierarchy from healthy gingivae to generalized chronic periodontitis. Steps in this ordinal ranking were on the basis of inflammatory changes limited to interdental gingival papillae, to involvement of marginal tissues,* and finally into attached gingivae with periodontal pockets formed.** Also, determination was made as to a localized or generalized distribution of the periodontal condition. If any one dento-gingival area was involved in a segment, that segment was considered to be involved. All six dental segments had to be involved, both on facial and lingual aspects, for the determination of generalized involvement. Additional diagnoses were recorded, when present, for necrotizing gingivitis,*** primary herpetic gingivostomatitis,**** pericoronitis about third molars,† periodontosis-like bony destruction,†† and aphthous stomatitis.††† Limited examination and partial recording were done for the six teeth assessed by the NPDI (Figure 1) and NPI. The periodontal probe was used while examining for the presence or absence of calculus (supragingival[†] or subgingival[†]) on the four axial surfaces of the same six teeth examined for the NPDI. This was a modification of the Calculus Surface Index (CSI).²¹ The subjects then rinsed for five seconds with one mouthful of clear water, expectorated, then rinsed with a solution of two teaspoons (10 ml) of water and 0.5 ml erythrosine concentrate‡ for ten seconds. The NPI was done according to its criteria (Figure 2). When plaque at the gingival margin extended coronally more than one millimeter, it was scored as both G and R.

After consultation with clinicians at the clinics treating recruits, periodontal treatment need case-types were contrived as follows: Case-Type I when the NPDI score for worst tooth = 0 to 2, CSI = 0, and plaque control instruction (PCI) required; Case-Type II when NPDI score = 0 to 2, CSI \geq 1, and PCI and oral prophylaxis (PRO) required; Case-Type III when NPDI = 5 to 7, CSI \geq 1, and PCI, PRO, and periodontal scaling (Pdt Scl) required; Case Type IV when NPDI score = 8 to 10, CSI \geq 1, and PCI, Pdt Scl, PRO, surgical and post-operative care were required. From the examination data, a treatment plan was made for each subject who might attend service school at Great Lakes. The rules for formulation of the treatment plan were verified with senior clinicians at the recruit dental treatment clinic, and each subject's treatment plan was confirmed by two examiners. Subjects who completed service school were re-examined as previously described. Their dental health record was then abstracted to determine what dental procedures and services had been accomplished, and a new treatment plan was made.

The data recorded on the forms was punched into cards and processed on computers with the use of the Statistical Package for Social Sciences.^o All procedures involving the subjects were reviewed annually and approved by a committee for the protection of human subjects.

*ICD-DA No. 523.10, WHO Geneva, 1973.
**ICD-DA No. 523.41
***ICD-DA No. 101.X0.
****ICD-DA No. 054.X1.

†ICD-DA No. 523.42.
††ICD-DA No. 523.5X.
†††ICD-DA No. 528.20.
+ICD-DA No. 523.64.
++ICD-DA No. 523.65.

‡Trace dental disclosing solution, The Lorvic Corp., St. Louis, MO.
^oMcGraw-Hill, Inc., New York, N. Y.

Results

The sampling methods allowed the selection of 1186 subjects. About 0.4% of all recruits were represented by the 433 men in the random sample. The rest were those selected for service school after basic training. The random sample had a mean age of 19.0 ± 2.5 (S.D.) years, and 73.5% were high school graduates or had a GED equivalent. Their residence was a farm for 1.9%, a city with over 50,000 persons for 37.5%, and 60.6% were from towns and villages (<50,000). The service school group had no significant difference for age or residence, but they had 87.7% high school graduates. The DMFT was 10.9 ± 5.4 in the random group. The service school group had statistically the same DMFT, but significantly ($p = 0.02$) fewer decayed teeth (Random 6.5 ± 4.4 , Service School 5.9 ± 4.5).

The periodontal disease status of naval recruits is presented in Table 1. There were statistically significant differences for the NPDI total score, primarily because of lower mean score for the pocket portion of the index in the Service School group. That group had a significantly lower CSI mean than the random, and the distribution of clinical diagnoses was also different, but none of the differences were significant on a clinical basis. That is, there would be no major difference in planning clinic operations for either group as shown in the distribution of Case-Type.

The overall percent reliability based on intra-examiner diagnostic discrepancies between original and repeat examinations was found to be: NPDI gingival score 90%, pocket score 91%, NPI 95%, CSI 91%, and clinical diagnosis 99%.

The subjects were ranked by their clinical diagnosis and the indices, and rank correlations determined (Table 2). The NPDI increased in relation to increasing severity of diagnostic opinion and so it is thought to have validity for a recruit population. In evaluating the Navy Periodontal Screening Examination as an index for treatment needs we constructed Case Types according to recommendations of the NPDI but dividing those with NPDI Scores of 0 to 2 into two groups according to the absence or presence of calculus. Table 3 presents the relationships and shows that the NPDI serves to determine treatment needs.

It should be noted that there were no subjects with healthy gingivae. The prevalence of periodontal diseases was 100%. In the randomly-selected group 82% of the subjects had at least one pocket for the six teeth examined, and 5.6% had pockets on all six teeth. The distribution of pocket scores and gingival scores is presented in Table 4. The data indicated that gingival inflammation was found at almost every site examined and that it encircled nearly 90% of the teeth. The pockets were primarily 3 to 5 mm gingival pockets associated with premolars and molars. Only one subject had an apparent "periodontosis."

An indication of the oral hygiene of naval recruits is presented in Table 5. Their plaque scores were high and from the distribution of positive findings of dental bacterial plaque in the specific geographical sites of the NPI it appeared that the subjects performed no daily cleansing

between their teeth or at the gingival margins. This probably accounted for the high levels of inflammation, pocket formation and calculus. Over 98% of the subjects had calculus deposits.

There were very few subjects seen with acute conditions such as necrotizing gingivitis, primary herpetic gingivostomatitis or aphthous ulcers. The prevalence of each was less than 1%. Although many had slight inflammation about erupting wisdom teeth, only 2% were considered to have a frank acute pericoronitis requiring treatment.

The ages in the recruit population were tightly clustered in the 17 to 22 year range and age was not found to have strong correlations with the disease variables. Statistically significant ($p < 0.05$) correlations with age were a +0.10 with pocket total score, a +0.11 with NPDI total score, and +0.18 with CSI. The distribution of periodontal clinical diagnoses by age was statistically significant ($p < 0.01$) by the Chi square analysis for the random group, but the same finding did not occur for Case-Type.

There were no significant relationships of residence with any periodontal disease variable. Residence had no significant relationship to having a high school diploma for this population. In general, there was no significant relationship of having a high school diploma to any periodontal disease variable.

There were seasonal variations in the number of recruits reporting to Great Lakes. In the period March to June the population on board was 3000 to 4000, while in July to October there were about 7000 men. The peak period also occurred when there were more high school graduates entering the Navy at Great Lakes, Table 6. There were slight changes in the NPDI and CSI with the time of the year.

Criteria for formulating treatment plans specific for dentistry in the naval recruit setting were applied to all subjects selected for service school. The summary of treatment needs is presented in Table 7, using the categories of service used for reporting productivity in naval dental clinics. Results are projected to the third decimal point for each item so that one can estimate the number of treatments per thousand recruits. The standard routine for the clinic operations was that subjects should get two stannous fluoride treatments and three group plaque control training sessions during their first six months in the Navy. Although the men received about 40% of their overall treatment requirements, only 16% had a needed prophylaxis and less than 10% of the periodontal scaling was accomplished.

There were positive and statistically significant correlations between all the periodontal indices of the recruits at entry to the Navy. The strength of the correlations was low, being less than +0.5 for most associations. This could not be due to few subjects, as there were over one thousand, but may have been influenced by skewed distributions of findings. Most recruits had a gingival score of 11 or 12, at the end of the scale, as an example. Since we used the NPDI score to assign subjects to Case-Types

and construct treatment plans, the correlation of the NPDI Score to the initial projected treatment in periodontics was +0.6, $p = 0.001$. Most of the periodontal indices had no correlation with initial dental caries variables or with caries attack rates. No significant association has been found yet between periodontal variables and AFQTS or the recruiter's Screen Score. At this time in the epidemiological survey of the periodontal health of naval recruits, the NPDI Score is the best determination of those who need periodontal treatment and it distinguishes the level of therapy required. Based on work measurement figures²² the estimate of time to complete periodontics and oral hygiene procedures, including plaque control instruction, per recruit is 76 minutes. Based on VA fee schedules, this projects to \$86.80 per man for the value of services required. At Great Lakes only 26 minutes are devoted to the care of the average recruit for periodontal and plaque control instruction procedures.

Discussion

The significance of these epidemiological findings in naval recruits lies in their impact on treatment requirements and the ability to manage the disease in the population so that readiness of military forces can be improved. Periodontal diseases were found in every naval recruit at Great Lakes. About 22% of the periodontal treatment needs could be performed by dental auxiliaries. The remainder would require the services of a Dental Officer. The large number of recruits (over 80%) with pockets to be treated showed a magnitude never before reported even though previous studies have documented the problem. The periodontal diseases were associated with low levels of oral hygiene. Especially important seemed to be the almost non-existent interdental cleansing practiced by these men.

The Navy Periodontal Disease Index has been found to be a valid and reliable index in this recruit population. The NPDI Score determined the level of therapist required and the extent of treatment to be planned. Current clinical operations emphasize the treatment of dental caries and rely primarily on plaque control instruction for gingival health maintenance. Only the severest of periodontal cases get treated by a Dental Officer. Clinical procedures very carefully discriminate and record dental caries and its relationship to the pulp and to the dentinoenamel junction. Gingival disease, however, is overlooked. There should be an attempt for early detection and treatment of incipient disease, a benchmark recording of conditions entered in the recruits' health records and the recruits informed of their condition. Plaque control instructions would have to be very effective, indeed, to maintain an essentially untreated population. If the periodontal treatment requirements are more than recruit clinics have professional staff with which to cope, then it appears very important to conduct research studies into alternative modes of therapy and prevention in order to achieve readiness of naval personnel for the defense mission of the Navy.

Summary

The present population of naval recruits at Great Lakes has a universal prevalence of chronic inflammatory periodontal disease. The public health significance of this finding is denoted by the fact that four out of five need periodontal pocket therapy by a dentist. In this young age group there are few who would need surgical repair of deformities, therefore, the periodontal treatment of the population could be managed by general Dental Officers, dental hygienists, and Navy Dental Technicians.

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Table 1

Periodontal Disease Status of Naval Recruits at Great Lakes

	Random N=433	Service School N=753
Navy Periodontal Disease Index (NPDI)		
Gingival Total (0-12 scale)	11.3 \pm 1.4*	11.2 \pm 1.4
Pocket Total (0-48 scale)	8.5 \pm 7.2	7.3 \pm 6.5**
Score for "worst" tooth (0-10 scale)	6.1 \pm 2.1	5.9 \pm 2.2
Total for all six teeth (0-60 scale)	19.8 \pm 7.7	18.5 \pm 7.0**
Navy Plaque Index (NPI)		
Score for "worst" tooth (0-18 scale)	16.8 \pm 1.3	16.6 \pm 1.3**
Total for all six teeth (0-108 scale)	86.2 \pm 11.4	85.7 \pm 10.7
Calculus Surface Index		
Total for all six teeth (0-24 scale)	8.8 \pm 5.1	7.9 \pm 4.6**
Distribution of Diagnoses**		
Generalized chronic periodontitis	0.2%	0.3%
Gingivitis with localized periodontitis	7.2	4.1
Generalized chronic marginal gingivitis	66.7	65.2
Localized chronic gingivitis	25.4	30.1
Generalized chronic papillary gingivitis	0.0	0.3
Localized chronic papillary gingivitis	0.5	0.0
Healthy gingivae	0.0	0.0
Treatment Needs		
Case Type IV (PCI, PRO, Pdt Scl, Gvcty, POT)	3.5%	3.2%
Case Type III (PCI, PRO, Pdt Scl)	77.9	74.4
Case Type II (PCI, PRO)	18.6	21.7
Case Type I (PCI)	0.0	0.7

*Mean \pm S.D.

**p < 0.05

Table 2

Relationships of Clinical Diagnostic Opinion and Navy Periodontal Screening Examination in Naval Recruits at Great Lakes, 1976-1978

Clinical Diagnosis	Number of Subjects	G* Total	P* Total	NPDI* Score/Total	NPI* Score/Total	CSI*
Generalized Chronic Periodontitis	3	12	35	10/47	18/92	18
Gingivitis with Localized Periodontitis	62	12	16	8/27	17/90	13
Generalized Chronic Marginal Gingivitis	764	12	8	6/20	17/88	9
Localized Chronic Marginal Gingivitis	334	10	5	5/15	16/82	7
Generalized Chronic Papillary Gingivitis	2	6	9	8/15	14/55	5
Localized Chronic Papillary Gingivitis	2	9	5	4/14	17/82	4
Healthy Gingivae	0	0	0	0	0	0
Summary	1167	11	8	6/19	17/86	8

*Average, nearest whole number

Rank Correlation with
 Diagnosis +0.753 +0.306 +0.470 +0.259 +0.257

All relationships are significant, statistically.

Table 3

Relationships of Treatment Needs and Navy Periodontal Screening Examination in Naval Recruits at Great Lakes, 1976-1978

Treatment Needs	Number of Subjects	G* Total	P* Total	NPDI* Score/Total	NPI* Score/Total	CSI*
Case Type IV	10	12	21	10/32	17/88	12
Case Type III	258	11	9	7/20	17/86	8
Case Type II	82	11	0	2/11	17/86	7
Case Type I	3	11	0	2/11	16/74	0
Summary		11	7	6/18	17/86	8

*Average, nearest whole number.

Rank Correlation with Case Type +0.180 +0.741 +0.711 +0.117 +0.234

All relationships are significant, statistically.

Table 4

Percent Distribution of Gingival Inflammation and Pockets in a Group of Random-Selected Naval Recruits. Scores from the Navy Periodontal Disease Index

Tooth Number	Gingival Scores			Pocket Scores		
	0's	1's	2's	0's	5's	8's
3	0	13.3%	86.7%	64.0%	34.9%	1.1%
9	0.5%	23.7	75.7	88.0	11.5	0.5
12	0	14.4	85.6	72.0	27.5	0.5
19	0	5.1	94.9	27.5	70.1	2.4
25	0	5.9	94.1	93.3	6.7	0
28	0	7.7	92.3	86.9	12.8	0.3

Table 5

Percent Distribution of Plaque in a Group of
Randomly-Selected Naval Recruits

Tooth Number	Facial				Lingual			
	M	G	D	R	M	G	D	R
3	93%	71%	99%	59%	99%	52%	100%	30%
9	84	38	89	18	97	40	99	43
12	83	40	93	17	96	27	99	1
19	96	60	99	34	98	93	100	21
25	95	53	96	15	99	93	99	60
28	89	39	97	10	100	92	100	25

M = mesial, G = gingival, D = distal, R = remainder

Table 6

Seasonal Variation in Status of Naval Recruits at Great Lakes

Variable	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
High School Graduate*	79%	80%	89%	83%
DMFT	10.9	10.1	10.8	11.2
NPDI*	17.9	19.6	19.1	19.1
CSI*	8.1	8.2	7.3	9.0

*Significant, $p < 0.05$

Table 7

Periodontics and Oral Hygiene Procedures, Needs and Accomplishments
 from the Beginning of Recruit Training to Graduation from
 Service School, Average Per Man

Procedure	Initial Projected Treatment	Services Accomplished	Treatment Yet To Be Done
Equilibration	0	.014	0
Gingivectomy	.031	.014	.017
Gingivitis or stomatitis Treatment	.010	.031	.003
Prophylaxis	.995	.163	.980
Scaling (Periodontal)	.811	.070	.700
Plaque Control Instruction	4.871	2.439	1.717
Total	6.718	2.731	3.417

PART I - NAVY PERIODONTAL DISEASE INDEX

INSTRUCTION

For each tooth examined, record score on the adjacent chart as follows:

- Obtain** GINGIVAL SCORE and enter figure in gingival score column.
- Obtain** POCKET SCORE and enter figure in pocket score column.
- Add** GINGIVAL SCORE to POCKET SCORE and enter sum in TOOTH SCORE column.

To amend chart: If the tooth designated on the chart is missing, strike through indicated number and insert substituted tooth number beside it. If 3, 12, 19, or 28 is missing, substitute the next most posterior tooth. If 9 or 25 is missing, substitute the nearest incisor in the arch; or where all incisors are missing from the arch, substitute a cuspid.

To determine GINGIVAL and/or POCKET score:

- Gingival Score** (Dry tissues around tooth before scoring)
- 0** Gingival tissue is normal in color and tightly adapted to the tooth—tissue is firm and no exudate is present.
 - 1** Inflammatory changes are present, but do not completely encircle the tooth. Changes may include one or a combination of the following:
 Any change from normal gingival color
 Loss of normal density and consistency
 Slight enlargement or blunting of the papilla or gingiva
 Tendency to bleed upon palpation or probing
 - 2** Inflammatory changes listed above completely encircle the tooth.
- Pocket Score** With calibrated periodontal probe take six measurements of each designated tooth—mesial, middle, and distal areas of the facial and lingual surfaces. The greatest single measurement determines the Pocket Score for the tooth.
- 0** Probing reveals sulcular depth not over 3 mm.
 - 5** Probing reveals pocket depth greater than 3 mm. but not over 5 mm.
 - 8** Probing reveals pocket depth greater than 5 mm.

DIAGNOSTIC AND TREATMENT RECOMMENDATIONS:

NPDI SCORE of 0 to 2: Oral prophylaxis, cariostatic agents, plaque control instruction.

NPDI SCORE of 5 to 7: Complete oral examination, periodontal treatment, cariostatic agents, plaque control instruction by general practitioner.

NPDI SCORE of 8 to 10: Complete oral examination, periodontal treatment initiated by general practitioner, with possible referral to periodontist.

TOOTH NO.	GINGIVAL SCORE	POCKET SCORE	TOOTH SCORE
3			
9			
12			
19			
25			
28			

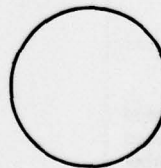
TOTAL SCORE FOR ALL TEETH _____

CLINICAL DIAGNOSIS:

- HG= healthy gingivae
- LPG= loc. pap. gvtis.
- GPG= gen. pap. gvtis.
- IMG= loc. marg. gvtis.
- GMG= gen. marg. gvtis.
- LAG= loc. pdtis.
- GAG= gen. pdtis.
- NUG
- PRGS
- PECOR
- PDTOSIS

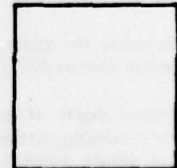
NPDI SCORE

Record in circle highest score for any one tooth.



NPDI TOTAL

Record in square total score for all teeth.



PLACE OF EXAMINATION	EXAMINER			DATE
PATIENT'S LAST NAME, FIRST, MIDDLE	GRADE/RATE	SSN	SEX	AGE

Figure 1.

PART II - NAVY PLAQUE INDEX

Diagram of surface areas:
M—mesial; *G*—gingival; *D*—
 distal; and *R*—remaining

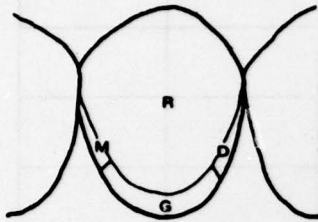


CHART FOR RECORDING PLAQUE FORMATION

TOOTH NO.	FACIAL				LINGUAL				TOOTH SCORE
	M	G	D	R	M	G	D	R	
3	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0
9	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0
12	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0
19	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0
25	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0
28	M 3	G 2	D 3	R 1	M 3	G 2	D 3	R 1	0

INSTRUCTION

For each tooth examined, record score on adjacent chart as follows:

Circle **(M)**
3

If you find plaque in contact with gingival tissue on *mesial* proximal surface.

Circle **(G)**
2

If you find plaque in contact with gingival tissue on *facial* or *lingual* surface.

Circle **(D)**
3

If you find plaque in contact with gingival tissue on *distal* proximal surface.

Circle **(R)**
1

If you find plaque on *facial* or *lingual* surface that is not in contact with gingival tissue.

Add

Encircled numbers for each tooth, and record in **TOOTH SCORE** column.

Enter

Highest score for any *one* tooth in **NPI SCORE** circle.

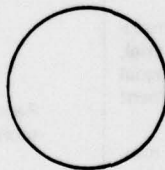
To complete the chart, total score for all teeth, and enter sum in **NPI TOTAL** square.

To amend chart: If the tooth designated on the chart is missing, strike through indicated number and insert substitute tooth number beside it. If 3, 12, 19, or 28 is missing, substitute the next most posterior tooth. If 9 or 25 is missing, substitute the nearest incisor in the arch, or where all incisors are missing from the arch, substitute a cuspid.

TOTAL SCORE FOR ALL TEETH

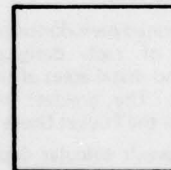
NPI SCORE

Record in circle highest score for any one tooth.



NPI TOTAL

Record in square total score for all teeth.



CALCULUS SURFACE INDEX:

3	M	F	D	L	_____
9	M	F	D	L	_____
12	M	F	D	L	_____
19	M	F	D	L	_____
25	M	F	D	L	_____
28	M	F	D	L	_____
TOTAL					_____

PLACE OF EXAMINATION

EXAMINER

DATE

PATIENT'S LAST NAME, FIRST, MIDDLE

GRADE/RATE SSN

SEX

AGE

NAVMED 6800/4 (Back)

Figure 2.

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Naval recruits Epidemiology Periodontal diseases Treatment needs		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Past surveys of naval recruits and enlisted men have found a deplorable state of oral and dental health, with a larger number of persons having advanced periodontal disease than had been previously recognized. Also, the disease starts at a much younger age than was generally believed. This report of a three-year survey found the prevalence of chronic inflammatory periodontal disease to be 100 percent. It is associated with poor oral hygiene, especially noted was the lack of interdental cleansing by the subjects. Only six teeth were examined in the screening method used, and		

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four out of five subjects had pockets needing treatment by a Dental Officer. Thus, this report may underestimate the true prevalence and severity.

Preventive dentistry measures of early detection, benchmark recording of conditions found in the recruits' health records, informing the recruits of their condition, and early treatment are recommended. The Navy Periodontal Disease Index is a valid and reliable index in this population and has treatment needs significance. Because of the overwhelming treatment needs, research studies into therapy and prevention are needed in order to achieve readiness of naval personnel for the defense mission of the Navy.

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