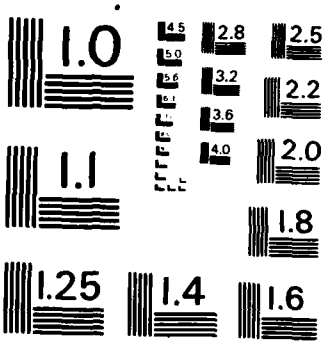
AD-A160 936 KNEE INJURIES AND DISABILITY AMONG ENLISTED MALES IN THE US NAVY(U) NAVAL HEALTH RESEARCH CENTER SAN DIEGO CA J C HELMKAMP ET AL. MAY 85 NAVHLTHRSCHC-85-17 1/1

UNCLASSIFIED F/G 6/5 NL



KNEE INJURIES AND DISABILITY AMONG ENLISTED MALES IN THE U. S. NAVY

J. C. HELMKAMP
P. A. COBEN

REPORT NO. 85-17

NAVAL HEALTH RESEARCH CENTER
P.O. BOX 85122
SAN DIEGO, CALIFORNIA 92138-9174

NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND
BETHESDA, MARYLAND

KNEE INJURIES AND DISABILITY AMONG ENLISTED MALES IN THE U.S. NAVY

LCDR James C. Helmkamp, MSC, USN

and

Patricia A. Coben

Environmental Medicine Department

Naval Health Research Center

P. O. Box 85122

San Diego, California 92138-9174

Report No. 85-17 was supported by the Naval Medical Research and Development Command, (Department of the Navy) Bethesda, Maryland, under research Work Unit MF58.524.001-0007. The views presented in this paper are those of the authors. No endorsement by the Department of the Navy has been given or should be inferred.

SUMMARY

Problem

This epidemiologic investigation was undertaken in response to an inquiry from the Commanding Officer, Naval Hospital, Oakland, California. It was requested that the Naval Health Research Center examine the relationship between knee injuries and subsequent diseases of the knee resulting in physical disability among Navy and Marine Corps personnel.

Objective

The objective of this study was to determine the relative incidence of knee injuries among Navy enlisted personnel that resulted in hospitalizations, Medical Boards, and/or Physical Evaluation Boards.

Approach

Medical history and service history files for all enlisted personnel entering the Navy in CY 1974 formed the data base. Subjects experiencing a first hospitalization for any of six diseases or conditions of the musculoskeletal system involving the knee joint were identified. Relative incidence rates were estimated for each knee diagnosis and comparisons were made to determine if the relative incidence of various knee injury conditions changed with age, length of service, or pay grade.

Results

Dislocated knees (35.2%), other knee derangements (30.8%), and Chondromalacia (19.9%) were the most common knee diagnoses among the 1974 cohort. Estimated annual age- (length-of-service- and pay grade) specific incidence rates were calculated and were highest for these three diagnoses. Of the 989 men who were admitted with one of the six diagnoses, 48% later had a Medical Board and 31% a Physical Evaluation Board. Varying rates of disability were awarded.

Conclusions

Results of this study may be helpful in developing methods to decrease the incidence of knee disability and time loss in the active duty population.

INTRODUCTION

This preliminary epidemiological study was conducted to investigate the relative incidence of knee injuries among Navy enlisted personnel that have resulted in hospitalizations, Medical Boards and/or Physical Evaluation Boards. The population used was the 1974 cohort of all enlisted accessions, which was followed through 1979. Medical data for the years 1980 and 1981 also were available and were used to provide rough estimates of annual knee injury incidence for the total Navy.

METHODS

Procedure

The data base was comprised of the service history and medical history files for all enlisted personnel entering the Navy in calendar year 1974 (N = 93,728). Subjects with the following specific knee diagnoses were identified from the medical history files:

ICDA-8 Code	Description
724.5	Other knee derangement
729.6	Loose body in knee
729.7	Chondromalacia of knee
729.9	Other diseases of knee
822.0, 822.1	Fracture of patella
836.0, 836.1, 836.9	Dislocation of knee

The first hospitalization for any of these diagnoses was chosen. This eliminated multiple records for the same individual. Inpatient records were then matched against the service history file in order to extract demographic and enlisted history characteristics of these subjects.

Similarly, Medical Board (MED BD) records were matched against medical and service history records. Because there was a possibility of more than one MED BD per person, inpatient and MED BD dates were compared and the first MED BD after the inpatient hospitalization was chosen whether or not the MED BD diagnosis was for a knee problem.

Finally, Physical Evaluation Board (PEB) records were matched against the medical history/-service history/MED BD file, and these four types of records (hospitalization, service history, MED BD, and PEB) then were combined into one data file.

Data Analysis

Females accounted for less than 4 percent of the knee related hospitalizations, so data analyses were limited to males (N = 989). Univariate distributions were compared among the six diagnostic categories. Bivariate comparisons were made for age, length-of-service at the time of hospitalization, and pay grade for each knee diagnosis. Variable-specific (age, length-of-service, pay grade) annual incidence (hospitalization) rates, per 100,000, were estimated for each knee diagnosis. The total male enlisted population (N = 87,166) at the beginning of the study interval was the denominator used in the calculation of these rates. Ninety-five percent confidence intervals were calculated to determine if there were any significant differences among the rates.

Univariate frequency distributions, for the six knee diagnoses, were also compared among men in Cohort 74 who had a MED BD or PEB. For men who had a MED BD, a comparison of individual dispositions was made. Similarly, for men who had a PEB, a comparison of percent disability ratings was made.

Comparisons were then made to determine if any specific variables could predict hospitalization in the given diagnostic categories.

Finally, the collective annual incidence rate for the six knee diagnoses among all enlisted personnel were compared for 1980 and 1981.

RESULTS

The data in Figure 1 show the hospitalization, MED BD, and PEB status among male enlisted personnel from the 1974 Cohort who had been diagnosed with at least one of the six knee injury categories.

Dislocated knees (35.2%), other knee derangements (30.8%), and Chondromalacia (19.9) were the most common knee diagnoses identified in this cohort of men, as shown in Table 1.

Tables 2 through 4 and Figures 2 through 4 present estimated annual age-(length-of-service and pay grade) specific incidence rates for the knee disorders. Incidence was highest, in rank order from high to low, for dislocated knees, other knee derangements and Chondromalacia in all four age groups (Table 2, Figure 2). The 20-21 year age group had significantly higher rates for both dislocated knees and other knee derangements compared to the two older age groups. The incidence rates in the other knee injury categories were similar across all age groups.

Data in Table 3 and Figure 3 show that the relative incidence of dislocated knee was highest in those men who had served in the Navy more than 2 years at the time of hospitalization. Other knee derangements accounted for the second highest incidence at all length-of-service (LOS) intervals. Chondromalacia was the most common knee disorder among men who had served two years or less at the time of hospitalization. It is interesting to note that the highest relative incidence in all six knee disorder categories occurred within the four-to-six year length-of-service interval.

The results in Table 4 and Figure 4 indicate a wider variation in pay grade-specific incidence. Dislocated knees were most common in E2s and E4s and above, while Chondromalacia and other knee derangements were the most common knee disorders in pay grades E1 and E3, respectively. With the exception of Chondromalacia, the highest incidence of the other knee disorders occurred in the E3 pay grade. Officers (E3-4) had significantly higher rates for other knee derangements and dislocations compared to pay grades E1 and E5.

Chondromalacia was the most common knee diagnosis (39.2%) among the men in this cohort who received a Medical Board. Other knee derangements and dislocated knees each accounted for nearly one quarter of the knee related MED BDs--24.5% and 22.0%, respectively (Table 5). Table 6 provides a summary of the individual disposition of the 286 MED BDs. There was generally equal distribution of men referred to a PEB, discharged due to enlistment error, and returned to full or limited duty.

Of the 194 men who received a PEB for any one of the six major knee diagnoses, nearly half were for Chondromalacia (49.5%) and an additional 22% for other knee derangements (Table 7). The data in Table 8 show that more than 19% of the PEBs received no disability or had missing or incomplete data in their medical history files. More than three quarters of those men who rated a disability received between 10 and 20%. No one received in excess of 40%.

No single variable was found to be an independently significant predictor of knee related hospitalizations. The traditionally high correlation among key demographic variables such as age, pay grade, and length-of-service was evident in this population. Other variables considered, but found to be of little predictive value were unauthorized absence (UA) status, occupational rate, mental group, and General Classification Test (GCT) score.

Comparison of overall knee injury data for Navy enlisted personnel during 1980 and 1981 is presented in Table 9. Hospital admissions for the six knee-specific diagnoses accounted for 3.1% of the total hospitalizations during each year. Although the number of knee related hospitalizations were nearly equal in 1980 and 1981 (1454 and 1437 respectively) the slightly lower incidence rate in 1981 is due to a larger year-end strength in 1981 than in 1980.

Losses due to attrition were not reflected in the population figure used to calculate the variable specific relative incidence rates for knee disorders. This resulted in more conservative or lower rates among older personnel than were actually experienced. A person-years approach would have been appropriate to estimate true incidence because each subject contributes only as many years of observation to the population at risk as he is actually observed.

CONCLUSIONS

Methods utilized in this study demonstrated the capability of the Naval Health Research Center to respond to requests for epidemiologic services in a timely and efficient manner. Such studies may lead to a reduction in the incidence of knee disabilities in Navy personnel and the time loss that is associated with these disabilities.

TABLE 1 - Distribution of Hospitalization of Males by Knee Diagnosis in Cohort 74

Diagnostic Category ICDA-8	N	%	Rank
Other knee derangement 724.5	305	30.8	2
Loose body in knee 729.6	35	3.5	6
Chondromalacia 729.7	197	19.9	3
Other knee diseases 729.9	48	4.9	5
Fractured patella 822.0, 822.1	56	5.7	4
Dislocated knee 836.0, 836.1, 836.9	348	35.2	1
Total	989	100	--

TABLE 2 - Estimated Annual Age - Specific Incidence Rates* for Knee Disorders in Males in Cohort 74

Diagnostic Category ICDA-8	Age Group < 19 N	Rate	20-21 N	Rate	22-24 N	Rate	> 25 N	Rate
Other knee derangement 724.5	85	68	112	97	93	64	15	11
Loose body in knee 729.6	15	12	11	10	8	5	1	1
Chondromalacia 729.7	78	62	63	55	42	29	14	10
Other knee diseases 729.9	13	10	16	14	15	10	4	3
Fractured patella 822.0, 822.1	21	17	16	14	14	9	5	4
Dislocated knee 836.0, 836.1, 836.9	91	72	117	102	100	68	40	29
Total	303	241	335	292	272	185	79	58

$$*\text{Rate} = \frac{\#\text{ males hospitalized in age-specific group for each diagnostic category}}{\text{Total \# males in age-specific group of cohort 74}} \times \frac{100{,}000}{6\text{ yrs.}}$$

TABLE 3 - Estimated Annual LOS-specific* Incidence Rates** for Knee Disorders in Males in Cohort 74

Diagnostic Category ICDA-8	Length of Service* ≤ 2.0 yrs. N	Rate	2.1-3.9 yrs. N	Rate	4.0-6.0 yrs. N	Rate	≥6.1 yrs. N	Rate
Other Knee derangement 724.5	63	35	134	70	51	98	57	57
Loose body in knee 729.6	8	4	14	7	8	15	5	5
Chondromalacia 729.7	85	47	64	34	29	67	19	19
Other Knee diseases 729.9	11	6	16	8	9	17	12	12
Fractured patella 822.0, 822.1	8	4	16	8	11	21	21	21
Dislocated Knee 836.0, 836.1, 836.9	47	26	146	77	65	125	90	90
Total	222	122	390	204	173	343	204	204

*Length-of-service at time of hospitalization

**Rate = $\frac{\text{\# of males in LOS-specific group hospitalized for each diagnostic category}}{\text{Total \# of males in LOS-specific group of Cohort 74}} \times \frac{100{,}000}{6 \text{ yrs.}}$

TABLE 4 - Estimated Annual Paygrade-specific Incidence Rates* for Knee Disorders in Males in Cohort 74

Diagnostic Category ICDA-8	PAYGRADE E1 N	Rate	E2 N	Rate	E3 N	Rate	E4 N	Rate	E5 & above N	Rate
Other knee derangement 724.5	25	32	67	76	94	112	88	75	31	21
Loose body in knee 729.6	3	4	9	10	10	12	11	9	2	1
Chondromalacia 729.7	55	70	26	28	49	58	51	44	16	11
Other knee diseases 729.9	6	8	9	10	10	12	12	10	11	8
Fractured patella 822.0, 822.1	9	11	10	11	22	26	10	9	5	3
Dislocated knee 836.0, 836.1, 836.9	21	26	79	85	88	105	103	88	57	38
Total	119	151	200	216	273	307	275	235	122	82

*Rate = $\frac{\text{\# of males in paygrade-specific group hospitalized for each diagnostic category}}{\text{Total \# of males in paygrade-specific group of Cohort 74}} \quad \frac{100{,}000}{6 \text{ yrs.}}$

TABLE 5 - Distribution of Medical Boards for Males with Knee Diagnosis in Cohort 74

Diagnostic Category ICDA-8	N	%	Rank
Other knee derangement 724.5	70	24.5	2
Loose body in knee 729.6	4	1.4	6
Chondromalacia 729.7	112	39.2	1
Other knee diseases 729.9	30	10.5	4
Fractured patella 822.0, 822.1	7	2.4	5
Dislocated knee 836.0, 836.1, 836.9	63	22.0	3
Total	286	100	--

TABLE 6 - Individual Disposition at Medical Board for Males with Knee Diagnosis in Cohort 74

Disposition	N	%
Refer to Physical Evaluation Board	62	21.7
Discharge:		
Physical disability	24	8.4
Enlisted in error	53	18.5
Convenience of government	6	2.1
Full duty	77	26.9
Limited duty	62	21.7
Other	2	0.7
Total	286	100

TABLE - 7 Distribution of Physical Evaluation Boards for Males with Knee Diagnosis in Cohort 74

Diagnostic Category ICDA-8	N	%	Rank
Other knee derangement 724.5	43	22.2	2
Loose body in knee 729.6	1	0.5	6
Chondromalacia 729.7	96	49.5	1
Other knee diseases 729.9	28	14.4	3
Fractured patella 822.0, 822.1	5	2.6	5
Dislocated knee 836.0, 836.1, 836.9	21	10.8	4
Total	194	100	--

TABLE 8 - Individual Combined Disability Rating at Physical Evaluation Board for Males with Knee Diagnosis in Cohort 74

Combined Disability Rating (%)	N	%
None, missing data	37	19.1
10	107	55.2
20	45	23.2
30	3	1.5
40	2	1.0
Total	194	100

TABLE 9 - Annual Incidence Rate for Knee Injuries Among Navy Enlisted Personnel,* 1980-1981

Year	Knee Related Hospitalizations	Incidence Rate (per 100,000)
1980	1454	317
1981	1437	307

*1980 enlisted strength - 459,197
1981 enlisted strength - 468,405

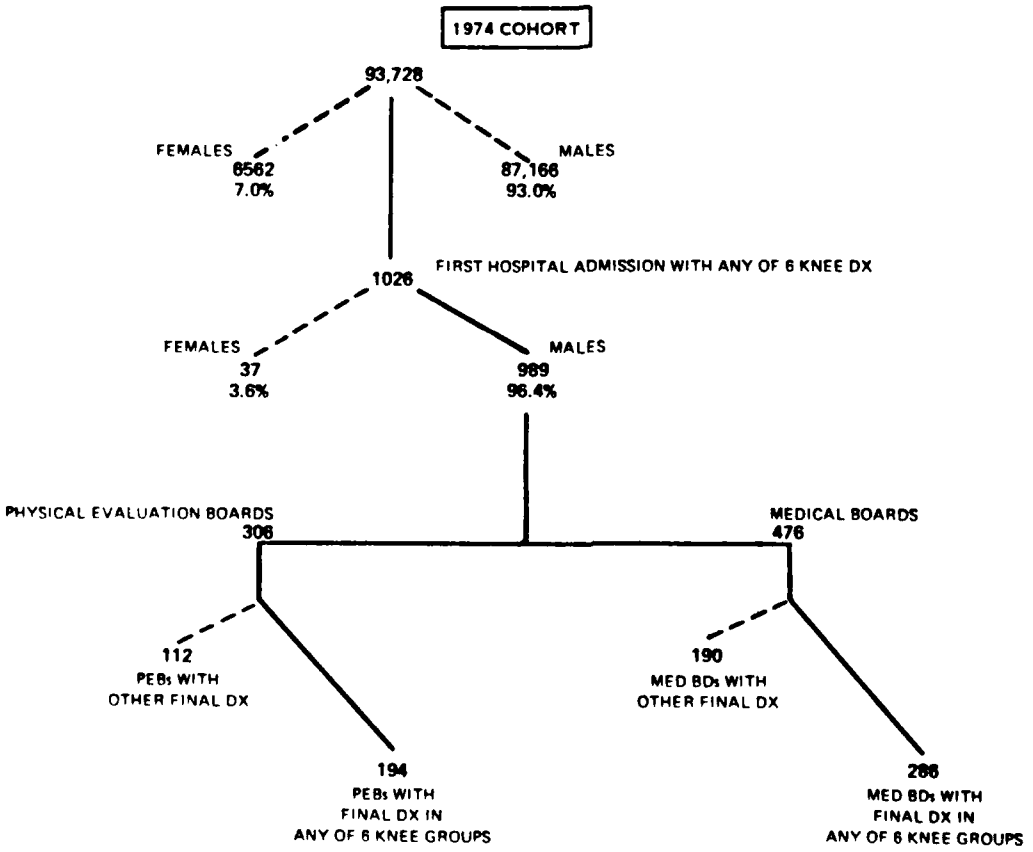


Fig. 1. Hospitalization, Medical Board, and Physical Evaluation Board status in Cohort 74.

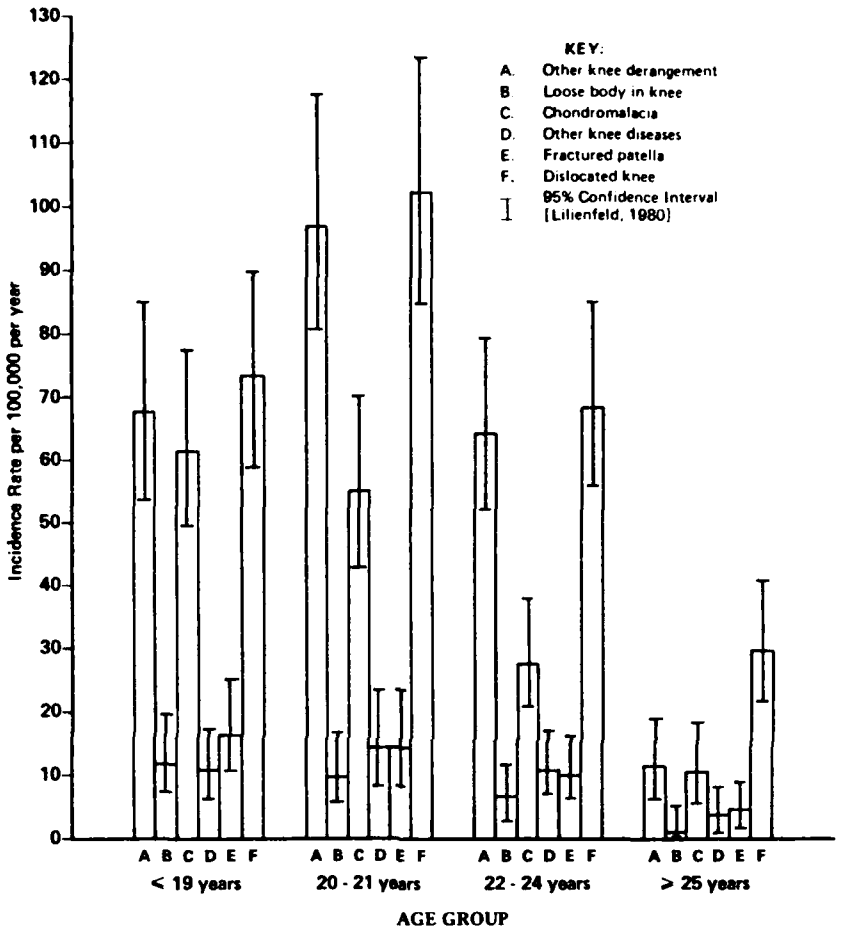


Fig. 2. Annual age-specific incidence rates for knee disorders in males in Cohort 74.

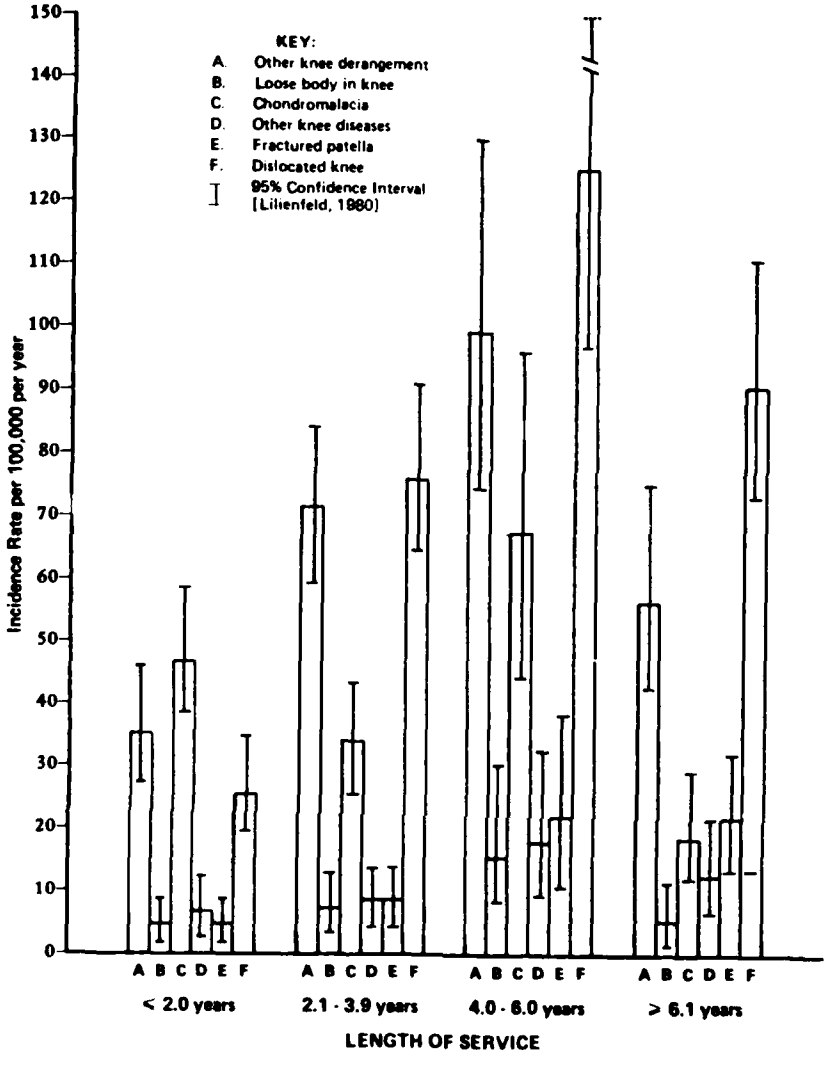


Fig. 3. Annual length of service-specific incidence rates for knee disorders in males in Cohort 74.

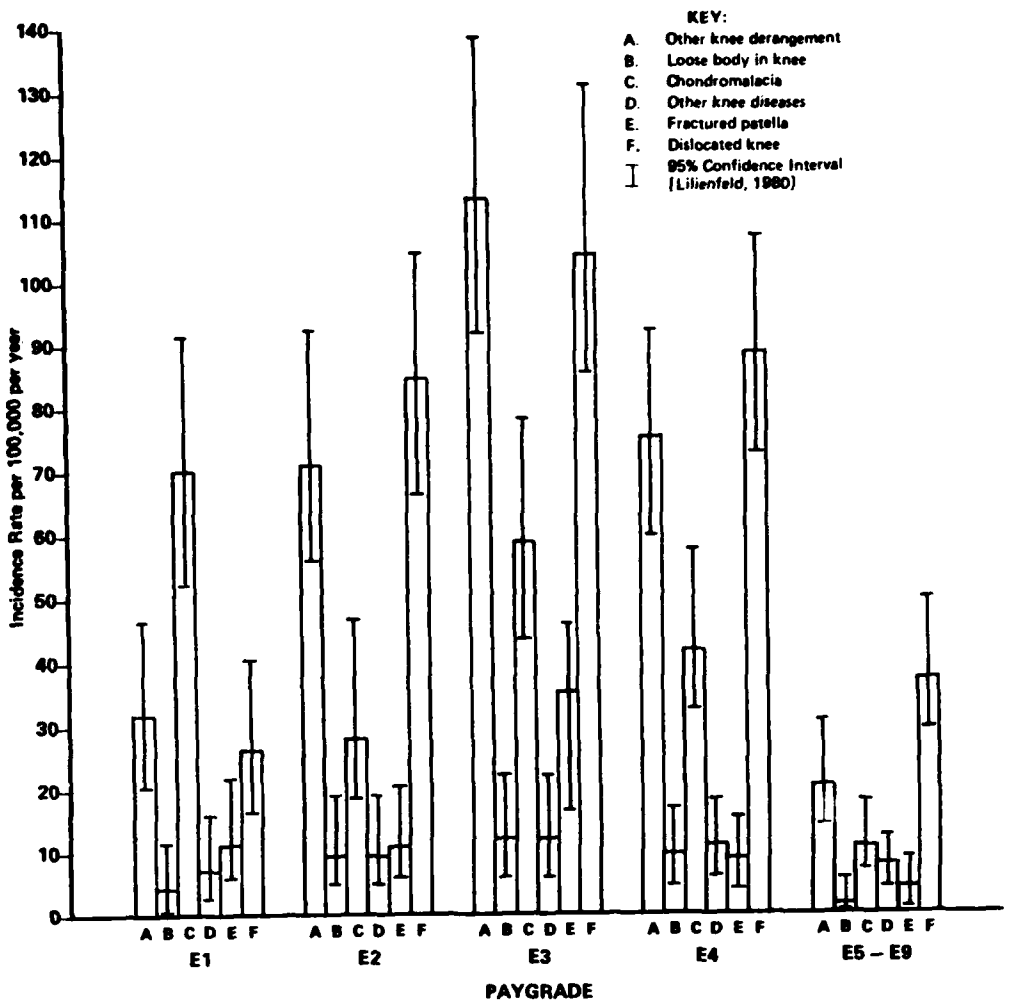


Fig. 4. Annual paygrade-specific incidence rates for knee disorders in males in Cohort 74.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 85-17	2. GOVT ACCESSION NO. AD-A160 736	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* (U) KNEE INJURIES AND DISABILITY AMONG ENLISTED MALES IN THE U.S. NAVY		5. TYPE OF REPORT & PERIOD COVERED Interim 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James C. Helmkamp and Patricia A. Coben		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Health Research Center P. O. Box 85122 San Diego, CA 92138-9174		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MF58.524.001-0007
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research & Development Command Naval Medical Command, National Capital Region Bethesda, MD 20814-5044		12. REPORT DATE May 1985 13. NUMBER OF PAGES 13
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)* Commander, Naval Medical Command Department of the Navy Washington, DC 20372-5120		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

Approved for public release; distribution unlimited.

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Knee injuries
Knee-related hospitalizations
Medical Boards
Physical Evaluation Boards
Musculoskeletal diseases

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This study was conducted to investigate the incidence of knee injuries among Navy enlisted personnel that resulted in hospitalization, medical board, and/or physical evaluation board action. The data base used was the 1974 Cohort, which was followed through 1979. Of 989 males hospitalized (first admission) with any of 6 knee diagnoses, dislocated knees (35.2%) other knee derangements (30.8%), and chondromalacia (19.9%) were the most common diagnoses. Estimated annual age- (length-of-service and pay grade) specific incidence rates were

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102 LF 014 6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

calculated and were generally highest for these three diagnoses and indicated significant differences across age, length-of-service, and pay grade groups. Men less than 22 years of age had a significantly greater incidence of chondromalacia compared to older men.

END

FILMED

12-85

DTIC