

The Facility Case Record Study

A Preliminary Report

by

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In the spring of 1965 the Conference of Prosthetists of the American Orthotic and Prosthetic Association, in the interest of upgrading professional standards of prosthetics practice, decided to encourage prosthetists to institute a system for keeping complete and accurate records on amputee patients. Subsequently, a standard record form was developed on which pertinent information re-

lated to the case history, physical findings and prosthetic prescriptions could be recorded.

Recognizing that information recorded in this manner could yield vast amounts of valuable data, the Conference of Prosthetists further decided to incorporate in their records duplicate tear-off sheets which could be assembled for purposes of collecting such data. The Committee on Prosthetic-Orthotic Education‡ (CPOE), National Research Council, furnished the participating facilities with the forms and ac-

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cepted responsibility for collecting, processing and analyzing the data. Instructions were distributed to guide participants in completion of the forms.

The purpose of this preliminary report is to present data reported by the participating facilities. Discussion of results and conclusions will be included in a final detailed report.

METHODS

Forty-four facilities participated in the project and, for over a period of two years, submitted copies of case record forms to the CPOE office. The cut-off date for entering new case records was June 30, 1967.

Each of the facility record forms was edited in the CPOE office. An attempt was made to clarify any questionable entries and obtain complete information on all data by sending follow-up forms to the prosthetics facility owners. Because the data items on the forms were not pre-coded, it was necessary to set up a coding system and to translate and record each item on the form according to this system. The data were then transferred to IBM data processing magnetic tape.

In February 1968 an ad hoc working group met with the CPOE staff and with a consultant for data processing from the National Research Council to formulate pertinent questions which could be answered by the computer technique.

The prosthetists participating in the study represented thirty states, and for purposes of this study, the states are grouped according to geographical areas as shown in *Figure 1*. The highest percentage of participation by prosthetists was in the East Central region, and the lowest percentage in the Western region. (*Figure 2*.)

SUBJECTS

Information was collected on a total of 8,323 patients, 7,954 of whom were fitted with one prosthesis; 364 with two; four with three; and one with four. This group presented a total of 8,698 amputations, of which 4,034 were "new" amputations and 4,664 were "old." (*Figure 3*.) (The term "new" in this discussion indicates a first fitting and is applied to both the amputee and the amputation. "Old" indicates a replacement prosthesis.)

<u>New England</u>	<u>East Central</u>	<u>South</u>	<u>Mid-West</u>	<u>West</u>
Mass.	N. Y.	Ga.	Ohio	Mont.
Conn.	N. J.	S. C.	Ind.	Idaho
R. I.	Pa.	Tenn.	Ill.	Ore.
	Md.	Okla.	Mich.	Calif.
	N. C.	La.	Mo.	Wyo.
	W. Va.	Fla.	Neb.	Utah
	Va.	Texas	Minn.	

FIGURE 1—Breakdown by states into geographical areas.

<u>New England</u>	<u>East- Central</u>	<u>South</u>	<u>Mid-West</u>	<u>West</u>
1,630*	2,745	1,410	2,509	404
(18.7%)	(31.6%)	(16.2%)	(28.8%)	(4.6%)

* Represents number of forms submitted.

FIGURE 2—Participation of facilities by geographical area.

Amputees with one fitted extremity	7,954
Amputees with two fitted extremities	364
Amputees with three fitted extremities	4
Amputees with four fitted extremities	1
TOTAL	8,323

Number of new amputations	4,034 (46.4%)
Number of old amputations	4,664 (53.6%)
TOTAL	8,698

FIGURE 3—Number of amputees and amputations in study.

All statistics reported in this study refer to amputees who were fitted with prostheses. *Non-fitted amputees are not included.*

FINDINGS

Comparison with Amputee Census

In a study of 12,000 new amputees, commonly known as the "Amputee Census" and reported by Glattly* in 1964, the characteristics of the amputee population, including sex and age of the amputee, and cause, side, and level of the amputation were investigated. A well-defined pattern of these characteristics was established.

In this facility case record study, the pattern approximates that of the former study, thus giving us confidence that our sample in-

cludes a typical cross-section of the fitted amputee population.

In comparing statistics of the present study with those of the Amputee Census, we include only the 4,034 "new" patients. *Figures 4, 5, 6, 7 and 8* show that corresponding tabulations in the two studies approximate each other very closely.

In the present study, distribution by age agains shows the highest incidence of amputations occurring in the seventh decade. (*Figure 4.*) Newly fitted amputees over age 50 account for 61.1 percent of the total. Because many geriatric amputees are not prosthetically fitted, the incidence of amputation in the older age groups would presumably be even higher if statistics on non-fitted amputees were available.

The distribution of right-sided and left-sided amputation is almost equal in both studies, and lower extremity amputations still

* Glattly, H. W., "A Statistical Study of 12,000 New Amputees," Southern Med. J., 57:1373-1378, November 1964

account for about 85 percent of all fitted amputations. (Figure 5.) The number of male amputees continues to outnumber the number of female amputees by about three to one. (Figure 6.)

The relative incidence of trauma as a cause of amputation decreased by four percent; the incidence by cause as shown in the other three tabulations increased, but by a relatively small amount. (Figure 7.) In Figure 8 a higher incidence of below-knee amputations and a lower incidence of above-knee amputations is reflected in the more recent study. Those sites of amputation not shown in Figure 8 each total less than 2.0 percent of all new amputations. Among new patients there were a total of 3,254 above-knee

and below-knee amputations. Of these, 50.9 percent were above-knee.

Replacement Prosthesis

Amputees returned to the facility for a replacement prosthesis for several reasons, but "worn out" is listed in over 60 percent of the cases. "Outgrown" is next in frequency, appearing in approximately 12.5 percent of cases. Whereas 41 percent of new prostheses were above-knee (Figure 9), only 30 percent of replacement prostheses were above-knee. In the below-knee amputee, the situation is reversed, and the percentage of replacement prosthesis is greater (52 percent) than that of the new prostheses (39.6 percent).

The average age of all replaced

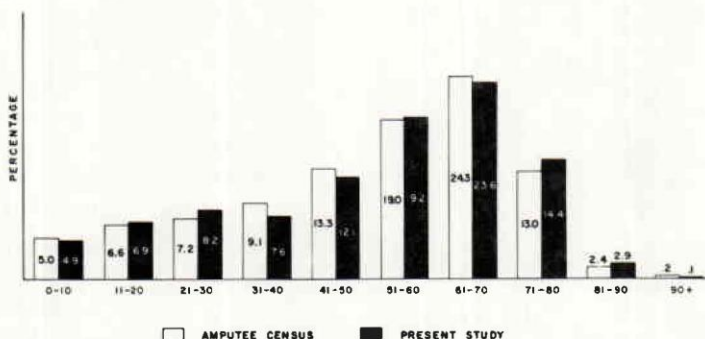


FIGURE 4—Distribution by age.

	Amputee Census	Present Study
Left side	49.2%	51.2%
Right side	50.8%	48.8%
Upper Extremity	14.9%	14.4%
Lower Extremity	85.1%	85.6%

FIGURE 5—Distribution by side and extremity. Comparison of "Amputee Census" and present study.

prostheses was 6.1 years. The above-elbow prostheses averaged 9.2 years; the below-elbow prostheses, 6.5 years; the above-knee prostheses, 6.2 years; and the below-knee prostheses, 5.8 years.

Source of Patient

The tabulation in *Figure 10* reflects the prevalence of amputee clinic referrals. There is still a small group (4.7 percent) of new amputees who are receiving prosthetic fittings without a physician's referral.

Source of Payment

Of the 8,631 prostheses for which source of payment was reported, 25.8 percent were paid for exclusively by the amputee, his family, or both. (*Figure 11*.)

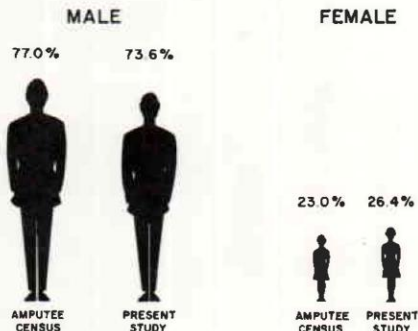


FIGURE 6—Distribution by sex.

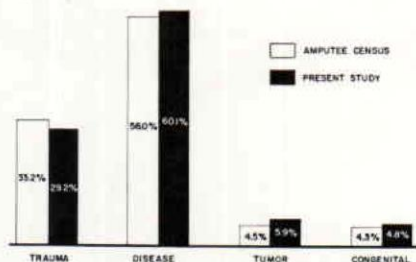


FIGURE 7—Distribution by cause.

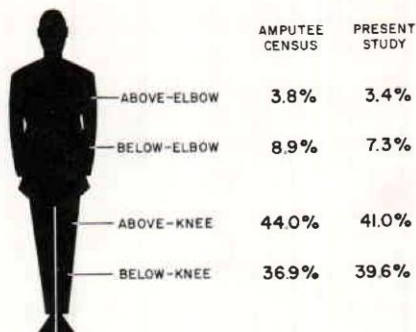


FIGURE 8—Distribution by site of amputation.

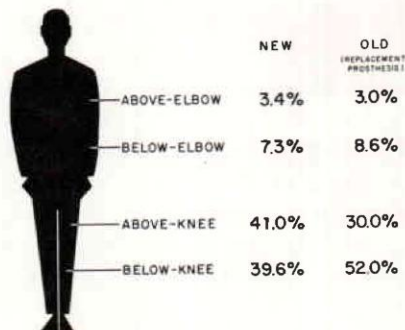


FIGURE 9—Distribution by site of new and old amputations.

Either insurance or compensation alone accounted for payment of 9.9 percent, and essentially all the remaining prostheses were paid for by different governmental agencies. Approximately 400 were paid for from more than one source; the Veterans Administration is the only source of payment not appearing in combination with any other source. The Medicare Act had been in effect during the second year of data collection only.

Components. Lower Extremity.

Prosthetics practice in terms of types of components used by pros-

thetists varied moderately according to geographical location. The frequency of use of various components is shown in *Figures 12-21*.

In this study the quadrilateral socket is the overwhelming choice of prosthetists in fabrication of above-knee prostheses, although plug sockets are still used in 5.8 percent. (*Figure 12*.) Wood is used 56.9 percent of the time in fabrication of above-knee sockets; plastic, 38.6 percent; and leather 4.2 percent. Leather is used with greatest frequency in New Eng-

land (17 percent). Wood is the shank material used in 95.2 percent of above-knee prostheses.

Hydraulic knee components show an 8.4 percent preference (*Figure 13*), with the Western area showing the highest percentage of usage (17.3 percent) and the Midwest area the lowest (4.6 percent).

The pelvic belt remains the suspension of choice for above-knee prostheses. Suction socket alone or combined with some other type of suspension is used

	<u>New Patients</u>	<u>Old Patients</u>
Amputee Clinic	2,467 (61.4%)	2,485 (54.6%)
Physician	1,362 (33.9%)	899 (19.7%)
Not Referred	188 (4.7%)	1,169 (25.7%)

FIGURE 10—Source of patients.

<u>Source</u>	<u>Prostheses</u>	<u>Percentage</u>
Amputee and/or family	2,228	25.8
Bureau of Vocational Rehabilitation	1,944	22.5
Veterans Administration	1,238	14.3
Welfare	928	10.8
Insurance and compensation	854	9.9
Social Security	400	4.6
Children's Bureau	550	6.4
Other	83	1.0
Combined sources	406	4.7
TOTAL	8,631	

FIGURE 11—Source of payment.

	<u>Prostheses</u>	<u>Percentage</u>
Quadrilateral	2,563	85.3
Plug	173	5.8
End Bearing	21	.7
Hard and/or Open End	154	5.1
Other	93	3.1
TOTAL	3,004	

FIGURE 12—Sockets, above-knee prostheses.

	<u>Prostheses</u>	<u>Percentage</u>
Single Axis	2,470	85.7
Hydraulic	243	8.4
Other	169	5.9
TOTAL	2,882	

FIGURE 13—Knee components, above-knee prostheses.

	<u>Prostheses</u>	<u>Percentage</u>
Pelvic Belt	1,684	56.3
Suction	544	18.2
Silesian Band	377	12.6
Suction Plus	311	10.4
Other	76	2.5
TOTAL	2,992	

FIGURE 14—Suspension, above-knee prostheses.

<u>Age</u>	<u>Prostheses</u>	<u>SACH</u>	<u>Other</u>	<u>Percent SACH</u>
5 or less	19	14	5	73.7
6-11	36	28	8	77.8
12-17	93	78	15	83.9
18-20	55	45	10	81.8
21-50	983	615	368	62.6
51-64	847	432	415	51.0
65+	896	392	504	43.8
TOTAL	2,929	1,604	1,325	54.8

FIGURE 15—Foot components, above-knee prostheses.

in 28.6 percent (*Figure 14*) of the total above-knee prostheses, and 17 percent in above-knee prostheses prescribed for amputees over age 50.

The SACH foot is used with greater frequency than any other foot component, although in the older age groups the frequency of use declines markedly for both above-knee prostheses (*Figure 15*) and below-knee prostheses (*Figure 16*). In children the SACH foot is used almost exclusively for those with below-knee prostheses,

but slightly less frequently for those wearing above-knee prostheses.

The patellar-tendon-bearing socket in this study out-numbers all other kinds of sockets for below-knee amputees. (*Figure 17*.) Suspension by knee cuff alone is most widely used by teenagers, with a lower frequency of use in young children and in the 65-and-above age groups. (*Figure 18*.) Wood is used in 90 percent of the below-knee shanks.

<u>Age</u>	<u>Prostheses</u>	<u>SACH</u>	<u>Other</u>	<u>Percent SACH</u>
5 or less	70	68	2	97.1
6-11	113	108	5	95.6
12-17	149	138	11	92.6
18-20	83	80	3	96.4
21-50	1,546	1,218	328	78.8
51-64	1,010	696	314	68.9
65+	969	568	401	58.6
TOTAL	3,940	2,876	1,064	73.0

FIGURE 16—Foot components, below-knee prostheses.

	<u>Prostheses</u>	<u>Percentage</u>
PTB	2,245	56.4
Hard & Open End	668	16.8
Hard	610	15.3
Hard & Soft Insert	121	3.0
Other	333	8.4
TOTAL	3,977	

FIGURE 17—Sockets, below-knee prostheses.

<u>Age</u>	<u>PTB Prostheses</u>	<u>Percent Knee Cuff</u>	<u>Percent Cuff with Waist Belt</u>
5 or less	45	35.6	20.0
6-11	74	58.1	23.0
12-17	109	76.1	11.9
18-20	65	76.9	9.2
21-50	903	62.2	14.4
51-64	530	64.2	11.7
65+	446	58.5	15.0
TOTAL	2,172		

FIGURE 18—Suspension, PTB socket prostheses.

<u>Age</u>	<u>Double Wall</u>	<u>Single Wall</u>	<u>Other</u>	<u>Total</u>
5 or less	7	1	1	9
6-11	12		1	13
12-17	12	1		13
18-20	16	3		19
21-50	138	10	3	151
51-64	35	3		38
65+	7	3		10
TOTAL	227	21	5	253

FIGURE 19—Sockets, above-elbow prostheses.

<u>Age</u>	<u>Pre-Flexed</u>	<u>Double Wall</u>	<u>Single Wall</u>	<u>Other</u>	<u>Total</u>
5 or less	20	44	2	2	68
6-11	11	39	2	2	54
12-17	11	37	4	3	55
18-20	2	26	3	2	33
21-50	21	238	26	5	290
51-64	4	84	14	1	103
65+	3	23	6	—	32
TOTAL	72	491	57	15	635

FIGURE 20—Sockets, below-elbow prostheses.

	<u>Hand Type</u>	<u>Hook Type</u>
Passive	113 (29.5%)	—
Voluntary Opening	144 (37.6%)	859 (89.2%)
Voluntary Closing	124 (32.4%)	95 (9.9%)
Other	2 (0.5%)	9 (0.9%)
TOTALS	383	963

Total voluntary opening and
closing hands

268

Voluntary opening hands

(53.7%)

Voluntary closing hands

(46.3%)

FIGURE 21—Terminal devices, hand and hook types.

Components. Upper Ex- ***tremity.***

In this study double wall sockets are used in 89.7 percent of all above-elbow prostheses (*Figure 19*), and 77.3 percent of below-elbow prostheses (*Figure 20*). No distinction is made between the Muënster and other types of pre-flexed sockets in below-elbow prostheses. These numbered 72, or 11.3 percent of the total 635 below-elbow prostheses.

Sixty-nine percent of the elbow units in the above-elbow prostheses are internal locks. In addition, 9 percent have spring flexion assists. In below-elbow, the elbow

hinges are flexible in 64.2 percent of prostheses. The triceps pad is the most frequently used type of arm cuff (56 percent), and cuff materials are usually plastic (61.1 percent). The ring figure 8 harness is the most frequently used type of harness, 45.7 percent in the above-elbow prostheses and 53.8 percent in the below-elbow prostheses.

The passive or cosmetic hand was prescribed 113 times (29.5 percent of the total number of hand types) (*Figure 21*). Of the 268 mechanically controlled hands, the voluntary opening hand was prescribed 7.4 percent more often than the voluntary closing hand. In the

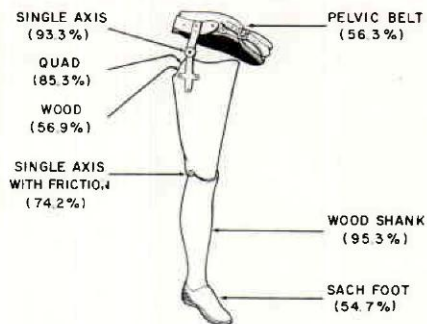


FIGURE 22—Above-knee prosthesis.

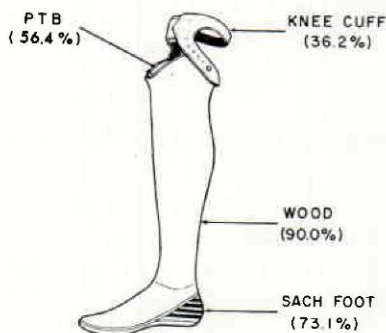


FIGURE 23—Below-knee prosthesis.

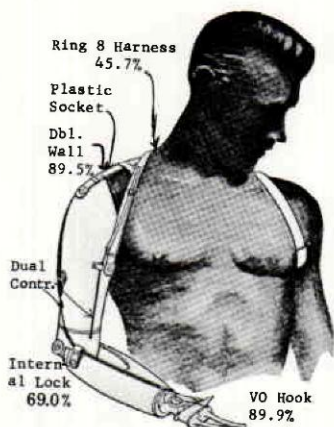


FIGURE 24—Above-elbow prosthesis.

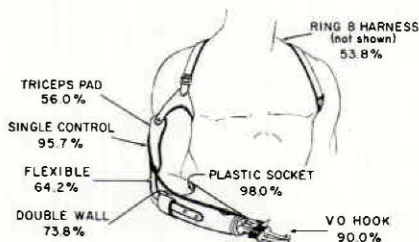


FIGURE 25—Below-elbow prosthesis.

Four types of prostheses showing most frequently used components.

hook type terminal device the voluntary opening hand was used approximately 90 percent of the time. The most frequently used components for four types of prostheses are shown in *Figures 22 to 25*.

This paper illustrates the types of tabulations and correlations

that can be developed from the facility record data now stored on magnetic tape. Much more information remains to be retrieved. We invite your suggestions and recommendations in selection of those tabulations that you would like to see developed.