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Matching Prosthetics Order Records in the VA National Prosthetics Patient Database (NPPD) to Health Care Utilization Databases

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Terms

AAC	Austin Automation Center
CPT	Current Procedural Terminology
DSS	Decision Support System
FY	Fiscal year
HCPCS	HCFA Common Procedure Coding System
ICD-9	International Classification of Disease, 9th Revision
IE	Inpatient Encounter
IFCAP	Integrated Funds Distribution, Control Point Activity, Accounting and Procurement
IRB	Institutional Review Board
NDE	National Data Extract
NOS	Not Otherwise Specified
NPCD	National Patient Care Database
NPPD	National Prosthetics Patient Database
OPC	Outpatient Care File
PSAS	Prosthetics and Sensory Aids Service
PTF	Patient Treatment File
SCRSSN	Scrambled Social Security Number
SSN	Social Security Number
VA	U.S. Department of Veterans Affairs
VIREC	VA Information Resource Center
VISTA	Veterans Health Information Systems and Technology Architecture

Abstract

The VA Prosthetics and Sensory Aids Service (PSAS) provided $1.3 billion in services in FY2005 (Fact Sheet 2006). This covered artificial legs or components for 10,546 veterans, artificial arms or components for 1,832 veterans, and eyeglasses, hearing aids, or related aids for over 647,000 veterans (Fact Sheet 2006). It also includes items not traditionally considered prosthetics, such as cardiac stents, surgical fixtures, and home oxygen equipment.

Orders for prosthetic and assistive items channeled through PSAS are added quarterly to the National Prosthetics Patient Database (NPPD). NPPD is the only national VA dataset that records characteristics of individual prosthetic items. Other databases capture information on prosthetics as well, such as the Decision Support System (DSS), the Patient Treatment File (PTF), and the Outpatient Care File (OPC). It is unknown whether NPPD provides additional data beyond what appear in these common utilization databases.

This report presents results of several comparisons between NPPD and three utilization databases. We first compared the count of prosthetics records in NPPD to the count of prosthetics-related procedures for the same individuals recorded in the utilization databases. We then attempted to match NPPD records to the utilization records by fiscal year, patient ID, prosthetic category, and date. We find moderate concordance in the number of non-supply items across data sources, and that only a minority of NPPD records can be matched to utilization records. The relatively low match rate most likely reflects the process by which prosthetics are ordered and received rather than missingness or data entry error. The report concludes with suggestions of other research uses for NPPD.

1 Introduction

In FY2007 VA will provide prosthetic and sensory devices, repairs, and related services to over 1.5 million veterans at a cost of more than $1.3 billion. The VA Prosthetics and Sensory Aids Service (PSAS) oversees procurement, delivery, training, replacement, and repair of these items.

The range of items is very wide: prosthetics and orthotics, assistive devices of all kinds, and everything that is implanted for at least 30 days in or on a patient. Thus cardiac stents, bandages, injection catheters, and surgical fixtures are all ordered through PSAS. The most common devices and services include home oxygen therapy, glasses, orthopedic devices, and surgical supplies. In this report we will use the term "prosthetics" to refer to all of these items and services.

Prosthetics devices and services constitute an important and timely research area. They play an important role in the care for veterans who have sustained polytrauma and blast-related injuries. As longevity of Americans increases there will be growing demand for assistive devices. The trend toward home-based health care, such as home monitoring of chronic illnesses, may also lead to a greater reliance on home care products distributed by PSAS. Finally, the range and cost of alternative devices and services within particular classes, such as between different limbs or wheelchair models, point to the need for cost-effectiveness analyses in all areas of rehabilitation, whether home-based or institutional.

Research projects involving prosthetics data may make use of other utilization databases such as the Decision Support System (DSS), the Patient Treatment File (PTF), and the Outpatient Care File (OPC). It is unknown whether NPPD provides additional data beyond what appears in these databases. If all NPPD prosthetics orders correspond to prosthetics-related encounters in DSS and PTF/OPC, then NPPD would be needed only to provide detail about specific prosthetics orders and the direct cost of prosthetics. Conversely, if there are prosthetics dispensed without a provider encounter then it will be necessary to consult NPPD in addition to the standard utilization databases in order to develop a complete account of prosthetics-related care.

To address this issue we investigated the extent to which NPPD records can be matched to inpatient and outpatient encounters recorded in the DSS National Data Extracts, in OPC, and in PTF. We had two hypotheses:

Hypothesis 1: Most NPPD records can be matched to prosthetics-related events in the OPC (outpatient) and PTF (inpatient) utilization files.

Hypothesis 2: Most NPPD records can be matched to prosthetics-related events in the DSS NDE inpatient and outpatient utilization files.

We believed that the match rates would be high for two reasons. First, both DSS and NPPD draw prosthetics use data from the VISTA Prosthetics Package. Two datasets that draw from the

same source could be expected to have similar records. Second, recent analyses by HERC staff have shown that OPC/PTF and the DSS NDEs have extremely high overlap when one selects DSS records with the NPCD flag (King 2007). In short, if DSS data match NPPD then so should OPC and PTF.

2 Methods

2.1 Dates

A common method for searching utilization data is to look for all records pertaining to a particular individual that fall within a pre-specified time period, such as the time from study enrollment to the end of a follow-up period. Patient ID appears on the NPPD data in the form of scrambled Social Security number (SCRSSN). There are two date fields in NPPD. One is the data entry date (CREATEDT), which records when the prosthetics order entered VISTA, typically within 5 days of the date when a physician enters a prosthetics 'consult' into the patient's electronic medical record. The data entry date often falls before the patient receives the prosthetic item, although in some cases it can come afterward. The second variable is labeled Delivery Date (DELIVRDT). It represents the date when payment for the order clears in a VA financial system called IFCAP (Integrated Funds Distribution, Control Point Activity, Accounting and Procurement). The delivery date has no necessary relation to clinical events. We therefore used the data entry date (CREATEDT) as an approximation of the encounter date with the understanding that some prosthetics orders will never have an associated encounter.

2.2 Procedure codes

Prosthetics items, both devices and services, are referenced by codes in the HCFA Common Procedure Coding System (HCPCS). There are two types of HCPCS codes. The first, known as Level I codes, are procedures codes in the Common Procedural Terminology (CPT) system. The second type, Level II codes, represent additional items and services excluded from CPT by design. Level II codes are distinguished by a leading alphabetic character rather than a leading digit (e.g., "V2020"). Examples of common HCPCS codes in NPPD include V2199 (lens, single vision, NOC), A4670 (auto blood pressure monitor), and V5014 (hearing aid repair/modifying).

Most but not all prosthetics items have individual codes. Where two or more share a single code they are similar in nature, such as two models of wheelchair. When a prosthetics order contains multiple items, NPPD usually features a separate record for each item that has its own HCPCS code.

The utilization databases employ two procedure code sets. Outpatient records in OPC and DSS use the HCPCS system. Although the variable names refer to CPTs, both Level I and Level II codes are allowed. PTF and the DSS NDE for inpatient care use the International Classification of Disease - 9th Revision (ICD-9) procedure coding system instead. ICD-9 procedure codes are

four digits in length rather than five and thus cannot accept HCPCS codes. There are fewer ICD-9 procedure codes than CPT and HCPCS codes, and thus a one-to-one match cannot be made.

We believed that the match between NPPD and utilization databases would be better for prosthetics items referenced by Level II codes than for those referenced by Level I (CPT) codes. This was straightforward for outpatient records, as we could simply select those records using Level II codes. For inpatient records, however, the distinction was not clear. We therefore reviewed the entire set of ICD-9 procedure codes and developed two lists. The first included all procedures that involve prosthetics in some fashion; this was designed to be similar to the entire HCPCS set. The second, a subset of the first, included only those codes that refer directly to a prosthetic device. This list was intended to relate more specifically to the Level II HCPCS codes.

2.3 Cohorts of prosthetics users

We created several mutually exclusive cohorts of prosthetics users in order to investigate how the matching rate varied by service setting and by procedure code type. We distinguished between two service settings, inpatient and outpatient. Rehabilitation units, domiciliaries, and nursing homes were grouped under inpatient care. The method for creating each cohort is explained in Section 3.

2.4 Categories of prosthetics items

Our next step was to classify prosthetics items into 10 broad categories based these on their names and on descriptions available in published guides. The categories and brief descriptions appear in Table 1. The categories clarify several facts about prosthetics in NPPD. First, the term includes non-durable equipment, such as dialysis catheters, as well as durable items, such as prosthetic limbs or hearing aids. Second, it includes some items that are placed in or on the body only temporarily, such as internal or external fixation devices. An important fact that is not apparent from the table is that certain services delivered on contract, such as long-term oxygen therapy, may include instruction, delivery, and other services that are secondary to the prosthetic item itself.

2.5 Matching methods

The matching process had two steps. In the first we simply counted the number of records by year and category in each dataset. We did not restrict the records to match on person ID (SCRSSN) or HCPCS code. This broad match offers a preview of the more specific matching to follow. Because all of our analyses are stratified by year and category, a wide discrepancy between NPPD and a utilization dataset in the number of records in a particular year-category pair shows that matching with a more specific method will necessarily have poor results.

Table 1: Categories of Prosthetics Items

Category Abbreviation and Name	Description
Non-cardiac implanted devices	Non-cardiac catheters and other devices NOS, including stents, shunts, electrodes, stimulators, access devices, and others.
Dialysis	Kidney dialysis of all types
Fixtures	Surgical fixtures, internal or external
Eyeglasses	Glasses, contact lenses, frames, etc.
Maxillofacial	Maxillofacial items
Orthopedics	Orthopedic implants and devices other than fixtures, including prosthetic limbs and orthotics
Plastics	Plastic and reconstructive surgery, including artificial skin grafts and breast implants
Drug delivery devices	Infusion pumps of all types
Supplies	All supply items, including most durable medical equipment (e.g., canes, wheelchairs), oxygen equipment, batteries, bandages, and others
Cardiac	All cardiac items including catheters and leads

The second matching method used four variables: fiscal year, category, person ID (SCRSSN), and date. We expected that the match on date would be poor due to the lack of an encounter date in NPPD, and so we allowed a matching window for the dates. Starting with the encounter date in the utilization data, we searched for every NPPD record that fell within the matching window and which had the same fiscal year, category, and SCRSSN. Several windows were tried: 0 days (exact match), +/- 7 days, +/- 14 days, +/- 21 days, and +/- 28 days. In a few cases we added +/- 90 days as well, to see how much the match rate improved under a very wide window.

The second match requires careful interpretation. Once the match window is extended beyond 0 days (an exact match), multiple NPPD records can be matched to the same encounter record. Thus the matching percentages we report represent upper bounds on the true proportion that match in the given window. For example, suppose that a person had two inpatient operations in a 10-day period, each using external fixation. Once the matching boundary exceeds 10 days, the two NPPD records for external fixation will be "matched" to both operations, resulting in four apparent matches rather than two.

3 Data

NPPD data were provided by Liz Kiley of the PCM team at the Hines VA medical center. Ms. Kiley reported that NPPD data quality had improved over time, and so we obtained data from both FY2002 and FY2005. We extracted DSS, OPC, and PTF data in SAS format from the Austin Automation Center.

Next we describe the process for creating the FY2002 extracts. A similar process was used for the FY2005 extracts.

We constructed file **OP1** to contain all NPPD records for 4,000 people having prosthetics-related Level I or II HCPCS procedure codes in OPC in FY2002 . We located all OPC records with a procedure code relating to prosthetics. From these we determined the set of unique scrambled SSNs and randomly selected 4,000 of them. The final step was to locate all NPPD records for these individuals in FY2002.

We constructed file **OP2** to contain all NPPD records for 5,000 people having a CPT or HCPCS code that refers to a particular prosthetic device. This category is narrower than the prosthetics-related services used to derive **OP1**. The first step was to locate all OPC records having a Level II HCPCS procedure code. We then determined the unique set of scrambled SSNS and randomly selected 5,000 of them. Finally, we located all NPPD records for these individuals in FY2002.

We constructed file **IP** to contain all NPPD records for 1,000 people have prosthetics-related ICD-9 procedure codes in FY2002 PTF. We began by locating all PTF records having a HCPCS Level I or Level II prosthetics-related procedure code. From these records we determined the set of unique scrambled SSNs, and then we randomly selected 1,000 of them. We then located all NPPD records for these individuals in FY2002.

We constructed file **NP** to contain all NPPD records for 5,000 people randomly chosen from all NPPD records that year. We determined the list of unique scrambled SSNs represented by FY2002 NPPD records. We then randomly selected 5,000 of these scrambled SSNs. The final step was to select all NPPD records for those individuals.

Once each cohort was finalized, we found all utilization records and all NPPD records for those individuals. We then dropped any NPPD records that lacked a valid HCPCS code. (For example, for many years shipping charges were reported as a separate record; the value

'NPPDNULL' appeared in the HCPCS field in such cases.) Blank or null HCPCS values occurred many times in FY2002 NPPD data but almost never in FY2005 data. We also dropped

Table 2. Sample Sizes for Groups OP1, OP2, and IP

	FY2002				FY2005			
	OP1	OP2	IP	NP	OP1	OP2	IP	NP
# IDs submitted to NPPD team[1]	4,000	5,000	1,000	5,000	4,000	5,000	1,000	5,000
# IDs with no NPPD records	0	0	3	0	870	677	258	0
# IDs with only invalid NPPD records[2]	1,084	733	263	117	2	1	0	79
# IDs with any valid NPPD records (analysis samples)	2,916	4,267	734	4,893	3,148	3,322	742	4,921

1. ID refers to the patient's scrambled social security number (SCRSSN). Rather than submitting IDs for the NP group, we asked the NPPD team to develop a random selection of 5,000 IDs from each year's NPPD file.

2. Invalid records are those with a missing or null ("NPPDNULL") value for the procedure code variable HCPCSPSA.

anyone who had no records at all in NPPD. The count of individuals at each step is shown in Table 2.

4 Matching by Year and Category

4.1 Group OP1

We began with group OP1. These are all NPPD records for a random subset of individuals who had prosthetics-related outpatient procedure codes.

Table 3 shows the number of OPC prosthetics procedure records and NPPD records occurring in FY2002 and FY2005 for the people in Group OP1. The total number of items varies

Table 3: Group OP1: OPC and NPPD Records by Year, Source, and Category

Description	FY2002 OPC	FY2002 NPPD	FY2005 OPC	FY2005 NPPD
Non-cardiac catheter, other dev.	289	52	926	166
Dialysis	0	5	0	56
Fixtures	2	101	1	167
Eyeglasses	1,607	2,297	1,918	2,648
Maxillofacial	0	13	0	19
Orthopedics	1,018	953	2,027	1,742
Plastics	7	7	6	2
Drug delivery devices	8	5	16	11
Supplies	0	4,260	0	7,960
Cardiac	148	62	1,091	132
Vision implants, hearing, speech	829	107	1,633	331
TOTAL	3,908	7,862	7,618	13,234
TOTAL without Supplies	3,908	3,602	7,618	5,274

considerably across datasets. Because OPC captures procedures rather than items, it is unlikely to record many instances of supply deliveries. In practice we found no supply-related HCPCS codes in the OPC data for these patients. Once the supply records are removed, the total number of records differs by less than 10 percent in FY2002. A similar pattern holds in FY2005, although the remaining difference between NPPD and OPC is still large, 2,344 records.

There are several reasons why the counts could differ between data sources. If a single procedure uses multiple prosthetics then the number of NPPD records will exceed the number of OPC records. This situation is likely to apply to fixtures. Similarly, patients may receive multiple pairs of eyeglasses in a single fitting, or they may be dispensed by the Denver

Distribution Center and mailed directly to the patient's home without a corresponding outpatient visit. Conversely, there may instances in which multiple procedures are associated with a single prosthetic item. Finally, items used in one fiscal year may have been ordered in a previous year.

4.2 Group OP2

We next analyzed group OP2. These are all NPPD records for a random subset of individuals who had outpatient Level II HCPCS procedure codes.

Table 4 shows the number of OPC prosthetics procedure records and NPPD records occurring in FY2002 and FY2005 for people in Group OP2. The number of records is again quite discrepant within categories and after supplies are removed. As with OP1 (Table 3), NPPD reported a

Table 4: Group OP2: OPC and NPPD Records by Year, Source, and Category

Category	FY2002 OPC	FY2002 NPPD	FY2005 OPC	FY2005 NPPD
Non-cardiac catheter, other dev.	14	40	47	154
Dialysis	265	8	1,438	18
Fixtures	128	185	71	277
Eyeglasses	1,214	2,230	570	1,982
Maxillofacial	156	30	768	55
Orthopedics	1,346	1,920	2,339	2,193
Plastics	1	6	13	21
Drug delivery devices	13	19	10	9
Supplies	3,601	7,900	8,983	9,775
Cardiac	7	67	21	99
Vision implants, hearing, speech	53	86	329	494
TOTAL	6,798	12,491	14,589	15,077
TOTAL without Supplies	3,197	4,591	5,606	5,302

much greater number of eyeglasses and supplies records in both years. Both OPC and NPPD report a significant number of supply records for the OP2 group, although OPC had notably fewer than NPPD each year.

Between FY2002 and FY2005, the match between OPC and NPPD decreased for OP1 but increased for OP2. In both years there were many categories with wide discrepancies in counts.

4.3 Group IP

We next analyzed Group IP. These represent all NPPD records for a randomly selected subset of individuals having inpatient prosthetics-related procedures.

Table 5 presents the number of PTF and NPPD records for individuals in this group, by year and data source. Starting with inpatient NPPD records, we searched for prosthetics-related PTF records in the same fiscal year. Once supply records were removed, there were 81% more PTF records than NPPD records. Cardiac devices and non-cardiac catheters and other implantable devices again accounted for much of the discrepancy in non-supply records. They were counterbalanced in part by NPPD records for eyeglasses prescriptions, none of which appeared in PTF. The complete absence of such records in PTF suggests that providers may simply avoid coding an inherently ambulatory procedure during an inpatient stay.

4.4 Group NP

Our next analysis used individuals in the NP group, a randomly selected subsample of all those with NPPD records in FY2002. Starting with their NPPD records, we searched the PTF and OPC files for prosthetic-related services incurred by the same individuals. We located PTF or OPC records for 2,109 persons, or 41.3% of the sample.

Table 6 shows the distribution of records by category. There were substantially more records in the NPPD file for the individuals in group NP, even if one discounts supply records. Here the discrepancy is not mostly due to cardiac devices and non-cardiac catheters, but instead to eyeglasses and orthopedics. The substantially greater number of these among NPPD records suggests either that the PTF and OPC are underreporting actual events or that many patients are receiving multiple devices in a single visit.

Table 5: Group IP: PTF and NPPD Records, by Year, Source, and Category

Category	FY2002 PTF	FY2002 NPPD	FY2005 PTF	FY2005 NPPD
Non-cardiac catheter, other dev.	556	118	943	287
Dialysis	38	4	49	11
Fixtures	4	28	5	63
Eyeglasses	0	242	1	258
Maxillofacial	0	6	0	5
Orthopedics	126	334	108	636
Plastics	0	3	1	3
Drug delivery devices	0	12	3	13
Supplies	6	1,931	6	3,611
Cardiac	920	144	1,209	311
Vision implants, hearing, speech	4	22	7	43
TOTAL	1,654	2,844	2,332	5,241
TOTAL without Supplies	1,648	913	2,326	1,630

Table 6: Group NP: PTF/OPC and NPPD Records, by Year, Source, and Category

Description	FY2002 PTF/OPC	FY2002 NPPD	FY2005 PTF/OPC	FY2005 NPPD
Non-cardiac catheter, other dev.	227	64	614	101
Dialysis	32	15	15	54
Fixtures	44	115	55	268
Eyeglasses	1,091	3,065	1,243	3,441
Maxillofacial	71	17	198	7
Orthopedics	709	1,394	1,250	3,489
Plastics	2	3	5	9
Drug delivery devices	2	5	1	9
Supplies	1,197	6,907	1,893	23,128
Cardiac	149	50	257	91
Vision implants, hearing, speech	276	44	679	623
TOTAL	3,800	11,679	6,210	31,220
TOTAL without Supplies	2,603	4,772	4,317	8,092

5 Matching by Year, Category, and Encounter Date

Researchers often wish to determine the total utilization and cost of health care services in a defined period. For NPPD to serve this purpose, it must be possible to match its records to those in PTF, OPC, and DSS by date. Although there is no service date in NPPD, the data entry data (CREATEDT) is intended to fall within five days of the physician order ('consult'). We therefore investigated how closely the delivery date appears to match the service date in utilization databases.

Our approach was to search for utilization records pertaining to prosthetics within a certain number of days on either side of the data entry date of each NPPD record in the respective group. We matched on three variables: SCRSSN, prosthetic category, and matching window. The matching window represented the encounter date plus or minus a selected number of days. Outpatient NPPD records were matched only to outpatient utilization files and inpatient NPPD records only to inpatient utilization files.

By construction, a single NPPD record was matched to *every* utilization record that fell within the matching window. The percentages in the following tables are therefore labeled as upper bounds because they will overstate the true rate of one-to-one matching, possibly by a considerable margin. In the tables, the upper bounds are preceded by the symbol "<" to reflect that the true matching rate will be lower. The larger the match window, the larger the gap between the true value and the upper bound.

5.1 NPPD and OPC / PTF

We began by looking for matches between prosthetics-related procedures marked by CPT codes. These correspond to groups OP1, IP, and NPPD. Several date ranges were tried. For each of the three groups, we show the percentage of NPPD records that had an OPC or PTF record in the same category for the same individual within 7, 14, 21, or 28 days before or after the NPPD data entry date. Following the advice of a VA researcher who has used NPPD data, we expanded the window to 60 and 90 days for FY2005 data.

Results in Tables 7 and 8 indicate that fewer than 28% of NPPD records can be matched to OPC or PTF records within a 56-day window (+/- 28 days) around the NPPD data entry date. No more than one-third can be matched within a 180-day window around the NPPD data entry date in FY2005 (results not shown).

Table 7: Non-Supply NPPD Records Matching OPC or PTF Records, by Matching Window, FY2002

Matching Window	Upper Bound on Percentage Matched		
	Group OP1	Group IP	Group NP
NPPD create date = Service date	3.1 %	0.9 %	8.5 %
NPPD create date = Service date +/- 7 days	< 14.5 %	< 9.8 %	< 16.6 %
NPPD create date = Service date +/- 14 days	< 19.0 %	< 12.6 %	< 22.4 %
NPPD create date = Service date +/- 21 days	< 21.9 %	< 14.5 %	< 26.4 %
NPPD create date = Service date +/- 28 days	< 23.8 %	< 15.7 %	< 29.4 %

Table 8: Non-Supply NPPD Records Matching OPC or PTF Records, by Matching Window, FY2005

Matching Window	Upper Bound on Percentage Matched		
	Group OP1	Group IP	Group NP
NPPD create date = Service date	2.5 %	2.0 %	1.7 %
NPPD create date = Service date +/- 7 days	< 15.0 %	< 15.6 %	< 8.0 %
NPPD create date = Service date +/- 14 days	< 18.2 %	< 19.9 %	< 10.4 %
NPPD create date = Service date +/- 21 days	< 20.2 %	< 22.0 %	< 12.0 %
NPPD create date = Service date +/- 28 days	< 21.9 %	< 27.1 %	< 13.6 %

We next searched for matches using HCPCS procedure codes, those corresponding to specific prosthetic devices or services. Most of these are outpatient codes and so we limited our focus to outpatient NPPD records and the OPC utilization file. In order to obtain the largest sample size we used all individuals in the OP1 and OP2 categories, a total of 7,183 persons in FY2002 and 6,470 persons in FY2005 (cf. Table 2).

By construction, all people in OP2 had at least one OPC records with a procedure code pertaining to a particular prosthetics device or service. Some but not all people in OP1 have at least one such record as well.

Results in Table 9 indicate a much greater match rate. More than 35% of FY2002 records have an exact match in OPC, and as many as 65% match over a 56-day window around the NPPD data entry date. The matching rate was notably lower in FY2005, however, with only 11% matching exactly and under 42% matching within a 56-day window. These results demonstrate that substantially better matching is possible when one selects only CPT/HCPCS codes pertaining to specific prosthetics devices and services. The drop in matching frequency between FY2002 and FY2005 does not have an obvious explanation.

Table 9: Non-Supply NPPD Records Matching OPC Records for Prosthetics Devices and Services, by Matching Window and Year

Matching Window	Upper Bound on Percentage Matched	
	FY2002	FY2005
NPPD create date = Service date	35.5 %	10.8 %
NPPD create date = Service date +/- 7 days	< 47.2 %	< 24.3 %
NPPD create date = Service date +/- 14 days	< 53.9 %	< 31.1 %
NPPD create date = Service date +/- 21 days	< 59.9 %	< 36.6 %
NPPD create date = Service date +/- 28 days	< 65.0 %	< 41.8 %

5.2 NPPD and DSS NDE

The DSS National Data Extracts (NDEs) represent an alternative source of information on inpatient and outpatient utilization. Use of DSS NDEs is growing over time, and VA researchers may want to know how well the NDEs overlap with NPPD data. We therefore performed analyses similar to those reported above for PTF and OPC data.

A unique feature of DSS NDEs is separate reporting of labor and supply costs. Labor costs represent salary and benefits for employees. Supply costs represent non-labor purchases such as equipment, pharmaceuticals, and all manner of prosthetics. A procedure tied to a prosthetic, such as stent implantation or glasses fitting, could involve labor costs alone, supply costs alone, or both. We therefore chose two groups of DSS records: those having prosthetics labor costs greater than $0, and those have prosthetics supply costs greater than $0.

As seen in Tables 10-11, very few NPPD records for inpatient prosthetics could be tied to individual DSS inpatient records within four weeks before or after the NPPD delivery date.

Table 10: NPPD Records Matching DSS Treating Specialty (Inpatient) Records, by Matching Window and DSS Record Type, FY2002

Matching Window	Upper Bound on Percentage Matched	
	DSS Inpatient Labor > $0	DSS Inpatient Supply > $0
NPPD create date = Service date	0.4 %	1.7 %
NPPD create date = Service date +/- 7 days	< 4.0 %	< 19.5 %
NPPD create date = Service date +/- 14 days	< 7.1 %	< 33.2 %
NPPD create date = Service date +/- 21 days	< 9.4 %	< 42.3 %
NPPD create date = Service date +/- 28 days	< 11.5 %	< 49.9 %

Table 11: NPPD Records Matching DSS Treating Specialty (Inpatient) Records, by Matching Window and DSS Record Type, FY2005

Matching Window	Upper Bound on Percentage Matched	
	DSS Inpatient Labor > $0	DSS Inpatient Supply > $0
NPPD create date = Service date	0.1 %	0.5 %
NPPD create date = Service date +/- 7 days	< 0.9 %	< 5.2 %
NPPD create date = Service date +/- 14 days	< 1.4 %	< 8.3 %
NPPD create date = Service date +/- 21 days	< 1.8 %	< 10.8 %
NPPD create date = Service date +/- 28 days	< 2.1 %	< 12.8 %

We found considerable variation across years and DSS records. In FY2002, as many as 30% of NPPD records could be matched to DSS outpatient records with positive prosthetics labor costs by date range, category, and person ID (Table 12). A much greater percentage, as high as 100%, could be matched to DSS records with positive prosthetics supply cost. The pattern reversed in FY2005 (Table 13), when as many as 100% of NPPD records could be matched to DSS records with positive prosthetics labor costs, while as many as 50% could be matched to DSS records with positive prosthetics supply costs.

Table 12: NPPD Records Matching Outpatient DSS NDE Records, by Matching Window and DSS Record Type, FY2002

Matching Window	Upper Bound on Percentage	
	DSS Outpatient Labor > $0	DSS Outpatient Supply > $0
NPPD create date = Service date	9.3 %	38.2 %
NPPD create date = Service date +/- 7 days	< 16.7 %	< 63.4 %
NPPD create date = Service date +/- 14 days	< 22.0 %	< 90.5 %
NPPD create date = Service date +/- 21 days	< 26.6 %	< 100.0 %
NPPD create date = Service date +/- 28 days	< 30.4 %	< 100.0 %

Table 13: NPPD Records Matching Outpatient DSS NDE Records, by Matching Window and DSS Record Type, FY2005

Matching Window	Upper Bound on Percentage Matched	
	DSS Outpatient Labor > $0	DSS Outpatient Supply > $0
NPPD create date = Service date	54.4 %	22.8 %
NPPD create date = Service date +/- 7 days	< 94.8 %	< 27.5 %
NPPD create date = Service date +/- 14 days	< 100.0 %	< 31.8 %
NPPD create date = Service date +/- 21 days	< 100.0 %	< 37.4 %
NPPD create date = Service date +/- 28 days	< 100.0 %	< 49.8 %

6 Conclusion

We hypothesized that most NPPD records can be matched to prosthetics-related events in standard outpatient and inpatient utilization files. We can reject our hypotheses if we limit the analysis to strict matching by date. Allowing for wider match windows increases the matching rate considerably, but overall we find that most NPPD records cannot be matched to utilization records within relatively short windows, such as +/- 14 days.

The proportion of records that match varies considerably by data source. The highest rates were found when matching NPPD records to DSS outpatient records having positive prosthetics labor or supply costs. More than 50% of NPPD records could be matched to DSS records within a 14-day window around the NPPD data entry date (CREATEDT). We also matched 40-60 % of NPPD records to OPC outpatient records that pertain to prosthetics devices, those containing HCPCS Level II codes. We found relatively low matching rates between NPPD records and inpatient data (PTF or DSS treating specialty) and between NPPD and outpatient OPC records featuring Level I HCPCS codes (CPT codes). There were not a clear pattern of change in matching rates between FY2002 and FY2005.

The inability to match a particular NPPD record to an encounter record does not necessarily indicate a shortcoming in either NPPD or the utilization databases. If an item is ordered in one year but the related encounter falls in another year, then our method would not have found a match. Naturally this will be most common in items ordered in September and October, the months that bracket the dividing line between fiscal years. Matching will also be poor when replacement items are ordered without a need for an office visit. For example, a patient might have a single encounter in which a wheelchair is prescribed. He later obtains the wheelchair but finds that it does not suit his needs. If a new NPPD order is placed for a different chair, in many cases a second encounter would not be needed. A third explanation for limited matching concerns the time needed to order certain items. Prosthetic limbs and specialized wheelchairs, for example, may take several months to create, thereby causing the NPPD order and the related encounter to fall beyond the matching windows we studied.

Although we believe that the utilization files are mostly complete, it is well known that some inpatient events are not well captured. Examples include kidney dialysis and outpatient care received by residential and nursing home patients, among others. VA recently developed a VISTA application, the Inpatient Encounter (IE) system, to capture outpatient care provided to inpatients. IE achieved widespread implementation only after the fiscal years we studied. If it captures additional care that incorporates prosthetics then we would likely find higher matching rates among inpatients in future years.

Matching rates should be interpreted in light of the purpose of NPPD. Most utilization databases record events, such as a hospital stay or outpatient visit, but NPPD records orders. One cannot use NPPD to determine whether, or for how long, the patient used a particular prosthetic item. In

this respect it is similar to a pharmacy prescription database that records whether a prescription was filled but not whether the patient took the medication. This distinction can explain some apparent anomalies in prosthetics ordering. For example, NPPD records might indicate that a single person received three wheelchairs in the same month. The individual might have returned the first two and kept only the third. NPPD records do not indicate whether a patient ever used or continues to use a product. Nor, as noted above, would we expect there to be a separate provider encounter for each order.

Another interpretation of our results is that some veterans obtain prosthetics within VA but go to outside providers for prosthetics-related care. This is unlikely to explain the matching results we found. It is extremely unlikely that current inpatients would transfer for another inpatient provider for the use or placement of a prosthetic device. Among outpatients, the NPPD order had to be placed by a VA physician. Even if later encounters related to the prosthetic occurred outside VA, it should be possible to match the original VA encounter to the prosthetic as long as the item arrives within a few weeks.

We have several recommendations for researchers. First, to develop the fullest understanding of the prosthetics used by a particular patient will require both NPPD and utilization databases. The results presented earlier suggest that both sources are needed to determine the full set of prosthetics – even defined broadly as categories – received by an individual. Second, one should clarify whether the order date or the fulfillment date is of greater interest. For complex items such as wheelchairs and prosthetic limbs, these may be months apart, in some cases in separate fiscal years. Third, we recommend that NPPD not be used to study the purchase of prosthetics only if the items are not stored as ward stock. Although individual orders may be fulfilled from ward stock, the ward stocks themselves are not replenished through orders that appear in NPPD.

We will conclude by noting that NPPD can serve researchers in several ways beyond matching to utilization data. NPPD records can be used to calculate the cost of particular items or the cost ratio of new versus replacement items. These can be calculated at the station, VISN, or national level, and for any selected time period. NPPD can also be used to determine when a new device or service was first ordered in VA.

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