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Clinical databases in physical therapy

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ABSTRACT

Clinical databases in physical therapy provide increasing opportunities for research into physical therapy theory and practice. At present, information on the characteristics of existing databases is lacking.

The purpose of this study was to identify clinical databases in which physical therapists record data on their patients and treatments and to investigate the basic aspects, data sets, output, management, and data quality of the databases. Identification of the databases was performed by contacting members of the World Confederation for Physical Therapy, searching Pubmed, searching the Internet, and snowball sampling. A structured questionnaire was used to study the characteristics of the databases. The search was restricted to North America, Australia, Israel, and Western Europe. Seven clinical databases on physical therapy were identified. Four databases collected data on specific patient categories, whereas the others collected data on all patients. All databases collected data on patient characteristics, referrals, diagnoses, treatments, and closure, whereas some databases also collected functional status information. The purposes of the databases were diverse, but they can be summarized as quality improvement, research, and performance management. Although clinical databases are new to the field, they offer great potential for physical therapy research. Potential can be increased by further cooperation among databases allowing international comparative studies.

INTRODUCTION

Information technology is becoming an important tool for improving the clinical management of patients and assessing clinical outcomes (Black and Payne, 2003; Carey et al, 2004; Hannan, 1999; Månsson, Nilsson, Björkelund, and Strender, 2004; Miller and Sim, 2004; Palmer, 1997; Resnik and Hart, 2003; Resnik and Jensen, 2003; Treweek, 2003; Werneke and Hart, 2004). Health care providers regularly record clinical information during normal daily practice to manage the treatment of their patients (Fritz, Delitto, and Erhard, 2003; George, Fritz, Bialosky, and Donald, 2003; Werneke and Hart, 2003) and to make decisions on treatment most likely to produce good outcomes (Childs et al, 2004; Wainner et al, 2005). Entering clinical information in computers as electronic medical records (EMRs) instead of handwritten records improves accessibility of the information (Metsemakers et al, 1992). When EMRs include standardized data elements, these elements can be aggregated and stored in a clinical database from which the data can be exported for analyses. We operationally define a clinical database as a collection of information from (electronic) medical records from many providers, one purpose of which is research.

Clinical databases form a unique source of population-based information on health services usage (Carey et al, 2004), promoting the opportunity to conduct research. Databases can be used for epidemiologic and observational studies of accessibility to health care, health care use, prevalence and management of diagnosed disorders, and outcome research (Concato, Shah, and Horwits, 2000; Hannan, 1999; Russek, Wooden, Ekedahl, and Bush, 1997). Databases can also facilitate assessment of quality improvement measures such as clinical audits (Black and Payne, 2003; Hannan, 1999; Månsson, Nilsson, Björkelund, and Strender, 2004; Miller and Sim, 2004; Treweek, 2003). Databases that contain data collected over time can be used to monitor changes in health care secondary to changes in procedure or policy (Russek, Wooden, Ekedahl, and Bush, 1997). Information in databases can be used to investigate changes in patient demand secondary to restrictions on reimbursement (Swinkels, van Sonsbeeck, and de Bakker, 2005). Finally, clinical databases can be used to compare health care between countries. All these potential uses also apply to databases in physical therapy, which additionally contribute to the development of physical therapy as a profession, by describing the practice of physical therapy to policymakers, financiers, and referrers.

Although the need for clinical databases has been documented, some sources have expressed concern about the quality of the databases. Simply extracting information from electronic medical records makes researchers dependent on the quality of the information entered, limiting the research options to qualitative research methods when only free text data are available. Options are greatly enhanced when data elements are standardized, but questions then arise with regard to coding variation. To maximize the use of clinical databases and to encourage confidence in them, databases should include relevant information on patient characteristics, treatment procedures, and outcome (De Jong et al, 2004), and information on the database goals, design, and data validity (Black and Payne, 2003; Carey et al, 2004; Treweek, 2003) should be made available.

We did not find a published review of existing clinical databases in physical therapy. Such an overview has several benefits, which include helping clinical database developers set up or improve their own databases and providing insight into the extent to which data from various databases are comparable. The purposes of the current study were to identify physical therapy clinical databases and to describe the basic aspects, data set, outputs, management, and data quality of the databases. We restricted our search to databases in North America, Australia, Israel, and Western Europe.

METHODS

Inclusion criteria

Criteria for the inclusion of a database in our analyses were established on the basis of a consensus among the authors. The first criterion was that the clinical database should contain data on physical therapy services. Furthermore, data contained in the database should be recorded by physical therapists. Third, the database should contain data on the patient, on the treatment episode, or on a

lower level (e.g., patient visit). Fourth, the database had to be in existence for at least one year. Fifth, the database had to be electronic, regardless of the source of collected information (written or electronic). Sixth, the database should contain data on patients with common impairments treated in outpatient rehabilitation clinics. Seventh, public use of the data had to be permitted.

Furthermore, data had to be collected by at least 10 physical therapy practices/clinics. Ninth, the database had to include five or more variables on patient or treatment characteristics.

Finally, the database had to be located in North America, Australia, Israel, or Western Europe.

Identification of clinical databases

Identification of clinical databases was done in five ways:

1. The present study was a collaboration between researchers in the Netherlands, the United States, and Israel. Three of the authors are involved in a clinical database in these countries.
2. All member organizations of the World Confederation for Physical Therapy (WCPT) in North America, Canada, Australia, Israel, and Western Europe were contacted by electronic mail. They were asked to identify clinical databases in their country and to provide contact details of key persons responsible for these databases. This e-mail was accompanied by an electronic mail from the Royal Dutch Society for Physical Therapy (KNGF), encouraging participation. Reminders were sent 2 and 5 weeks after the first e-mail. The Secretary General of the WCPT was informed about the research project.
3. The literature database Pubmed was searched for publications in which data from clinical databases were used. The following search strategy was used for this search: ('Information systems'[MeSH] OR 'Databases, factual'[MeSH] OR 'Database management systems'[MeSH] OR 'Medical records systems, computerized'[MeSH] OR 'Registries'[MeSH] OR 'Management information systems'[MeSH] OR 'Medical records'[MeSH]) AND ('Physical therapy techniques'[MeSH] OR 'physical therapy (specialty)')[MeSH]). The search was restricted to publications in English published between January 1, 1990, and the date on which the search was performed (December 8, 2004).
4. Searches on the Internet were performed to find additional databases. This search was performed in the AltaVista search service, because of its capability of searching with Boolean expressions. The following search strategy was used: ('physical therapy' OR 'physiotherapy') AND 'clinical database'. The search was restricted to web pages in English published between January 1, 1990, and the date on which the search was performed (December 20, 2004).
5. Finally, identified key persons were asked to name other persons who might be responsible for databases (snowball sampling).

Questionnaire for collecting characteristics

A questionnaire was developed to systematically investigate the characteristics of clinical databases. This questionnaire was based on the Quality Assessment Checklist of DoCDat, Directory of Clinical Databases (Black and Payne, 2003). The DoCDat data offer an electronic source of information on the actual or potential recipients of health care in the United Kingdom (DoCDat, 2004).

The questionnaire used in the current study consisted mainly of closed-ended questions (the questionnaire is posted online: <http://www.nivel.nl/system/scripts/downloadtracker.asp?download=http://www.nivel.nl/pdf/questionnaire-clinical-databases-physical-therapy.pdf>).

It was sent by e-mail to the contact persons for the clinical databases. Respondents had the option of completing it electronically or on paper. The questionnaire included questions on five topic areas: .

Basic aspects. This topic included the date when data collection began, the date when data collection ended, timing of data entry by participating therapists, generalizability of the database to the population, inclusion of disciplines other than physical therapy, methods of registration, and purposes (number of questions: 11).

. **Data set.** This topic included the numbers of participating practices and therapists, the numbers of patients on whom data were collected, variables collected, and times when data were recorded (number of questions: 8).

. **Output.** This topic included methods of data transmission, audit reports, patient-specific data reports, and publications (number of questions: 4).

. **Management of the databases.** This topic included items related to database management, funding, decision-making on identifying the variables to be included, steering committees, and users of the databases (number of questions: 5).

. **Data quality.** This topic included items related to validity assurance of the databases, coding guidelines, timing of meetings between participating therapists, and guidelines for modifying the database following pertinent changes in the health care environment, profession, or research activities (number of questions: 5).

RESULTS

Identification of clinical databases

Eighteen members of the WCPT were contacted for information about physical therapy clinical databases in their countries. The response rate was 61% ($n = 11$), with no response from the national physical therapy organizations in Austria, France, Italy, Luxembourg, Portugal, Spain, and Switzerland. The contact persons of 7 of 11 national physical therapy organizations reported that their organizations were unfamiliar with such databases in their countries. Four contact persons suggested other authorities or provided contact details for key persons for clinical databases in their country. This resulted in two clinical databases that might fulfill the inclusion criteria (National Outcome Registry and Private Practice Management Programme).

Searching in Pubmed and Altavista resulted in 352 and 156 search results, respectively. One of these results described a clinical database that had not been identified (State Funded Physical Therapy Outcome System [SFPTOS]) (Ohio Occupational Therapy, Physical Therapy, and Athletic Trainers Board, 2005). Furthermore, snowball sampling resulted in four additional clinical databases (Ongoing Patient Records, Medrisk, UMC Utrecht, Radboud University Nijmegen Medical Centre).

The following 10 databases were identified in this way:

- . National Information Service for Allied Health Care (LiPZ), Netherlands Institute for Health Services Research, Utrecht, the Netherlands
- . Focus on Therapeutic Outcomes, Inc. (FOTO Inc.), Tennessee, USA
- . Maccabi Healthcare Services, Tel-Aviv, Israel
- . State Funded Physical Therapy Outcome System (SFPTOS), Rehabilitation and Health Center, Inc., Ohio, USA .
- National Outcome Registry, American Physical Therapy Association (APTA), USA . Medrisk, Inc., King of Prussia, Pennsylvania, USA
- . Private Practice Management Programme (PPMP), The University of Queensland, Brisbane, Australia
- . Ongoing Patient Records (OPR), Maastricht University, the Netherlands .
- Mammacare, Fysioeffect, Parknet, Radboud University Medical Centre (Research Centre for Allied Health Care), Nijmegen, the Netherlands .
- University Medical Centre Utrecht, the Netherlands
- Seven of these databases met the inclusion criteria. The clinical databases of the University Medical Centre Utrecht and the University of Queensland were excluded, because they collected data on less than 10 practices/clinics.

The National Outcome Registry, which is expected to obtain data from electronic patient records, was excluded because APTA was still in the process of development. Appendix 1 contains descriptions of the registration networks, information about the contact persons, and contact details.

Basic characteristics clinical databases

The clinical databases differ in their basic aspects (Table 1). In most cases, the settings of the participants were private practices or outpatient clinics. The primary participating therapists in most of the databases were physical therapists in general practice, but specialized therapists (such as therapists treating children or athletes) also participated. Several databases were specific to patients with certain diagnoses. The database of Radboud University Nijmegen Medical Centre contained data on patients with Parkinson's disease, osteoarthritis, and breast cancer surgery; OPR contained data on patients with claudication; and Medrisk contained data on patients with neuromusculoskeletal complaints. The other databases included data on a larger variety of patients.

[TABLE 1]

In all databases except SFPTOS, physical therapists entered data over a period of at least 1 year without interruption. Data were entered electronically in most databases, and several databases used the Internet to transfer data to the database. In databases without an Internet connection, data were usually transferred monthly. Medrisk, which is one of the oldest databases, collected written paper and pencil surveys every 6 months. The data from the handwritten records were entered manually into the database. In some databases, physical therapists, their assistants, and patients entered data. For the Radboud University Nijmegen Medical Centre database, data were entered by patients, occupational therapists, and speech therapists, in addition to physical therapists. In the FOTO database, data were entered by physical therapists, their assistants, patients, athletic trainers, and occupational therapists. The data entered in the OPR database were recorded by nurse practitioners and medical specialists, as well as physical therapists.

All databases were used for research. The purposes of most databases included quality assurance and external benchmarking, (i.e., comparing the results of individual health care providers or clinics with a large aggregated sample). In addition to these purposes, OPR focused on implementation of the clinical guidelines for treatment of patients with claudication. The FOTO data were used to assist the therapists in the management of their patients' treatment and were used to assist administrators in the management of therapists, and of the practice, to develop marketing strategies, and to assist with sales.

Data set

The number of practices/clinics participating in the various databases ranged from 22 (SFPTOS) to 13,000 (Medrisk) (Table 1). The number of patients whose data were collected yearly ranged from 60 (OPR) to 130,000 (FOTO).

In most clinical databases, data were recorded on the first and the last patient visits. In half of the databases, data were recorded at every treatment session. All databases contained information on basic patient characteristics, such as gender and age (Table 2), whereas some databases included more specific patient characteristics, such as daily activity prior to initiation of the problem or level of education. Data on the reason for referral was collected in all databases; four databases contained the patient's diagnosis, and all databases contained information on the treatment provided. The treatment codes and the date of the first visit, for example, were included in all databases. The number of waiting days from the appointment scheduling day to the first visit and treatment dates were included in half of the databases. Closure data were included in most databases and contained, for example, information about the person who discharged the patient and the extent to which the treatment goals had been met. Attendance compliance and home program compliance were included in half of the databases. Only the OPR, FOTO and Maccabi databases collected functional outcomes data.

Table 3 shows the outcome measures used in the databases. Furthermore, some international classifications were used. SFPTOS, Maccabi, and FOTO, for example, used the International Classification of Diseases (ICD-9) (WHO, 1977), whereas the Radboud University Nijmegen Medical

Centre and LiPZ used the International Classification of Functioning, Disabilities and Health (ICF) (WHO, 2001) in order to code functions, activities, participation, and treatment goals. Furthermore, LiPZ used the International Classification of Primary Care (ICPC) (Lamberts and Woods, 1987) for diagnostic codes.

Output

The databases differed in the written outputs produced from the data. Research papers based on data from FOTO, Medrisk, and LiPZ have been published in national and international scientific journals and in nonscientific journals (Beattie et al, 2005; Hart, Mioduski, and Stratford, 2005; Resnik and Hart, 2003; Swinkels et al, 2005b) (Table 4). OPR, Maccabi, and Radboud University Nijmegen Medical Centre intend to publish in scientific journals, LiPZ researchers publish annual reports, and the SFPTOS has resulted in a final report to the State of Ohio.

[TABLE 2]

[TABLE 3]

Specific and comparative reports for participating therapists and clinics were produced from most clinical databases. These reports contained the results for that particular participant or comparisons between one participant and other participants, like national aggregated external benchmarks. Data in some clinical databases were used to report individual patient data back to the treating therapist for the purpose of assisting in the management of the patient's treatment in real time. FOTO provided risk-adjusted reports to participating clinics, in which the functional status outcomes of these clinics were benchmarked to the national aggregate.

Management

The clinical databases identified were supervised by various organizations: for-profit database management companies, independent research institutes, universities or health care organizations (Table 4). The majority of the databases (five out of seven) were funded by government of university. OPR was partly funded by provider fees; FOTO was primarily funded by provider fees and to a lesser degree by research grant funds. Most of the databases had steering committees, which were generally composed of providers, representatives of professional organizations, and researchers. In all databases, researchers were involved in decision making about the content of the collected data set, whereas providers, professional organizations, or policymakers were also involved in some databases. Various persons used the identified clinical databases, including policymakers, professional organizations, health care organizations, and providers.

Quality control

Attention was paid to data quality control in all clinical databases (Table 4). Four of the databases conducted range checks and consistency checks for internal validation of data quality, and some companies also performed external validation of the data through their research publications. Range checks and consistency checks alone were conducted in OPR and SFPTOS, whereas only external validation was conducted in Medrisk.

In four databases, registration rules were elucidated in a data manual, instruction was provided, and a helpdesk was available to answer questions about registration problems. Medrisk provided a data manual and SFPTOS provided instruction. Maccabi provided instruction and had a helpdesk. In all clinical databases, with the exception of LiPZ, regular meetings were planned in which participants could meet each other to discuss registration-related topics. Five databases were periodically adjusted for changes in health care organization or profession and six databases were periodically adjusted following research activities to keep the databases current (Table 4).

[TABLE 4]

DISCUSSION

We identified seven clinical databases: three in the United States of America, three in the Netherlands, and one in Israel. The databases generally contained data on patients, including diagnoses, referral sources, and treatments.

The development of clinical databases is rather new in physical therapy, but even the few physical therapy databases identified in the current study have already proved their value in health services research (Resnik, Feng, and Hart, 2006) and clinical outcomes (Hart, Mioduski, and Stratford, 2005; Jette and Jette, 1996; Resnik and Hart, 2003). The two main applications of physical therapy clinical databases (“clinical quality improvement and research” and “monitoring”) are explained and illustrated in the following paragraphs.

Clinical quality improvement and research

Data from FOTO, for example, have been used to describe the treatment of specific patient populations in support of clinical quality improvement and research (Di Fabio, 1998; Jette and Delitto, 1997). Once treatments have been described, researchers can investigate various aspects of clinical decision making (Jette and Jette, 1997) and perform external benchmark activities. Another benefit of clinical databases in physical therapy is that they can be used to assess improvement of the quality of care, depending on the collection of valid outcome data. Clinical databases have been used, for example, to identify clinical experts whose patients reported better gain in functional status compared to patients treated by non-experts (Resnik and Hart, 2003). Such studies require large clinical databases, because only large databases enable the use of refined risk adjustment processes from which meaningful interpretations of results can be made (Resnik, Feng, and Hart, 2006; Resnik and Hart, 2003). Clinical databases in physical therapy have also been used to develop new functional status outcomes instruments based on computerized adaptive technology that reduces patient burden for data collection. Data collection methods are improved as a result, and the use of clinically pertinent data in the real time management of patients in the clinic is facilitated (Hart et al, 2006; Hart, Mioduski, and Stratford, 2005).

Data from LiPZ have been used to investigate clinical guideline adherence (Swinkels et al, 2005a), and the results have shown that following implementation a majority of patients with low back pain were treated according to the Dutch physical therapy guidelines, although considerable variation existed among therapists.

Monitoring

The second application includes monitoring changes in physical therapy services. Several developments, such as health policy changes and newly developed clinical guidelines, can result in changes in physical therapy services.

Because clinical databases reflect physical therapy services continuously, changes in physical therapy treatments or outcomes can be monitored in real time. We illustrate this with an example: in the Netherlands, public insurance cover for physical therapy services was nationally regulated until 2004. On January 1, 2004, this situation changed: people had to obtain additional private insurance cover for physical therapy services. Data from the LiPZ network showed that this policy change has resulted in a decrease in the number of treatment sessions per practice (Swinkels, van Sonsbeeck, and de Bakker, 2005). These results played a major role in public discussions about the effect of the policy measure. Future investigations would benefit from the comparison of quality indicators (i.e., measures of effectiveness) and treatment visits (i.e., measures of efficiency).

Limitations

A limitation of the current study was its restriction to North America, Australia, Israel, and a part of Europe, and the use of inclusion criteria. Furthermore, the identification of databases depended on the knowledge and willingness of contact persons in the WCPT to participate, and we were not certain that we have included every available clinical database in our review. However, because our

search on Pubmed and the Internet and the snowball sampling resulted in only one additional database, we do not expect that many databases have been overlooked. Nevertheless, continuing exploration for additional clinical databases in physical therapy is warranted.

Future considerations

An important issue to consider is the future of clinical databases in physical therapy. Advances in computer technology will probably lead to an increased use of electronic medical records, and it is likely, therefore, that the number of clinical databases will grow. Organizations that are in the process of developing a clinical database can learn from the networks described in the current study. Furthermore, when existing networks cooperate, they can learn from each other by exchanging information, which will ultimately lead to improved information nationally and internationally. Results of the current study show that functional outcome measures are not included in all databases, whereas the outcome of care is believed to be an important aspect of the quality of care. Organizations with databases in which information about outcome of care is lacking might find it useful, therefore, to collect functional outcome-related data and explore how outcome measures are used in other databases. We suggest that greater international cooperation on the development of methods for outcome research and benchmarking will enhance quality in physical therapy. International cooperation on the establishment of indicators of quality of care that can be included in clinical databases will improve assessment of the quality of physical therapy. Assessment of differences in effectiveness and efficiency between different countries is also a future goal. The current study has shown that some databases take only minimal measures to increase the validity and data quality. It would be valuable to have a core set of data quality standards and range checks and consistency checks, and instruction could be part of this core set. The authors would encourage an international effort toward the standardization of the patient characteristics, treatment procedures, and outcome variables that are collected in the current or future physical therapy databases. Moreover, they would also encourage the development of a core set of validity measures for enhancing the quality of databases.

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TABLES

Table 1. General aspects of clinical databases.

Database	Start	Specialization of therapists	Setting of participating therapists	Number of practices	Categories of patients	Number of patients per year	Area	Purposes
OPR	2004	Exercise for patients with claudication	Private practice and hospital	> 25	Claudication	>260	Region Parkstad, the Netherlands	Quality assurance, research, benchmark data, implementation research
Medrisk	1994	Nonspecialized, sports, orthopedic manipulative, workers compensation	Private practice, public outpatient clinics	13,000	Neuromusculo-skeletal	43,000	USA	Quality assurance, health policy, research, benchmark
Radbound	2004	Specific categories	Inpatient and outpatient clinics	25	Parkinson, osteoarthritis, breast cancer surgery	> 150; 100; 60	Region Nijmegen, the Netherlands	Quality assurance, research, benchmark
Maccabi	2000	Nonspecialized, geriatrics, sports, orthopaedic manipulative, neurological, women's health, lymphatic, vestibular, postural	Public outpatient clinics	70	All	95,493	Israel	Quality assurance, research, benchmark, Medico-Legal
FOTO	1992	Nonspecialized, geriatrics, pediatrics (in and out patient), sports, orthopedic manipulative, industrial, neurologic, speech, cardiovascular including lymphadema, chronic pain	Private practice, public outpatient clinics, inpatient clinics, hospital outpatient clinics, payer owned clinics, physician owned clinics	517	All	138,517	USA, New Zealand, Israel	Quality assurance, health policy, research, bench mark, sales and marketing
SEPTOS	2001*	Nonspecialized, geriatrics, sports	Outpatient practice	22	All	14,527	State of Ohio, USA	Research, benchmark
LIPZ	2001	Nonspecialized	Private practice	40	All	23,000	the Netherlands	Quality assurance, health policy, research

*Data collection was ended at the end of the year 2001.

Table 2. Summary of variables collected in physical therapy clinical databases.

Category	Variables	OPR	Medrisk	Radboud	FOTO	Maccabi	SFPTOS	LiPZ
Patient	ID	X	X	X	X	X	X	X
	Gender	X	X	X	X	X	X	X
	Age	X	X	X	X	X	X	X
	Health insurance ¹	X	X	X	X	X		X
	Level of education	X		X				X
	Daily activity prior to initiation of the problem	X		X			X	
	Physical activity prior to initiation of the problem	X		X	X	X	X	
Referral	Referring date	X	X	X	X	X		X
	Type of referring physician	X	X	X	X	X		X
	Reason for referral (physician diagnosis)	X	X	X	X	X	X	X
Diagnosis	Patient's diagnosis	X		X	X	X		
	Type of disorder (orthopedic, neurological, etc.)	X	X	X	X	X	X	
	Recurrent complaints			X	X			X
	Previous health care for complaints	X	X	X	X	X		X
Treatment	Clinic ID	X	X	X	X	X	X	X
	Physical therapist's ID	X	X	X	X	X		X
	Episode number ²	X		X	X	X	X	X
	Episode starting date	X	X	X	X	X	X	X
	Episode status ³	X		X	X	X		X
	Frequency ⁴	X	X	X	X		X	X
	Payer type (care insurance, workers compensation, etc.) ⁵	X	X	X	X	X		
	Visit type (regular outpatient, home visit, etc)	X			X	X	X	X
	Waiting days referral to first visit	X	X				X	
	Waiting days appointment scheduling day to first visit	X					X	
	Treatment codes	X	X	X	X	X	X	X
	Treatment goals description	X	X	X	X	X		X
	Treatment dates	X	X	X	X			X
Closure	Episode summary letter (yes/no)	X	X	X	X	X		
	Date of episode summary letter	X	X	X	X			X
	Discharged by	X	X	X	X	X		X
	Return to full activity	X		X	X	X		
	Goals met	X	X	X	X	X		X
	Attendance compliance	X		X	X	X		
	Home program compliance	X		X	X	X		
	Number of visits in episode	X	X	X	X	X	X	X
	Number of days in episode	X		X	X	X	X	X

¹General health care insurance for the patient.

²Serial number for visits belonging to one episode.

³Status of the treatment episode: ongoing, completed.

⁴Frequency of the visits, for example once a week or twice a week.

⁵The payer of the patient's visit.

Table 3. Outcomes data collected in physical therapy clinical databases.

Database	Collected information
OPR	Performance and outcome indicators, not specified
Medrisk	Roland Morris (Roland and Morris, 1983), DASH 11, ¹ Expert Clinical Benchmarks, LLC patient satisfaction
Maccabi	Data on falls, Functional outcome data (FOTO)
FOTO	Pain information, global rating change, body-part-specific computerized adaptive tests for adult neuromusculoskeletal patients, computer administered surveys for pediatrics, 15 standardized computer-administered condition-specific surveys, patient satisfaction
SFPTOS	PF10, ² Oswestry (Fairbank, Couper, Davies and O'Brien, 1980), Neck Disability Index (Vernon and Mior, 1991), Shoulder Pain and Disability Index (SPADI) (Roach, Budiman-Mak, Songsiridej and Letratanakul, 1991), Knee Outcome Score (Irrgang, Snyder-Mackler and Wainner, 1998), Foot Function Index (FFI) (Budiman-Mak, Conrad and Roach, 1991)

¹DASH 11: Disabilities of the Arm, Shoulder and Hand questionnaire (Hudak, Amadio, and Bombardier, 1996).

²Physical Function subscale of the SF-36 (Ware and Sherbourne, 1992).

Table 4. Outputs, management, and data control in physical therapy clinical databases.

		OPR	Medrisk	Radboud	FOTO	Maccabi	SFPTOS	LiPZ
Output	Audit reports	X	X	X	X	X	X	X
	Patient reports for management	X	X	X	X	X	X	
	Published scientific articles		X		X			X
Supervisor	Intended scientific publications	X	X	X	X	X		X
	Independent research institute	X		X				X
	For profit database management company		X		X			
Funding	University	X		X				
	Health care organization					X	X	
	Public sector (i.e., government, university)	X		X		X	X	X
Decision-making ¹	Private sector (e.g., industry)		X					
	Providers	X			X			
	Researchers	X	X	X	X	X	X	X
Steering committee	Professional organization	X		X				X
	Providers	X	X		X	X		
	Policymakers				X			X
Validity	Other				X		X	
	Range checks	X		X	X	X	X	X
	Consistency checks	X		X	X	X	X	X
Coding rules	External validation		X	X	X	X		X
	Data manual	X	X	X	X			X
	Instruction	X		X	X	X	X	X
Periodical meetings ²	Helpdesk	X		X	X	X		X
	Periodically adjusted ³	X	X	X	X	X	X	
	Following changes in profession		X	X	X	X		X
Periodically adjusted ³	Following research activities	X	X	X	X	X		X

¹Who is responsible for the management of the data collection and the database?.

²Do participants periodically meet each other for discussing the procedures of rules?.

³Is the clinical database periodically adjusted for changes in the health care organization/profession or following research activities?.

APPENDIX 1

National Information Service for Allied Health Care (LiPZ)

LiPZ is a registration network in which Dutch physical therapists working in private practices all over the country collect health care-related data on a continuous basis. LiPZ participants record regular information that is necessary for health insurance in their own software program. An extra module has been built into these software programs, and additional information is recorded in this module. Once a month therapists extract all relevant information from the program and send it to the research institute. All information is entered into the database after standardized quality control. LiPZ is primarily intended to provide insight into physical therapy care. Policymakers use this information for planning and evaluating their policies.

Contact person: Ms I.C.S. Swinkels, MSc, researcher (i.swinkels@nivel.nl)

Address: NIVEL, Netherlands Institute for Health Services Research, P.O. Box 1568, 3500 BN Utrecht, the Netherlands Website: www.nivel.nl/lipz

Focus on Therapeutic Outcomes, Inc (FOTO Inc.)

FOTO is a proprietary medical rehabilitation database management company in the United States where clinicians and patients enter data from therapy intake to discharge that is used to produce risk-adjusted comparative reports. Data, which are primarily collected electronically, are used by clinicians to assist in the management of their patients in real time. FOTO emphasizes patient self-report of functional status measures using computerized adaptive testing, but standardized surveys for pain, self-efficacy, patient-specific functional scales, functional status, disability, global rating of change, and clinician assessed ADL/IADLs and user-defined surveys are available.

Surveys are translated into Spanish, Hebrew, Arabic, and Russian and are currently used in Israel and have been used in New Zealand. Data are intended to improve patient outcomes and are being studied for pay-for-performance processes by policymakers.

Contact person: D.L. Hart, PT PhD, Director of Consulting and Research FOTO Inc (hart@fotoinc.com)

Address: P.O. Box 114444; Knoxville, Tennessee 37939-1444, USA

Website: www.fotoinc.com

Maccabi Healthcare Services

Maccabi is a public health insurance organization in Israel, serving full medical care to approximately 1,700,000 citizens. Maccabi is the second largest public health care organization in Israel. Physical Therapy is provided in over 70 clinics throughout the country by 420 licensed physical therapists. Over the past 5 years, Maccabi's physical therapy services constructed an electronic database, based on an electronic medical file system, electronic appointment scheduling system, and a computer-based outcome measurement system (FOTO). All data are collected online on a regular basis. The main purpose is to initiate routine observational research strategies, resulting in clinic specific reports on outcomes and their relationships with patient characteristics and process variables, to facilitate outcome improvement over time.

Contact person: D. Deutscher, PT MSc, Quality assurance and research coordinator in Physical Therapy (deutsch d@mac.org.il)

Address: 42 Hamaapilim st. Maalot, 24952, Israel

Website: www.maccabi-health.co.il/english-site/index.html

State Funded Physical Therapy Outcome System (SFPTOS)

SFPTOS was established to develop and implement a process for multicenter outcomes data collection and to describe outpatient physical therapy practice in the State of Ohio. Twenty-two outpatient physical therapy facilities participated in data collection throughout one year (2001). These facilities were located mostly in the northern portion of the state and consisted of both private and hospital-based clinics. Demographic (patient and facility) and utilization data were downloaded from each facility via billing software. Patient self-reported functional outcomes were collected on initial examination and again at discharge. Staff at the facilities entered these data onto a website developed and maintained by the project database manager. Data from the billing download and website were matched on the patient identification number and formatted for descriptive and correlational analysis. The project was funded by the PT Section of the Ohio State OT/PT/AT Licensure Board.

Contact person: Ms S. Carter PT MS PhD OCS, Assistant Professor (SCarter@amp.osu.edu)

Address: Medical University of Ohio, Department of Physical Therapy, 3000 Arlington Avenue, Toledo, OH 43614

Website: <http://otptat.ohio.gov/pdfs/PT%20Outcome%20study%20Ex.%20Summary.pdf>

Medrisk, Inc

Founded in 1994 and based in King of Prussia, Pa, MedRisk, Inc. provides specialty managed care services and claims workflow management tools to the workers' compensation industry. With a demonstrated core competency in physical medicine, MedRisk uses advanced technology and evidence-based research to apply and integrate comprehensive physical medicine, prescription drug, and imaging management solutions to deliver savings that are significantly greater than traditional

workers' compensation managed care programs. Its customers include insurance carriers, selfinsured employers, third-party administrators, and general managed care workers' compensation companies. Expert Clinical Benchmarks, LLC (ECB) is the clinical research and academic arm of MedRisk, Inc., the United States' leading provider of managed care programs for physical medicine, ECB provides clinicians, therapists, and carriers with the best available musculoskeletal treatment strategies based on an integrated outcome model and evidence-based practice.

Contact person: R.M. Nelson PT PhD FAPTA, Vice President of Expert Clinical Benchmarks LLC, Medrisk Inc (roger@medrisknet.com)

Address: Expert Clinical Benchmarks, LLC, P.O. Box 61570, King of Prussia, PA 19406, USA

Website: www.medrisknet.com, www.expertclinicalbenchmarks.com

Ongoing Patient Records (OPR)

OPR is a registration network based on electronic patient files with real-time feedback on therapy performance, embedding Dutch Clinical practice Guidelines for Physical therapy. Software has been specifically developed for both registration and research purposes; the application is entirely Web based. Participating physical therapists have been specifically trained in the protocols applied, the measurements used, and the data management required to use the database. Collected data are used to benchmark physical therapy performance and to continuously update clinical guidelines. The database is independent of insurance parties.

Contact persons: R. De Bie PT PhD, Professor of Physiotherapy Research (ra.debie@epid.unimaas.nl) and E. Hendriks PT PhD, Programme leader for physical therapy clinical guideline development and implementation (hendriks@paramedisch.org)

Address: Maastricht University, Department of Epidemiology and Centre for Evidence Based Physiotherapy, P.O. Box 616, 6200 MD Maastricht, the Netherlands

Website: www.cebp.nl/?NODE=96

Mammacare, Fysioeffect, Parknet

Mammacare and Parknet were established to optimize the handover of patients with axillary lymph nodes dissection or Parkinson's disease from hospital care to outpatient physical therapy care. In hospital, medical and clinical physical therapy data are recorded in patient-specific forms within a special software program. A Web-based module transfers the data to the general practitioner and physical therapist in private practice. Physical therapists use measurement instruments to record the treatment data, such as goals, interventions, and evaluation. At the end of a treatment episode, data are saved in the databases. Fysioeffect is a Web-based system, which enables a follow-up of patients with osteoarthritis in the hip or knee. Data are recorded according to the Dutch PT guideline for clinical reporting. Standardized data for the course of pain and functioning will be available when the database is sufficiently full. The course of the treatment of an individual patient can be compared with the group of patients. Patients and physical therapists will be informed about the course and the expected results.

Contact person: R. Oostendorp PT MT PhD, Professor in Allied Health Sciences (r.oostendorp@kwazo.umcn.nl)

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