

Editorial

Statistics for orthopedic surgery 2006–2007: data from the Japanese Diagnosis Procedure Combination database

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Abstract

Background. The epidemiology of orthopedic surgery cases in Japan has not been determined adequately. This study analyzed statistics in orthopedic surgery for 2006 and 2007 using the Japanese Diagnosis Procedure Combination database.

Methods. Data were collected between July 1 and December 31 in both 2006 and 2007. We selected 78 diagnostic groups of musculoskeletal diseases and trauma, and recategorized them into eight specialties: trauma, spine, knee joint, hip joint, hand, oncology, rheumatoid arthritis, others. We then focused on the following five major diseases or procedures: spinal canal stenosis, disc degeneration or herniation, hip fracture, total hip arthroplasty, and total knee arthroplasty. We extracted the following information: type of admission, use of ambulance, age, sex, preoperative co-morbidities, surgical procedures, postoperative complications such as surgical-site infection or pulmonary embolism, in-hospital mortality, length of stay, and costs.

Results. A total of 226 644 patients were included. Approximately 33% were emergency cases. More than half of the patients were ≥60 years old. The surgery rate increased with age, with 13.1% of cases in their fifties to 22% in their seventies. The highest rate of surgery of the spine (5.8%), knee joint (4.5%), or hip joint (1.8%) occurred in patients in their seventies, and the highest rate of surgery for trauma (9.1%) occurred in patients in their eighties. The overall in-hospital mortality was 0.41%. Approximately 0.63% patients had a surgical-site infection, 0.22% had pulmonary embolism, 0.54% had cardiac events, and 0.41% had respiratory disorders. Hip fracture surgeries resulted in relatively high in-hospital mortality (1.38%) and postoperative complication rate (3.6%).

Conclusions. This study presents an overview of the clinical features of orthopedic surgery in Japan, which may be of value for determining therapeutic strategies in the management of orthopedic surgery patients.

Introduction

In Japan, orthopedic surgery covers both traumatic surgery and elective surgery, such as spinal surgery and total joint arthroplasty. Previously, we reported that the numbers of total hip arthroplasty (THA) or total knee arthroplasty (TKA) operations depended on hospital volume.^{1,2} We also reported the prevalence of total joint arthroplasty in rheumatoid arthritis patients using an observational cohort,³ but we do not have nationwide statistics on the total number of patients undergoing orthopedic surgery. Although the prevalence of postoperative complications (including surgical site infection) and in-hospital mortality have been reported for specific orthopedic surgeries,⁴⁻⁶ we unfortunately do not know the overall nationwide prevalence of postoperative complications after orthopedic surgery. Until now, a nationwide survey of orthopedic surgery has not been performed in Japan because of the lack of national reporting. The aim of this study was to describe statistics in orthopedic surgery in Japan between 2006 and 2007 using the Japanese Diagnosis Procedure Combination (DPC) database.

Material and methods

DPC database

The DPC is a diagnosis-dominant case-mix system comprising 17 major diagnostic categories (MDCs), 520 diagnostic groups, and 2347 case-mix groups. The system was started in 2003 with 82 medical school-affiliated hospitals. The number of participating hospitals has increased year by year. Data were collected between July 1 and December 31 each year and maintained by the DPC Research Group. The database included patient information on diagnoses coded with the ICD-10 (the International Classification of Diseases and Related

Health Problems, 10th Revision) codes, surgical procedures coded with the Japanese original K codes, preoperative co-morbidities and postoperative complications coded with the ICD-10 codes, in-hospital mortality, length of stay, and hospital costs.

Samples

Data for this survey were obtained from the DPC database for the years 2006 and 2007. Given the anonymous nature of the data, the requirement for informed consent was waived. From all 520 diagnostic groups in 17 MDCs, we selected 78 diagnostic groups in MDC 7 (musculoskeletal diseases) and MDC 16 (trauma). The 78 groups were then recategorized into eight specialties: trauma, spine, knee joint, hip joint, hand, oncology, rheumatoid arthritis, and others. The details of the eight specialties, comprised of the 78 diagnostic groups, are described in the Appendix. Among the patients in the 78 groups, we selected patients who underwent orthopedic surgery under general, spinal, or epidural anesthesia. Nonsurgical and minor surgical cases under local anesthesia were excluded. We then focused on the following five major diseases or procedures: (1) spinal canal stenosis, including cervical, thoracic, or lumbar canal stenosis; (2) disc degeneration or herniation; (3) hip fracture; (4) THA; (5) TKA. Surgical patients with spinal canal stenosis, disc degeneration or herniation, or hip fracture were identified using the unique DPC codes 070340, 070350, and 160800, respectively. Patients who underwent THA or TKA were identified using the unique K code (K0821).

Overall statistics

Using all the cases in the database, we extracted the following information: type of admission (elective or emergency), use of the ambulance service, age, sex, preoperative co-morbidities (diabetes mellitus, hyperlipidemia, hypertension, chronic lung disease, cardiac disease, cerebrovascular disease, renal dysfunction, liver cirrhosis), surgical procedures coded with the K codes, postoperative complications (surgical-site infection, sepsis, pulmonary embolism, cardiac event, respiratory disorder, cerebrovascular event, renal failure), and in-hospital mortality. The age distribution of patients stratified by the eight specialties was determined. The in-hospital mortality and postoperative complication rate were calculated for each diagnostic group and each generation.

Statistics of surgical patients in the five major disease categories

With regard to the five major diseases, we collected data on age, sex, diagnoses, preoperative co-morbidities, sur-

gical procedures, postoperative complications, in-hospital mortality, length of stay, and costs. Costs were calculated by summing the fee-for-service cost of drugs, medical equipment, examinations, procedures, and hospitalization.

Results

Overall statistics

A total of 226644 patient records were available for this study, including 79251 patients in 424 hospitals in 2006 and 147393 patients in 926 hospitals in 2007. The basic characteristics of the cases in 2006, 2007, and total are presented in Table 1. Chi-squared tests and *t*-tests showed no significant differences of the average age, rates of males, ambulance service use, preoperative co-morbidities, postoperative complications, or in-hospital deaths between 2006 and 2007 data. Thus, we merged the two data sets for further analyses.

Overall, approximately 45% of the patients were male, and 67% were elective cases. More than half of the patients were ≥ 60 years of age. Hypertension (11.9%) and diabetes (7.4%) were relatively common preoperative co-morbidities. With regard to postoperative complications, 1420 (0.63%) patients had a surgical-site infection, 489 (0.22%) had pulmonary embolism, 1217 (0.54%) had cardiac events, and 934 (0.41%) had a respiratory disorder. Overall, 4588 (2.01%) had at least one complication. The in-hospital mortality was 0.41%. Table 2 shows the postoperative mortality and morbidity for each generation. Linear trends were shown between age and mortality/morbidity.

The numbers of patients in the eight specialties are shown in Table 3 as follows: 104914 (46.3%) in the trauma category; 45407 (20.0%) in the spine group; 39042 (17.2%) in the knee joint group; 14921 (6.6%) in the hip joint group; 5543 (2.4%) in the hand group; 2895 (1.3%) in the oncology group; 4898 (2.2%) in the rheumatoid arthritis group; 9024 (4.0%) in the others group. Table 3 also shows the in-hospital mortality and postoperative complication rates in each diagnostic group in the eight specialties. Oncology had the highest in-hospital mortality rate (2.87%) of the eight specialties. Approximately 40% (41806 cases) of all traumatic surgeries were performed for hip fracture, and in-hospital mortality (1.38%) and the rate of postoperative complications (3.60%) following hip fracture surgery were the highest of all operations performed for traumatic injuries.

Figure 1 shows the age distribution of the patients stratified by the eight specialties. The proportion of patients in their tens, twenties, thirties, or forties ranged from 6% to 8%, whereas the proportion in their fifties

Table 1. Statistics for all cases ($n = 226644$)

	Total		2006		2007	
	No.	%	No.	%	No.	%
No. of patients	226644	100.0	79251	100.0	147393	100.0
Sex						
Male	102052	45.0	36427	46.0	65625	44.5
Female	124592	55.0	42824	54.0	81768	55.5
Age (years)						
≤ 9	5578	2.5	1964	2.5	3614	2.5
10–19	18110	8.0	6584	8.3	11526	7.8
20–29	14612	6.4	5561	7.0	9051	6.1
30–39	16342	7.2	6056	7.6	10286	7.0
40–49	16689	7.4	5959	7.5	10730	7.3
50–59	29590	13.1	10751	13.6	18839	12.8
60–69	37228	16.4	12859	16.2	24369	16.5
70–79	49945	22.0	17064	21.5	32881	22.3
80–89	30154	13.3	9756	12.3	20398	13.8
≥ 90	8396	3.7	2697	3.4	5699	3.9
Type of admission						
Elective	151178	66.7	53546	67.6	97632	66.2
Emergency	75457	33.3	25700	32.4	49757	33.8
Information not provided	9	0	5	0	4	0
Ambulance service use	34555	15.2	12011	15.2	22544	15.3
Preoperative co-morbidities						
Diabetes mellitus	16829	7.4	6103	7.7	10726	7.3
Hyperlipidemia	7596	3.4	2676	3.4	4920	3.3
Hypertension	27005	11.9	9633	12.2	17372	11.8
Chronic lung diseases	3764	1.7	1441	1.8	2323	1.6
History of cardiac diseases	8521	3.8	3179	4.0	5342	3.6
History of cerebrovascular diseases	1718	0.8	637	0.8	1081	0.7
Renal dysfunction	2644	1.2	985	1.2	1659	1.1
Liver cirrhosis	556	0.2	225	0.3	331	0.2
Postoperative complications						
Surgical site infection	1420	0.63	487	0.61	933	0.63
Sepsis	342	0.15	115	0.15	227	0.15
Pulmonary embolism	489	0.22	181	0.23	308	0.21
Cardiac events	1217	0.54	433	0.55	784	0.53
Respiratory disorder	934	0.41	309	0.39	625	0.42
Cerebrovascular event	302	0.13	124	0.16	178	0.12
Renal failure	119	0.05	50	0.06	69	0.05
At least one complication	4558	2.01	1620	2.04	2938	1.99
In-hospital mortality	934	0.41	309	0.39	625	0.42

Table 2. In-hospital deaths and postoperative complications in each generation

Age (years)	Total	In-hospital death		Postoperative complication	
		No.	%	No.	%
≤ 9	5578	0	0	33	0.59
10–19	18110	0	0	107	0.59
20–29	14612	3	0.02	148	1.01
30–39	16342	7	0.04	154	0.94
40–49	16689	10	0.06	158	0.95
50–59	29590	38	0.13	422	1.43
60–69	37228	109	0.29	744	2.00
70–79	49945	214	0.43	1305	2.61
80–89	30154	352	1.17	1103	3.66
90–99	8222	190	2.31	370	4.50
≥ 100	174	11	6.32	14	8.05
Total	226644	934	0.41	4558	2.01

sharply increased (13.1%), reaching a peak in patients in their seventies (22.0%). In regard to specialties, the highest proportions of patients in the spine (5.8%), knee joint (4.5%), or hip joint (1.8%) categories were in their seventies, and those in the trauma category (9.1%) were in their eighties. Most of the patients in their nineties underwent surgery for trauma.

Statistics of surgical patients regarding the five major diseases

Regarding the five major diseases and procedures, 26079 patients had spinal canal stenosis, 11582 had disc degeneration or herniation, 41806 had a hip fracture, 13537 underwent THA, and 16800 underwent TKA. Among the spinal canal stenosis patients, 7940 (30.4%) had cervical canal stenosis (ICD codes M4712, M4722,

Table 3. In-hospital deaths and postoperative complications following orthopedic surgery in eight specialties

Diagnostic group	Total	%	In-hospital death		Postoperative complication	
			No.	%	No.	%
Trauma						
Hip fractures	41 806		578	1.38	1507	3.60
Fracture or dislocation of foot and ankle	11 449		1	0.01	80	0.70
Fracture or dislocation around the knee	7 415		18	0.24	109	1.47
Fracture or dislocation around the elbow	7 197		3	0.04	52	0.72
Antebrachial fracture	6 535		0	0.00	44	0.67
Fracture or dislocation around the shoulder	6 525		13	0.20	69	1.06
Clavicular fracture/scapular fracture	5 653		2	0.04	24	0.42
Fracture around the lower leg	5 250		3	0.06	60	1.14
Muscle and tendon injury of the extremities	3 774		0	0.00	33	0.87
Other trauma	9 310		60	0.64	297	3.19
All trauma	104 914	46.3	678	0.65	2 275	2.17
Spine						
Spinal canal stenosis including spondylosis	26 079		41	0.16	580	2.22
Disc degeneration and herniation	11 582		2	0.02	90	0.78
Unstable spine	3 284		4	0.12	49	1.49
Cervical spinal injury	1 257		24	1.91	102	8.11
Other spinal diseases	3 205		27	0.84	161	5.02
All spinal diseases	45 407	20.0	98	0.22	982	2.16
Knee joint						
Osteoarthritis of the knee	16 127		9	0.06	374	2.32
Other knee joint diseases	22 915		11	0.05	188	0.82
All knee joint diseases	39 042	17.2	20	0.05	562	1.44
Hip joint						
Osteoarthritis of the femur	12 270		11	0.09	227	1.85
Idiopathic osteonecrosis of the femur	2 202		2	0.09	68	3.09
Other hip joint diseases	449		4	0.89	15	3.34
All hip joint diseases	14 921	6.6	17	0.11	310	2.08
Hand						
Fracture or dislocation around the wrist	2 967		0	0	11	0.37
Other hand surgeries	2 576		0	0	20	0.78
All hand surgeries	5 543	2.5	0	0	32	0.58
Oncology						
Benign musculoskeletal tumors	1 594		1	0.06	9	0.56
Malignant musculoskeletal tumors	1 154		82	7.11	68	5.89
Other oncological diseases	147		0	0	2	1.36
All oncological diseases	2 895	1.3	83	2.87	79	2.73
Rheumatoid arthritis	4 898	2.2	8	0.16	107	2.18
Others	9 024	4.0	30	0.33	212	2.35
Total	226 644	100.0	934	0.41	4 558	2.01

M4782, M4802, M4882), and 16 150 (61.9%) had lumbar canal stenosis (M4786, M4806). Among disc degeneration or herniation patients, 1142 (9.9%) had a cervical disc disorder (M50), and 10 440 (90.1%) had a thoracic or lumbar disc disorder (M51). Among THA patients, 10 913 (80.6%) were diagnosed with osteoarthritis (M16), 1 068 (7.9%) with osteonecrosis of the femoral head (M87), and 522 (3.9%) with rheumatoid arthritis (M05, M06, others). Among TKA patients, 13 962 (83.1%) were diagnosed with osteoarthritis (M17) and 1 911 (11.4%) with rheumatoid arthritis.

Table 4 shows the statistics of surgical patients with the five major diseases. The age distribution shows that spinal canal stenosis, THA, and TKA were common in

patients in their seventies, whereas for hip fracture the distribution showed a peak in patients in their eighties. The common preoperative co-morbidities were diabetes mellitus, hypertension, and cardiac disease. The rate of surgical-site infection was relatively high after surgery for spinal canal stenosis (0.83%), THA (0.80%), and TKA (0.96%). The rate of pulmonary embolism was 0.45% following hip fracture surgery, 0.46% following THA, and 0.68% following TKA, relatively higher than the rate following spinal surgery. The in-hospital mortality rate for the hip fracture group (1.38%) was markedly higher than mortality rates for the other specialties. The median length of hospital stay was shortest in the disc degeneration or herniation group (18 days). Costs

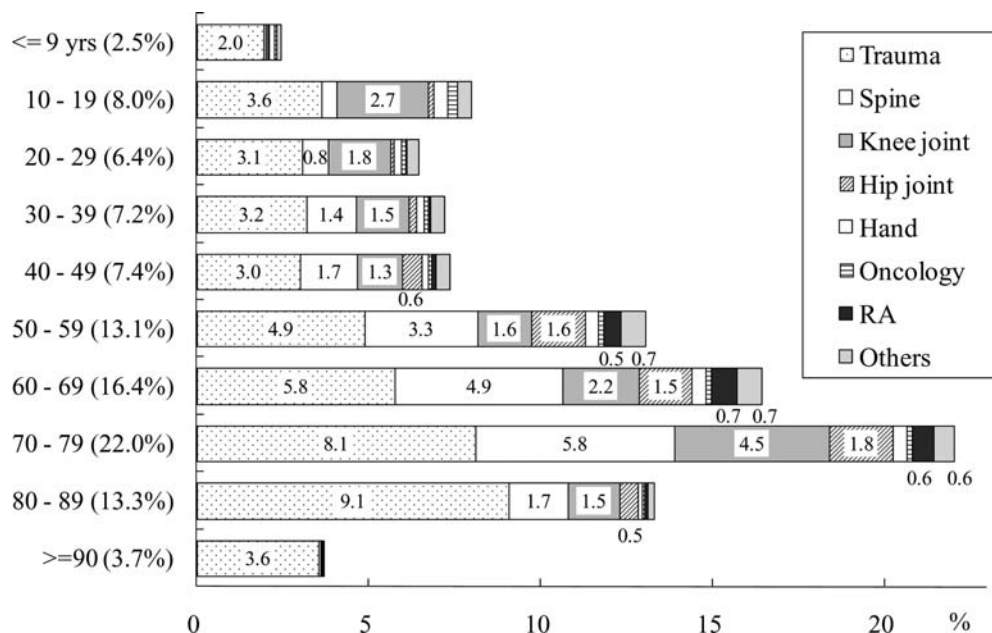


Fig. 1. Age distribution of patients stratified by eight specialties. The numbers indicate the percentage of patients in each specialty. Percentages below 0.5 were not described. RA, rheumatoid arthritis

Table 4. Statistics for surgical patients with the five major diseases

Parameter	SCS	DDH	HF	THA	TKA
No. of patients	26079	11582	41806	13537	16800
Teaching hospital (%)	21.1	15.3	4.5	26.8	17.6
Sex (% male)	60.5	66.7	23.6	16.1	16.3
Age (years), average	67.9	47.6	80.0	65.0	73.1
Age distribution (%)					
≤39 years	1.5	35.8	4.5	1.9	0.4
40–49 years	4.5	18.5	1.5	6.3	0.9
50–59 years	15.2	20.1	3.7	26.1	5.4
60–69 years	28.7	15.2	7.6	26.2	18.8
70–79 years	38.0	8.8	24.0	30.6	55.4
80–89 years	11.8	1.6	40.8	8.5	18.9
≥90 years	0.3	0.0	18.0	0.4	0.4
Preoperative co-morbidities (%)					
Diabetes mellitus	13.0	6.6	10.3	6.2	10.5
Hyperlipidemia	6.3	2.9	3.4	5.0	8.1
Hypertension	18.6	6.9	20.3	14.2	23.0
COPD	2.0	1.0	3.1	1.8	2.1
History of cardiac diseases	6.2	1.5	8.2	3.4	6.0
History of cerebrovascular diseases	1.0	0.3	2.1	0.5	0.9
Renal dysfunction	2.1	0.5	2.6	1.2	1.0
Liver cirrhosis	0.2	0.1	0.6	0.4	0.2
Postoperative complications (%)					
Surgical-site infection	0.83	0.28	0.35	0.80	0.96
Sepsis	0.10	0.05	0.26	0.08	0.11
Pulmonary embolism	0.09	0.05	0.45	0.46	0.68
Cardiac events	0.23	0.24	1.07	0.81	0.70
Respiratory disorder	0.14	0.12	1.27	0.20	0.32
Cerebrovascular events	0.05	0.05	0.37	0.10	0.14
Renal failure	0.05	0.00	0.10	0.06	0.04
In-hospital mortality (%)	0.16	0.02	1.38	0.23	0.09
Length of stay (days), median	23	18	35	32	32
Cost (thousand yen), median	1192	778	1484	2170	1844

SCS, spinal canal stenosis; DDH, disc degeneration or herniation; HF, hip fracture; THA, total hip arthroplasty; TKA, total knee arthroplasty; COPD, chronic obstructive pulmonary disease

Table 5. In-hospital deaths and postoperative complications in each generation among patients with the five major diseases, by age group

Parameter	No. of patients, by age group							Total
	≤39 Years	40–49 Years	50–59 Years	60–69 Years	70–79 Years	80–89 Years	≥90 Years	
SCS	399	1169	3975	7472	9919	3075	70	26079
Deaths	1 (0.25%)	1 (0.09%)	1 (0.03%)	12 (0.16%)	19 (0.19%)	6 (0.20%)	1 (1.43%)	41 (0.16%)
Complications	3 (0.75%)	11 (0.94%)	84 (2.11%)	142 (1.90%)	243 (2.45%)	92 (2.99%)	5 (7.14%)	580 (2.22%)
DDH	4151	2144	2326	1759	1017	183	2	11582
Deaths	1 (0.02%)	0	1 (0.04%)	0	0	0	0	2 (0.02%)
Complications	20 (0.48%)	9 (0.42%)	18 (0.77%)	25 (1.42%)	14 (1.38%)	4 (2.19%)	0	90 (0.78%)
HF	54642	16689	29590	37228	49945	30154	8396	226644
Deaths	10 (0.02%)	10 (0.06%)	38 (0.13%)	109 (0.29%)	214 (0.43%)	352 (1.17%)	201 (2.39%)	934 (0.41%)
Complications	442 (0.81%)	158 (0.95%)	422 (1.43%)	744 (2.00%)	1305 (2.61%)	1103 (3.66%)	384 (4.57%)	4558 (2.01%)
THA	254	856	3537	3544	4142	1155	49	13537
Deaths	1 (0.39%)	0	4 (0.11%)	6 (0.17%)	8 (0.19%)	12 (1.04%)	0	31 (0.23%)
Complications	3 (1.18%)	18 (2.10%)	53 (1.50%)	75 (2.12%)	122 (2.95%)	45 (3.90%)	3 (6.12%)	319 (2.36%)
TKA	61	143	912	3157	9300	3167	60	16800
Deaths	0	0	0	3 (0.10%)	7 (0.08%)	4 (0.13%)	1 (1.67%)	15 (0.09%)
Complications	4 (6.56%)	2 (1.40%)	25 (2.74%)	71 (2.25%)	261 (2.81%)	93 (2.94%)	5 (8.33%)	461 (2.74%)

were relatively high in the THA and TKA groups compared with the others.

Table 5 shows the rates of in-hospital deaths and postoperative complications in each generation among patients with the five major diseases. Linear trends of higher mortality and morbidity associated with higher age were presented, except for mortality in the disc degeneration or herniation group.

Discussion

The DPC database consists of data for approximately 1.08 million and 2.99 million inpatients in 2006 and 2007, respectively. Although the DPC database contains a huge amount of data, we should acknowledge a possible selection bias due to the difference of data size between 2006 and 2007. Approximately 5.6% of all the 4.07 million inpatients had a major diagnosis of orthopedic disease and underwent major orthopedic surgery. Orthopedic surgery covers both emergency traumatic surgery and elective surgery, including spinal surgery and total joint arthroplasty. This study revealed that about half of the orthopedic patients were taken to hospital because of trauma. Surprisingly, approximately 20% of orthopedic surgery patients suffered a hip fracture. Because hip fracture is a major trauma for elderly people, most of the orthopedic surgeons were expected to treat elderly patients who suffered a hip fracture. When we focused on elective surgery, as shown in Fig. 1, the rate of surgery for spinal canal stenosis, THA, and TKA were markedly increased in patients in their fifties. This may be determined by the natural course of degenerative changes, although it may also be influenced by the surgeons’ attitude. The average age of surgical patients for spinal canal stenosis and hip or knee joint diseases was >65 years.

Also surprisingly, the proportion of surgical patients who were ≥80 years of age was nearly 20%. It is well known that aging is associated with an increased prevalence of life-style disease, such as metabolic or cardio-pulmonary disease. This study clearly showed the high prevalence of life-style diseases in orthopedic surgical patients. For instance, 7.4% of the patients had diabetes mellitus, 11.9% had hypertension, and 3.8% had cardiac disease, as shown in Table 1. It suggested that orthopedic surgeons not only need to treat patients with the appropriate surgery but also need to collaborate with physicians who specialize in these life-style diseases.

This study determined the incidence of postoperative complications and in-hospital mortality using the nationally representative data set. As expected, age was associated with the incidence of postoperative complications and in-hospital mortality. As surgical-site infection is thought to be a strong predictor of mortality and

increased length of stay in hospital,⁷ we also focused on it. The overall incidence of surgical-site infection after orthopedic surgery was 0.63%. The incidence was relatively high after surgery for spinal canal stenosis (0.83%), THA (0.80%), and TKA (0.96%), similar to the results in previous reports.^{1,2,4,6,8} This finding was important because these infections can lead to tragic results, especially if they occur after implantation.

Pulmonary embolism was thought to be a major reason for in-hospital mortality and thus was investigated. The rates of pulmonary embolism following hip fracture surgery, THA, and TKA were relatively higher than that following spinal surgery. To prevent symptomatic pulmonary embolism, mechanical prophylaxis and early mobilization are recommended for high-risk patients after hip fracture surgery, THA, and TKA. Recently, chemoprophylactic agents were recommended for these patients^{9,10}; and in fact they were used for some patients in this database. We can evaluate their effects in a following study.

Most notably, the in-hospital mortality following hip fracture surgery (1.38%) was high compared with overall orthopedic surgical mortality. We can withhold “elective” surgery for high-risk patients until their condition improves, although surgery cannot be delayed in patients who suffer trauma. Although the in-hospital mortality was 1.38% in this study, it was reported that 68 (9%) of 845 patients died within 120 days after fracture,⁵ suggesting that patients might die after they leave surgical hospitals.

Japan faces an aging society. People aged ≥ 65 years reached 27 million in 2007, which is 22% of the total population in Japan. Bone and joint diseases associated with aging will inevitably increase. In fact, orthopedic-related bone and joint disease, resulting in locomotive problems, was the major reason for elderly people needing nursing care services in Japan, at a rate of more than 20%.¹¹ Moreover, aging will undoubtedly lead to an increase in the number of high-risk surgical patients who have several preoperative co-morbidities. Patient management in orthopedic surgery will unavoidably become more complex.

Future epidemiological study using the DPC database

This study presents basic information on clinical features of orthopedic surgery in Japan that can be useful for determining therapeutic strategies to manage orthopedic surgical patients. It is considered essential to

compile and analyze clinical epidemiological data continuously using the DPC database. We emphasize that orthopedists, epidemiologists, and health policy researchers should jointly utilize the DPC database to conduct academic studies that may be useful for managing the clinical orthopedic service.

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Appendix: 78 diagnostic groups in eight specialties

DPC database code	Diagnostic group
Trauma	
160590	Nerve injury of the extremities
160600	Vascular injury of the extremities
160610	Muscle and tendon injury of the extremities
160640	Traumatic amputation
160650	Compartment syndrome
160660	Subcutaneous soft tissue injury
160700	Clavicular fracture/scapular fracture
160710	Open clavicular fracture/scapular fracture
160720	Fracture or dislocation around the shoulder
160730	Open fracture around the shoulder
160740	Fracture or dislocation around the elbow
160750	Open fracture around the elbow
160760	Antebrachial fracture
160770	Open antebrachial fracture
160800	Hip fractures
160810	Open hip fractures
160820	Fracture or dislocation around the knee
160830	Open fracture around the knee
160835	Fracture around the lower leg
160840	Open fracture around the lower leg
160850	Fracture or dislocation of foot and ankle
160860	Open fracture or dislocation of foot and ankle
160890	Malunion (other than upper limbs)
160895	Malunion (upper limbs)
160980	Pelvic injury
160990	Multiple injuries
Spine	
070030	Benign tumors of spine and spinal cord
070180	Deformity of spine
070330	Spinal infection
070340	Spinal canal stenosis including spondylosis
070350	Disc degeneration and herniation
070360	Unstable spine
070370	Osteoporosis of the spine
160690	Injuries of thoracic and lumbar spine
160870	Cervical spinal injury
Hip joint	
070100	Suppurative or tuberculous coxitis
070220	Osteoarthritis of the femur
070400	Idiopathic osteonecrosis of the femoral head
070420	Slipped capital femoral epiphysis
Knee joint	
070120	Suppurative arthritis of the knee
070230	Osteoarthritis of the knee
070240	Flail joint
070250	Internal derangement of joint, joint loose body
070270	Patellar disorder
070280	Osteochondrosis
160620	Knee injuries
Hand	
070160	Peripheral nerve palsy of upper limbs
070190	Deformity of upper limbs and hands except pseudarthrosis
070200	Osteoarthritis of the hand
070390	Fibroblastic disorder, such as Dupuytren's contracture
160780	Fracture or dislocation around the wrist
160790	Open fracture around the wrist
Rheumatoid arthritis	
070470	Rheumatoid arthritis
070510	Gout and other joint diseases
070560	Autoimmune diseases with multiple organ disorder
Oncology	
070010	Benign musculoskeletal tumors

Appendix: Continued

DPC database code	Diagnostic group
070020	Benign tumors of nerve
070040	Malignant musculoskeletal tumors
070440	Pigmented villonodular synovitis
Others	
070050	Arthritis of shoulder
070060	Arthritis of hand or elbow
070070	Osteomyelitis
070080	Synovitis, tenosynovitis, etc. (upper limbs)
070085	Synovitis, tenosynovitis, etc. (others)
070090	Myositis
070135	Arthritis of lower limbs (except hip joint)
070150	Neurological deficit of upper limbs (thoracic outlet syndrome)
070170	Neurological deficit of lower limbs
070210	Deformities of the lower limbs
070290	Contracture and rigidity of upper limbs
070310	Contracture and rigidity of lower limbs
070380	Ganglion
070395	Necrotizing fasciitis
070430	Algoneurodystrophy
070460	Perthes disease
070570	Contracture of scar
070580	Torticollis
071030	Other musculoskeletal, soft tissue diseases

DPC, Diagnosis Procedure Combination (database)