

ONTARIO HOSPITALS' PURCHASING PRACTICES FOR HIP AND KNEE PROSTHESES: A SURVEY

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OBJECTIVES: To determine the makes, models and prices of the implants provided by Ontario hospitals for hip and knee replacements and the policies and procedures governing purchases.

DESIGN: A questionnaire survey of hospitals with telephone follow-up.

STUDY POPULATION: Seventy-nine public hospitals in Ontario in which 10 or more hip or knee replacements were carried out in the fiscal year 1993/94.

SURVEY RESPONSE: Seventy-six hospitals returned questionnaires (96% response rate), reporting on 4950 primary hip and 5107 primary knee implants. Sixty-two hospitals reported volumes and prices for 19 models used in 2961 hip implants. Information on price but not makes and models was available for 1989 hip implants. Model and price information was missing for 340 hip prostheses. Fifty-seven hospitals identified the models and prices for 3460 knee implants. Twenty-five hospitals provided prices but not specific models names for 1647 knee implants and hybrids.

OUTCOME MEASURE: The prices paid for prostheses.

RESULTS: The average price of hip implants was Can\$2141 (range from Can\$650 to Can\$3559). The average price for knee implants was Can\$2412 (range from Can\$1178 to Can\$3777). The averages and ranges were about the same for specified and unspecified models and hybrids. The variations were unrelated to hospital policies about the numbers of procedures to be provided or the procedures for making purchases from suppliers.

CONCLUSIONS: Savings of Can\$13.7 million could have been made in Ontario during the fiscal year 1993/94 had the lowest prices been paid for the implants. Although it may be neither desirable nor possible to use the least expensive model and price in every hospital, the potential for cost reductions in the purchase of implants is substantial.

OBJECTIF : Déterminer les marques, les modèles et les prix des implants fournis par les hôpitaux de l'Ontario pour des remplacements de la hanche et du genou, ainsi que les politiques et les procédures qui régissent les achats.

CONCEPTION : Enquête par questionnaire auprès d'hôpitaux et suivi téléphonique.

SUJETS DE L'ÉTUDE : Soixante-dix-neuf hôpitaux publics de l'Ontario qui ont procédé à au moins 10 remplacements de hanche ou de genou au cours de l'exercice 1993-1994.

RÉPONSES AU SONDAGE : Soixante-seize hôpitaux ont renvoyé les questionnaires (taux de réponse de 96 %) qui ont porté sur 4950 implants primaires de la hanche et 5107 implants primaires du genou. Soixante-deux hôpitaux ont indiqué des volumes et des prix pour 19 modèles utilisés dans 2961 implants de la hanche. Des renseignements sur les prix mais non sur les marques et les modèles étaient disponibles pour 1989 implants de la hanche. Les renseignements sur le modèle et le prix manquaient dans le cas de 340 prothèses de la hanche. Cinquante-sept hôpitaux ont indiqué des modèles et des prix pour 3460 implants de genou. Vingt-cinq hôpitaux ont fourni des prix et non des modèles précis pour 1647 implants de genou et implants hybrides.

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MESURE DE RÉSULTAT : Prix des prothèses.

RÉSULTATS : Le prix moyen des prothèses de la hanche s'est établi à 2141 \$ CAN (fourchette de 650 \$ à 3559 \$ CAN). Le prix moyen des implants de genou s'est établi à 2412 \$ CAN (fourchette de 1178 \$ à 3777 \$ CAN). Les moyennes et les fourchettes étaient à peu près les mêmes dans le cas des modèles et des hybrides spécifiés et non spécifiés. Les variations n'avaient aucun lien avec les politiques des hôpitaux au sujet du nombre d'interventions à pratiquer ni avec les procédures d'achat des fournisseurs.

CONCLUSIONS : Au cours de l'exercice 1993-1994, on aurait pu réaliser des économies de 13,7 millions de dollars CAN en Ontario si l'on avait payé les prix les plus bas pour les implants. Même s'il peut être ni souhaitable ni possible d'utiliser le modèle le moins coûteux dans chaque hôpital, il y a d'importantes possibilités de réduction des coûts d'achat d'implants.

Hip and knee replacements are the definitive treatment for reducing pain and disability caused by arthritic diseases or injury to these joints.¹⁻⁶ Among patients who have had joints replaced, relief of pain has been achieved in 85% to 90% and functional improvement seen in 70% to 80%.^{7,8} As a result, there has been a marked increase in the number of hip and knee replacement procedures in Ontario over the past 15 years. From the fiscal years 1980/81 to 1994/95, the number of procedures performed per 100 000 Ontario adults increased from 44 to 84 for hip replacement and from 14 to 80 for knee replacement.¹ There has been a corresponding proliferation of implantable hip and knee devices in the last 2 decades.⁹ Although the manufacturers suggest that the modern, more expensive designs with new alloys and coatings provide better anchorage and longevity than earlier designs, evidence from long-term studies is lacking.^{10,11}

There are few data in the literature to indicate the comparative effectiveness or cost-effectiveness of the various prostheses that are on the market. Hence, there are no evidence-based guidelines to indicate which implants should be purchased for primary hip and knee replacements and revisions.

The primary objective of this study was to determine the makes, models and prices of the implants being used by hospitals in Ontario for hip and knee replacements and the processes used for deciding upon prostheses. Some hospitals have negotiated contracts with specific suppliers and others participate in block purchase agreements with other hospitals. The variation in prices paid by the hospitals for the various implants could indicate the potential for savings in the costs of implants.

The secondary objective was to determine if the hospitals having set policies and purchase agreements with suppliers paid lower prices than hospi-

tals without such agreements.

To achieve these 2 objectives, we conducted a survey among Ontario hospitals that carried out hip and knee replacements to determine the variation in design usage, prices paid and the mechanisms by which the designs were chosen, utilization was monitored and prices were negotiated.

METHODS

According to the hospital discharge database compiled by the Canadian Institute for Health Information (CIHI), 5300 primary hip and 5400 primary knee replacements were carried out in a total of 93 Ontario hospitals during the fiscal year 1993/94. Ten hospitals that performed fewer than 10 procedures during the year were excluded to reduce the number of hospitals to be surveyed. One institution was misidentified in our database as one that performed these procedures when in fact it never did. It had the same name as a hospital that provided the procedures. We also excluded a federal hospital in Ottawa that performed procedures for members of the armed forces and the federal parliamentary staff because the practice might be very different from that in other hospitals.

The questionnaire developed for the survey asked for information on the models, makes, numbers and prices paid for the hip and knee implants; the committees or individuals who were responsible for purchasing

Table 1

Information Supplied by 74 Hospitals on Implantation of 4950 Hip Prostheses

No. of hospitals	Model (including hybrids)	Price	Volume	No. of implants
49	Yes	Yes	Yes	3591
9	No	Yes	Yes	735
4	Partial	Yes	Yes	198
4	Variable	Variable	Variable	426
8	Variable	Yes	No	?

Partial = hospitals provided incomplete information, variable = some hospitals provided specific information, others did not.

the implants; the committees or individuals who were responsible for determining the numbers of procedures to be performed in a year; and any additional information related to purchase policies and procedures the hospital wished to provide. For the pilot test of the questionnaire, we sent it to the chief executive officer and the chief of surgery at 15 hospitals. Members of the study team followed up the mailing with telephone calls to encourage participation, answer questions and collect any missing information. The questionnaire was revised and sent to the remaining hospitals, following the same procedures as used in the pilot study. The pilot study began in June 1995 and the full survey was completed by the following October.

Ethics approval was not sought for the following reasons: we requested

information about hospital policies and practices rather than information on individuals; in the covering letter we stated that neither the participating individuals nor hospitals would be identified in reports; finally, the persons receiving the letters could decide whether or not to participate in the study. The data were stored and processed on the Microsoft Access database program, version 2.0.

FINDINGS

The number of eligible hospitals was reduced to 79 from 81 because there were 2 mergers. Seventy-six (96%) of the 79 eligible hospitals participated in the study. Each of the 2 merged institutions submitted a joint questionnaire. According to the CIHI database, they provided 129 total pri-

mary hip replacements and 139 total primary knee replacements.

Purchasing policies and procedures

Of the 76 participating institutions, 39 (51%) reported that individual surgeons were the only persons who selected the designs to be implanted. A committee of surgeons chose the designs in 6 institutions, and 28 institutions had surgeons and other personnel, such as administrative staff or nurses, involved in the decision-making process. Ten of the 76 participating institutions participated in bulk purchase plans. The remaining hospitals dealt with vendors as individual institutions.

Seventy-two institutions indicated that their purchasing departments were part of the negotiating process with re-

Table II

Models of Hip Prostheses Implanted More Than 100 Times per Year in Ontario Hospitals From Apr. 1, 1993, to Mar. 31, 1994

No. of hospitals	Model name	No. of hips implanted (n = 3805)	Lowest price, \$ (and % from average price)	Highest price, \$ (and % from average price)	Average price, \$ weighted
10	AML	451	1895 (-28)	2995 (13)	2647
5	Contemporary	112	995 (-2)	1103 (8)	1018
2	Harris	180	975 (-5)	2150 (109)	1027
9	Harris-Galante Multilock	121	2497 (-13)	3343 (16)	2870
8	Mallory Head	303	2200 (-2)	2850 (27)	2246
5	Omnifit	176	1741 (-22)	2555 (15)	2229
13	PCA*	325	1695 (-31)	2828 (15)	2455
5	PCA E series	138	1548 (-16)	2755 (50)	1837
9	Precision	187	1598 (-18)	2599 (33)	1960
7	Protek	112	650 (-45)	1287 (10)	1172
2	St. Michael's	120	2121 (0)	2212 (4)	2122
4	Total hip system	231	2340 (-10)	2955 (14)	2587
12	Models not specified	759	995	3010	1980†
14	Hybrids of specific models	590	950	3559	2172†

*Includes both cemented and uncemented versions

†Not weighted

gard to these implants. Thirty-nine institutions involved their surgeons in the negotiations. In 4 institutions only the surgeons negotiated the prices.

Twenty-six institutions had established some form of limit (cap) on the number of primary hip implants that could be performed in the financial year. Forty-two hospitals reported they did not have caps. Five responding hospitals indicated uncertainty as to whether such a policy was in place, and the remaining 3 hospitals did not answer the question. The picture was similar for the primary knee implants. Twenty-four institutions had caps on the number of procedures that could be performed in the financial year. Thirty-seven hospitals did not have such limits. Four hospitals were unsure if such a policy was in place, and 11 hospitals did not answer the question. Most of the institutions set the cap based on the amount of money spent in the previous year.

Primary hip implants

Of the 76 responding institutions, 2 performed total hip arthroplasty only and 2 total knee arthroplasty only. The 74 institutions performing total hip arthroplasty carried out a total of 4950 hip replacements. Table I indicates the type of information supplied by the various hospitals on primary hip implants. For the hip im-

plants, where prices were available, the lowest unit price was Can\$650, the highest unit price was Can\$3559 (the unweighted average was Can\$2142).

Sixty-two hospitals gave specific model names for 2961 hip prostheses, not including hybrids. The hospitals identified a total of 19 makes and models of implants for hips. Table II lists the 12 models for which there were volumes of over 100 units/yr, accounting for 2456 (82.9%) of the units with a specific model name. The lowest prices paid for any of the models ranged from Can\$650 (Protek) to Can\$2497 (Harris-Galante Multilock) and the highest prices paid for any model ranged from Can\$1103 (Contemporary) to Can\$3343 (Harris-Galante Multilock). The average weighted price for a specific model ranged from Can\$1018 (Contemporary) to Can\$2870 (Harris-Galante Multilock). The unweighted average price across all models was Can\$2167.

Twelve institutions were unable to provide specific model names for their implants (1099 hips). Two hospitals gave specific model names for some but not all of their implants (45 hips). Another 18 hospitals used components from different designs to make up an implant for some or all of their procedures (670 hips). Three hospitals provided total volumes (175 hips) but not the volume associated with specific models. There were several

reasons why hospitals could not provide specific information on model, price and volume. Some did not have the data collection system or the personnel to retrieve the information from the records. Others could not divulge the information due to confidentiality clauses in contractual agreements with the suppliers. Of the 1099 hips replaced without named implants, the information on costs of the implants was unavailable for 340 hips. For the remaining 759 hips, the lowest unit price was Can\$995 and the highest was Can\$3010 (unweighted average Can\$1980).

Of the 18 hospitals that used hybrid implants, 4 did not specify the models from which the parts were drawn. These 4 hospitals replaced 80 hips for prices ranging from Can\$777 to Can\$2714/hip. The remaining 14 hospitals had a total volume of 590 hips and the unit prices varied from Can\$950 to Can\$3559 (unweighted average Can\$2172).

The 10 hospitals participating in bulk purchase plans bought a total of 752 hip implants. The unit prices paid ranged from a low of Can\$1108 to a high of Can\$3100 (weighted average Can\$2019).

Primary knee implants

Seventy-four hospitals provided a total of 5107 primary knee implants (Table III). The lowest price reported for a primary knee design was Can\$1178 with the highest price being Can\$3960 (unweighted average price Can\$2412).

Fifty-seven hospitals identified 24 model names for 3460 (67.8%) of all knee implants. Table IV lists the 12 models of knee implants for which the reported volumes 100 units/yr or more. The lowest unit prices paid ranged from Can\$1178 (PFC) to Can\$2300 (Duracon). The highest

Table III

Information Supplied by 74 Hospitals on Implantation of 5107 Knee Prostheses

No. of hospitals	Model (including hybrids)	Price	Volume	No. of implants
48	Yes	Yes	Yes	3695
8	No	Yes	Yes	618
4	Variable	Yes	Yes	235
3	Variable	Variable	Variable	559
11	Variable	Variable	No	?

Variable = some hospitals provided specific information, others did not.

unit prices for the 12 models ranged from Can\$2395 (Interax) to Can\$3777 (Genesis) (unweighted average across all models Can\$2370).

Twenty-five institutions were unable to provide specific model names for some or any of their knee implants (1360 knees). Others used separate components from different models to make up an implant (287 knees). Of the 1360 knee implants not associated with any specific model name, the lowest unit price was Can\$1385 and the highest was Can\$3137 (unweighted average Can\$2255). As for the 287 hybrid knee implants, the corresponding figures were Can\$1548, Can\$3233 and Can\$2368, respectively.

Ten hospitals bought the primary knee implants through bulk purchase plans. They purchased 834 knee implants with a minimum price of Can\$1385, a maximum price Can\$3263, and an unweighted aver-

age price of Can\$2253. The weighted average unit price was Can\$2031.

DISCUSSION

This study shows that there was significant variation in the designs of primary hip and knee prostheses used by Ontario hospitals. This finding is consistent with the observation made in the United Kingdom by Newman.¹⁰ In addition, there were significant variations in prices paid for the implants. The variation in price was present not only for the different designs but even for the same design. Therefore, there is a significant potential for savings in purchasing these devices.

The argument may be made that the newer or more expensive designs are better, but the superiority of the newer designs has not been convincingly demonstrated in the literature. Murray, Carr and Bulstrode⁹ polled

manufacturers of hip prostheses in the United Kingdom on the designs that were available, the corresponding list prices and references for any published results on the clinical evaluations of the design. The more recently the design was introduced, the more expensive it was. Yet there was little or no scientific evidence that the newer, more expensive, implants are better than the established designs. A similar study on primary knee prostheses yielded essentially the same findings: scanty literature evidence of efficacy and increasing prices with newer models.¹²

Morris¹³ and Rorabeck and colleagues¹⁴ have suggested that different devices be compared and evaluated through randomized clinical trials. Randomized trials would mean that thousands of patients would have to be followed up for years in order to test for predefined clinically significant differences between implants.¹⁵ An

Table IV

Models of Knee Prostheses Implanted More Than 100 Times per Year in Ontario Hospitals From Apr. 1, 1993, to Mar. 31, 1994

No. of hospitals	Model name	No. of hips implanted (n = 4500)	Lowest price, \$ (and % from average price)	Highest price, \$ (and % from average price)	Average price, \$ weighted
17	AMK*	287	1980 (-23)	3262 (27)	2565
5	Duracon	199	2300 (-7)	2730 (10)	2472
13	Genesis*	450	1981 (-13)	3777 (67)	2264
7	Insall-Burstein I or II	179	1850 (-8)	2449 (21)	2017
3	Interax	132	2200 (-7)	2395 (2)	2358
7	Kinemax*	224	1500 (-25)	2500 (25)	2000
3	Kinemax Plus*	151	2090 (-14)	2450 (1)	2431
4	Miller-Galante	115	2250 (-4)	3048 (31)	2333
24	Miller-Galante 2	521	1995 (-22)	3151 (23)	2555
7	PCA*	217	2129 (-22)	2997 (10)	2714
6	PFC*	190	1178 (-45)	2671 (25)	2139
4	Pressfit	188	2261 (-13)	2800 (8)	2596
19	Models not specified	1360	1385	3137	2255†
14	Hybrids of specific models	287	1548	3233	2368†

*Includes both cemented and uncemented versions

†Not weighted

arthroplasty registry is an alternative approach, as patients receiving various devices are followed up and assessed for outcomes.⁹ Sweden has a registry of total hip replacements initiated by the Swedish Orthopaedic Association. Malchau, Herberts and Ahnfelt¹⁶ reported on the outcomes of 92 675 primary total hip replacements performed between 1967 and 1977. The estimated prosthesis survival rates did not differ significantly according to the type of implant or whether the implants were cemented. Havelin and associates¹⁷ reported on 24 408 primary total hip replacements recorded by the Norwegian Arthroplasty Register from 1987 to 1993. They also found no clinically important differences among 8 different designs, but they did find that 2 cemented femoral components had higher rates of loosening whereas 4 others did not. Population-based registries of patients having total joint replacements provide a pragmatic and practical approach to assess the quality of implants and procedures.

That hospitals are paying markedly different prices for prostheses of the same design is an issue to be addressed. The hospitals were unaware of the prices other hospitals were paying for the same products. Our study may allow for a better understanding of the market place and the prices paid to suppliers. Although not studied by this survey, it is quite likely that the hospitals did not compare prices among themselves. Part of the problem stems from the fact that some hospitals entered into agreements with suppliers requiring that the prices paid remain confidential. Given that Ontario hospitals are publicly funded institutions, such agreements may not be in the public interest.

For every Can\$100 reduction in the unit price paid for the approximate 5000 primary hip implants and 5000

knee implants provided annually in Ontario, Can\$1 million could be saved. It must be emphasized that it may be neither desirable nor possible to use the least expensive model, but the following projection serves to illustrate the theoretical maximum for cost reduction. If the average price of hip implants were to fall to Can\$2000 to Can\$650 (the lowest reported price in the survey), the saving could be as much as Can\$6.8 million. The maximum saving projected for the 5000 primary knee implants, at Can\$6.8 million, is very similar in magnitude. Even though it may not be possible to achieve the hypothetical saving of Can\$13.4 million, it is likely that a savings of several million dollars is possible.

There are processes by which the pricing of these devices could be made more open and less subject to arbitrary pricing. Orthopedic surgeons may wish to establish a hospital panel by which to agree upon a small selection of devices. The decision will be based on all the important parameters such as patient characteristics, their needs, design features, available expertise and price. Guidelines that incorporated these factors have been proposed although they have not been evaluated in a prospective manner.¹⁸ A prosthesis utilization committee to monitor the outcome of these surgical procedures and to make decisions concerning the use of nonstandard prostheses serves to evaluate the entire process.¹⁹ A formal tendering process would follow to obtain the best prices from suppliers. Alternatively, many hospitals have formed group purchase plans to achieve even more savings by the volume of their purchases. Another useful exercise may be regular surveys among hospitals that provide joint implantation to find out what prices are paid for the different designs. Knowledge of the market place always

strengthens one's bargaining position.

With the increasing trend for joint implantation²⁰ and the associated costs,^{21,22} efforts to reduce the financial burden of these highly effective procedures could not be more timely.

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