Payments for care at private for-profit and private not-for-profit hospitals: a systematic review and meta-analysis


Abstract

Background: It has been shown that patients cared for at private for-profit hospitals have higher risk-adjusted mortality rates than those cared for at private not-for-profit hospitals. Uncertainty remains, however, about the economic implications of these forms of health care delivery. Since some policy-makers might still consider for-profit health care if expenditure savings were sufficiently large, we undertook a systematic review and meta-analysis to compare payments for care at private for-profit and private not-for-profit hospitals.

Methods: We used 6 search strategies to identify published and unpublished observational studies that directly compared the payments for care at private for-profit and private not-for-profit hospitals. We masked the study results before teams of 2 reviewers independently evaluated the eligibility of all studies. We confirmed data or obtained additional data from all but 1 author. For each study, we calculated the payments for care at private for-profit hospitals relative to private not-for-profit hospitals and pooled the results using a random effects model.

Results: Eight observational studies, involving more than 350,000 patients altogether and a median of 324 hospitals each, fulfilled our eligibility criteria. In 5 of 6 studies showing higher payments for care at private for-profit hospitals, the difference was statistically significant; in 1 of 2 studies showing higher payments for care at private not-for-profit hospitals, the difference was statistically significant. The pooled estimate demonstrated that private for-profit hospitals were associated with higher payments for care (relative payments for care 1.19, 95% confidence interval 1.07–1.33, \( p = 0.001 \)).

Interpretation: Private for-profit hospitals result in higher payments for care than private not-for-profit hospitals. Evidence strongly supports a policy of not-for-profit health care delivery at the hospital level.

Separating issues of funding (i.e., who pays for health care) and delivery (i.e., who owns and administers the institutions providing care) helps to inform debates about health care systems. Funding for health care can come through private sources, primarily administered through insurance companies, or through public payment, by governments using tax dollars. Care can be delivered at private for-profit institutions that are owned by investors; private not-for-profit institutions that are owned by communities, religious organizations or philanthropic groups; or public health care institutions owned and administered by the government.

Canadian hospitals are publicly funded. In terms of delivery, although they are commonly referred to as public institutions, Canadian hospitals are almost all owned and operated by private not-for-profit organizations.\(^1\) Canadian policy-makers continue to consider an expansion of private for-profit health care delivery, including private for-profit hospitals.\(^1\)

We have previously demonstrated higher risk-adjusted death rates among patients receiving care at private for-profit hospitals than among patients at private not-for-profit hospitals in a comprehensive systematic review.\(^2\) Uncertainty remains, however, about the economic implications of these forms of health care delivery. Studies evaluating the economics of health care delivery usually evaluate costs, charges or payments for care.\(^1\) From the perspective of a service provider, costs represent how much the provider paid to provide care, charges represent how much the provider billed the payer, and payments represent how much the provider received for the care received. In the context of publicly funded health care, the central policy question is how much government will pay for care delivered by private for-profit versus private not-for-profit providers. We therefore undertook a systematic
review and meta-analysis to address the following question: is there a difference in payments for patient care received at private for-profit compared with private not-for-profit hospitals?

Methods

We included published and unpublished observational studies and randomized controlled trials that directly compared payments for care at private for-profit and private not-for-profit hospitals. Because we required an estimate of variance to determine the precision of the estimate of the relative payments and to combine studies in our meta-analysis, we excluded from the quantitative meta-analysis studies that did not report (or whose authors could not provide) an estimate of variance for the payments.

Strategies to identify studies included an electronic search of 11 bibliographical databases; consultation with experts; review of our own files; review of reference lists from articles fulfilling our eligibility criteria; use of the “see related articles” feature in PubMed (in June 2003) for publications fulfilling our eligibility criteria; and use of Scisearch (in June 2003) for publications fulfilling our eligibility criteria.


Our 6 search strategies identified 7535 unique citations. Ten teams of 2 people independently screened the titles and abstracts of each citation and identified all citations that might contain a comparison of interest. This process yielded 788 full-text publications, identified by either screener, which we selected for full review (Fig. 1).

We masked the results by blacking them out in the tables and text of all publications selected for full review. To determine eligibility, 10 teams of 2 reviewers independently evaluated masked articles that they had not assessed during the screening process. The kappa value for agreement on article eligibility was 0.75. The consensus process to resolve disagreements required reviewers to discuss the reasoning for their decisions; in all cases, a realization of error by 1 reviewer completed the process. When both reviewers were uncertain as to whether a study was eligible, we contacted the author to clarify information.

Two reviewers independently abstracted the following data from all studies meeting eligibility criteria: sampling method, source of data, case mix, type of hospitals evaluated (e.g., general acute care, psychiatric), dates when data collection was initiated and completed, duration of patient follow-up, number of hospitals and patients evaluated, patient source of payment (e.g., public, private, insurance) and potential confounders adjusted for in the analyses. Reviewers resolved disagreements by consensus using the process described above. Our overall agreement was 89% for

![Fig. 1: Methodological steps of our systematic review.](www.cmaj.ca/cgi/content/full/170/12/1817/DC1)
For each study we computed the relative payments for care at private for-profit hospitals relative to private not-for-profit hospitals (see online Appendix 2 at www.cmaj.ca/cgi/content/full/170/12/1817/DC2). If a study reported 2 or more analyses with variance data, we included the adjusted analysis over an unadjusted analysis, and the analysis based on payments per discharge over that based on payments per day. We pooled these relative payments for care using a random effects model by weighting the natural logarithm of the relative payments by the inverse of their variances. Relative to the fixed effects model, the random effects model allows for between-study variation in the effect measure in addition to within-study variation. The random effects model generally results in wider confidence intervals than the fixed effects model. Although the random effects model still gives greater weight to studies with smaller variance than to studies with larger variance, the relative weight assigned to large studies is reduced compared with the weight assigned to those studies in the fixed effects model.

We calculated an I² as a measure of heterogeneity for the main analysis. An I² value represents the percentage of total variation across studies that is caused by heterogeneity rather than by chance. We considered a low I² value as 25% or lower and a high I² value as 75% or higher.7 We conducted a visual examination of funnel plots for evidence of publication bias.6

The Hamilton Health Sciences Research Ethics Board in Hamilton, Ontario approved the study protocol.

Results

We identified 8 publications of observational studies that met our eligibility criteria.5–14 We also identified 10 publications that we believed might be eligible but which required additional data from the authors. We were able to contact 9 of the 10 authors and to confirm that 6 of these studies had no measure of variance, 3 grouped private not-for-profit and public not-for-profit hospitals together and the authors either no longer had the data or could not run the analyses excluding the public hospitals, and 1 study had data on charges for care and did not have data on payments for care; these 10 studies were excluded from our systematic review (Table 1).15–24 All 10 excluded studies found higher payments or charges for care at private for-profit hospitals than at not-for-profit hospitals; in 6 of the 10, the differences were statistically significant.15–17,21,22,24

Table 2 presents the study characteristics and Table 3 the study methodology of the 8 observational studies included in our systematic review. We obtained or confirmed data with the investigators for 7 studies; the sole author of the remaining study had died.8 All studies were conducted in the United States and included data from 1980 until Dec 31, 1994. The 8 studies included over 350,000 patients and assessed a median of 324 hospitals per study.

Our quality assessment of studies revealed that 6 of the 8 studies appropriately adjusted or matched cases for many important determinants of payment for care (e.g., case mix). For 2 studies the authors were unable to provide an estimate of variance for their adjusted analyses, which we required to combine studies in our meta-analysis; instead, we report their unadjusted analyses for which there was an estimate of variance.9,10 The statistical significance of the findings of these 2 studies did not change between the unadjusted and adjusted analyses.

Five of the 8 studies showed statistically significant higher payments for care at private for-profit hospitals,9,11–14 and 1 showed statistically significant lower payments for care at private for-profit hospitals,8 1 showed a nonsignificant trend toward higher payments for care at private for-profit hospitals9 and 1 showed a nonsignificant trend toward lower payments for care at private for-profit hospitals (Fig. 2).10 Funnel plots did not suggest publication bias.

Our primary meta-analysis demonstrated that private for-profit hospitals were associated with higher payments for care (relative payments for care 1.19, 95% confidence interval [CI] 1.07–1.33, p = 0.001). There was large heterogeneity

Table 1: Excluded studies initially thought to be potentially eligible

<table>
<thead>
<tr>
<th>Problems that precluded study inclusion</th>
<th>Efforts to resolve problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six studies evaluated payments for care in PFP and PNFP hospitals, but no measures of variance were available15–20</td>
<td>Five authors were unable to provide the data15,16,19–20 and we were unable to contact 1 author.17 Two publications reported statistically significant higher payments for care in PFP hospitals,15,17 1 publication reported statistically significant higher payments for care in PFP hospitals for 11 of the 13 DRGs evaluated,16 1 publication reported a trend toward higher payments for care in PFP hospitals,17 and 2 publications did not report statistical analyses but demonstrated higher payments for care in PFP hospitals15–20</td>
</tr>
<tr>
<td>Three studies evaluated payments for care in PFP and NFP hospitals, but the NFP hospitals were a mixture of public and private NFP hospitals15–21</td>
<td>All 3 authors were contacted but were unable to provide the data to compare the PFP and PNFP hospitals. Two publications reported statistically significant higher payments for care in PFP hospitals,15,22 and 1 publication did not report statistical findings but demonstrated higher payments for care in PFP hospitals17</td>
</tr>
<tr>
<td>One study evaluated charges for care at PFP and PNFP hospitals14</td>
<td>The author was contacted but was unable to provide payment data. This study reported statistically significant higher charges for care in PFP hospitals24</td>
</tr>
</tbody>
</table>

Note: PFP = private for-profit, PNFP = private not-for-profit, NFP = not-for-profit, DRG = diagnosis related group.
across the study results ($I^2 = 90\%$). The lone study, by Kauer, that showed statistically significant higher payments for care at private not-for-profit hospitals compared hospitals owned by not-for-profit organizations but run by a for-profit firm with hospitals owned and operated by private for-profit organizations. Because this study design is different than that of the other studies, we undertook a heterogeneity test that evaluated the difference between Kauer’s estimate of payments for care (relative payments for care 0.93, 95% CI 0.88–0.99) and the estimate from the other studies (relative payments for care 1.24, 95% CI 1.11–1.39), and this test was statistically significant ($p = 0.048$). Even without Kauer’s study, large heterogeneity across the study results ($I^2 = 86\%$) persisted. Only 1 of our predefined hypotheses (specialty versus general hospitals) helped to explain some of the persistent heterogeneity ($p = 0.02$ for the difference between these subgroup summary estimates). Pooled estimates from both the 3 studies that evaluated specialty hospitals and the 5 studies that evaluated general hospitals showed higher payments for care at private for-profit hospitals (relative payments for care 1.48, 95% CI 1.15–1.89, and 1.11, 95% CI 1.00–1.23, respectively).

The 2 studies with the most extensive adjustment for potential confounders — the study by Sloan and associates and the study by Keeler and associates — reported statistically significant higher payments for care at the private for-profit hospitals than at the private not-for-profit hospitals (relative payments for care 1.51, 95% CI 1.17–1.94, and 1.13, 95% CI 1.09–1.16, respectively).

**Interpretation**

We identified 8 observational studies that compared payments for care at private for-profit and private not-for-profit hospitals. These studies altogether involved more than 350,000 patients and included a median of 324 hospitals each. Five of the studies and our pooled analysis demonstrated statistically significant higher payments for care at private for-profit hospitals than at private not-for-profit hospitals.

Our systematic review has several strengths. We undertook a comprehensive search using 6 strategies to identify studies for our review, masked study results before determining study eligibility, conducted eligibility decisions and data abstraction in duplicate and demonstrated a high degree of agreement. For 7 of the 8 studies the investigators provided or confirmed data.

Our systematic review has several limitations. We did not identify any randomized controlled trials. It is unlikely that patients will ever be randomly assigned to private for-profit and private not-for-profit health care delivery systems. Therefore, the strongest realistic design for addressing our question is an observational study.

The main limitation of observational data is the potential for confounding. Six of the 8 observational studies adjusted for potential confounders. The statistical significance of the findings within the 2 studies for which we present the unadjusted analyses did not vary between the unadjusted and adjusted analyses. The 2 studies with the most extensive adjustment for potential confounders both reported statistically significant higher payments for care at the private for-profit hospitals (relative payments for care 1.51 and 1.13). For example, the study by Sloan and associates adjusted for age, sex, education, ethnicity, marital status, income, community living, number of activities of daily living, cognitive awareness, bladder/bowel control, comorbidity, primary diagnosis at index admission, market characteristics (population per square mile, Herfindahl index, Medicare hospital wage index, Health Maintenance Organization market share, hospital beds per 100 popula-

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**Table 2: Characteristics of studies included in the systematic review**

<table>
<thead>
<tr>
<th>Study*</th>
<th>Type of hospital</th>
<th>Sources of payments</th>
<th>Date when data collection was initiated</th>
<th>Date when data collection was completed</th>
<th>Follow-up period for individual patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Ness</td>
<td>General acute care</td>
<td>Public and private</td>
<td>01/01/1980</td>
<td>31/12/1981</td>
<td>In hospital</td>
</tr>
<tr>
<td>Kauer</td>
<td>General acute care</td>
<td>Public and private</td>
<td>01/01/1981</td>
<td>31/12/1984</td>
<td>In hospital</td>
</tr>
<tr>
<td>Dickey*</td>
<td>Mixed†</td>
<td>Private</td>
<td>01/07/1985</td>
<td>30/06/1987</td>
<td>In hospital</td>
</tr>
<tr>
<td>Dranove et al</td>
<td>General acute care</td>
<td>Public and private</td>
<td>Fiscal year 1983</td>
<td>Fiscal year 1992</td>
<td>In hospital</td>
</tr>
<tr>
<td>McCue et al</td>
<td>Psychiatric acute care</td>
<td>Public and private</td>
<td>Fiscal year 1986</td>
<td>Fiscal period ending 1990</td>
<td>In hospital</td>
</tr>
<tr>
<td>Sloan et al</td>
<td>General acute care</td>
<td>Medicare</td>
<td>01/01/1983</td>
<td>31/12/1994</td>
<td>6 mo</td>
</tr>
<tr>
<td>Keeler et al</td>
<td>General acute care</td>
<td>Medicaid and private</td>
<td>01/01/1986</td>
<td>31/12/1994</td>
<td>In hospital</td>
</tr>
<tr>
<td>McCue et al</td>
<td>Rehabilitation</td>
<td>Public and private</td>
<td>Fiscal year 1989</td>
<td>Fiscal year 1992</td>
<td>In hospital</td>
</tr>
</tbody>
</table>

*The studies are in chronological order by midpoint of the data collection period.
†Mixed = general, major teaching, free-standing psychiatric or free-standing substance abuse.
Table 3: Methodology of studies included in the systematic review

<table>
<thead>
<tr>
<th>Study*</th>
<th>Sampling method</th>
<th>Data source</th>
<th>Case mix</th>
<th>Factors controlled for in the analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Ness</td>
<td>All acute care general hospitals that reported annual utilization and financial data to the California HFC. Excluded hospitals: psychiatric, children’s, university teaching, state, government, Kaiser Foundation, dental, and hospitals managed under contract by for-profit or not-for-profit chains</td>
<td>California HFC Commission, HCFA</td>
<td>No restriction</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Kauer</td>
<td>Hospitals randomly selected from all domestic owned or contract managed HCA hospitals that were acute care medical/surgical hospitals. Excluded hospitals: those with missing critical data, specialty hospitals, flagship hospitals and hospitals that were with the HCA system for &lt; 3 yr</td>
<td>Audited year-end financial statements, HCA operating indicators reports, and Federal Register</td>
<td>No restriction</td>
<td>Case mix, no. of beds, occupancy, wage index, ancillary services, year</td>
</tr>
<tr>
<td>Dickey</td>
<td>Psychiatric and substance abuse admissions of employees and their dependents &lt; 65 yr old from 2 large national corporations with generous indemnity health plans that included nondiscriminatory unlimited inpatient mental health benefits</td>
<td>Paid claims data from health plans</td>
<td>Psychiatric and substance abuse disorders</td>
<td>Unadjusted</td>
</tr>
<tr>
<td>Dranove et al</td>
<td>Private short-term hospitals in California that reported data to the California OSHPD and that had enough Medicaid patients to allow for reliable measures of service levels during fiscal years 1983 and 1992</td>
<td>Hospital disclosure files and discharge data files of the California OSHPD</td>
<td>No restriction</td>
<td>Case mix</td>
</tr>
<tr>
<td>McCue et al</td>
<td>Short-term psychiatric hospitals reported by the national association of Private Psychiatric Hospitals in 1989; matched by profit status according to location in same county, standard metropolitan statistical area or wage index</td>
<td>HCFA data</td>
<td>Psychiatric disorders</td>
<td>Matching process was validated by testing the means of pair differences for a set of market measures, including wage index, county population, no. of psychiatric beds in county, age population categories and total no. of beds</td>
</tr>
<tr>
<td>Sloan et al</td>
<td>All Medicare patients with 1 of 4 diagnoses admitted to a nonfederal, general hospital with LOS &lt; 92 d who were also included in Long-Term Care Survey (voluntary national Medicare survey of patients &gt; 65 yr old with ≥ 1 limitation of ADL or instrumental ADL, undertaken in 1982, 1984, 1989 and 1994)</td>
<td>Medicare claims data were merged with National Long-Term Care Survey data</td>
<td>Hip fracture, stroke, coronary artery disease, congestive heart failure</td>
<td>Age, sex, education, ethnicity, marital status, income, community living, no. of ADLs, cognitive awareness, bladder/bowel control, comorbidity, primary diagnosis at index admission, market characteristics (population per square mile, Herfindahl index, Medicare hospital wage index, HMO market share, hospital beds per 100 population), year of index admission, no. of hospital beds and teaching status</td>
</tr>
<tr>
<td>Keeler et al</td>
<td>Non-Medicare patients admitted with 1 of 10 common medical problems to a California hospital that submitted discharge data to the California OSHPD during 1986, 1989, 1992 and 1994. Excluded hospitals: Kaiser Permanente, military, specialty, psychiatric, rehabilitation and long-term care</td>
<td>Annual uniform discharge data and hospital disclosure data from the California OSHPD</td>
<td>Patients admitted with 1 of 10 common medical problems (e.g., cerebrovascular disease, pneumonia, heart failure)</td>
<td>Patient characteristics, case mix, LOS, percentage of admissions in each hospital covered by Medicare/Medicaid, capital ratio (total assets / total operating expenses), teaching status, county level measures (e.g., population per square mile, per capita income in 1988), Medicare prospective payment system wage price index, Herfindahl-Hirschman Index, and year of admissions</td>
</tr>
<tr>
<td>McCue et al</td>
<td>HCFA Minimum Cost Data Set was used to select 2 sample groups (existing and new rehabilitation hospitals), which differed in the establishment of their target reimbursement level under TEFRA</td>
<td>HCFA data</td>
<td>No restriction</td>
<td>Case mix</td>
</tr>
</tbody>
</table>

Note: HFC = Health Facilities Commission, HCFA = Health Care Financing Administration, HCA = Hospital Corporation of America, a private for-profit company, OSHPD = Office of Statewide Health Planning and Development, LOS = length of stay, ADL = activity of daily living, HMO = Health Maintenance Organization, TEFRA = Tax Equity and Fiscal Responsibility Act.

*The studies are in chronological order by midpoint of the data collection period.
Another limitation of our systematic review was that we were unable to include 6 studies because the investigators failed to provide an estimate of variance, 3 studies because the investigators either no longer had the data or could not rerun their analyses to remove the public not-for-profit hospitals, and 1 study because the investigators had only charges and not payment data. All 10 of these studies, however, showed higher payments or charges for care at private for-profit hospitals than at not-for-profit hospitals, and in 6 of the 10, the differences were statistically significant.

Our pooled analysis showed significant variability in the direction and magnitude of effect among the studies. It is common practice to pool results with significant heterogeneity, but one may question the advisability of doing so. Although the inference that private for-profit hospitals result in higher payments for care is secure, heterogeneity in results suggests that the magnitude of the effect may differ according to circumstances. In the presence of unexplained heterogeneity, inferences associated with pooled estimates are weaker; nonetheless, these estimates provide the best available estimate of the average effect.25 We present these results as we believe they constitute useful information for decision-makers.

Our pooled analysis and 5 of the studies included in our systematic review demonstrated statistically significant higher payments for care at private for-profit hospitals than at private not-for-profit hospitals, whereas only 1 study demonstrated the opposite.26 These results are completely consistent with those of studies that we were unable to include because of technical reasons (Table 1). The lone study demonstrating lower payments for care at private for-profit hospitals compared them with hospitals owned by private not-for-profit organizations but run by a private for-profit firm.26 In essence, this is a comparison between different modes of for-profit management.

Why would private for-profit hospitals have higher payments for care than private not-for-profit hospitals? One potential explanation could be that they are providing superior care. However, our previous meta-analysis involving over 38 million patients demonstrated that private for-profit hospitals have higher risk-adjusted mortality rates.2 Our meta-analysis involving over 500 000 patients receiving hemodialysis also revealed higher risk-adjusted mortality rates at private for-profit dialysis facilities.26

The likely explanation is the necessity to generate revenues to satisfy investors, a requirement absent in private not-for-profit hospitals. Private for-profit hospitals are also burdened with a 6% absolute increase in the proportion of hospital spending devoted to administration as compared with private not-for-profit hospitals.27 Further, executive
bonus incentives are over 20% higher at private for-profit
than at private not-for-profit hospitals.29

We offer 2 reasons why our results may actually under-
estimate the association between private for-profit hospitals
and higher payments for care. First, all but 2 of the studies
in our systematic review adjusted for case mix. Therefore,
our results do not capture any increase in payments for care
resulting from inappropriate upcoding of patient diagnoses
to enhance reimbursement. Private for-profit hospitals
manifest higher upcoding of patient diagnoses than do pri-

dvate not-for-profit hospitals.29

Second, the studies in our systematic review did not
explicitly address issues of fraud (e.g., performance of un-
necessary surgeries, billing for services not provided, in-
appropriate detainment of psychiatric patients for billing
purposes),29 which can increase both the direct costs of
care and the indirect costs related to investigating and
prosecuting offenders. The multimillion-dollar fraud
lawsuits in the United States have overwhelmingly been
against private for-profit hospitals.31,32 It is likely, there-
fore, that we are underestimating the true association be-
tween private for-profit hospitals and higher payments for
care.

Many countries, like Canada, are debating choices
about private for-profit and private not-for-profit health
care delivery. How important is a relative increase in pay-
ment for care of 19%? Canada currently spends $120 bil-

lion annually on health care, and hospital care accounts for
32% of overall expenditures.9 If we were to convert half of
our hospitals to private for-profit institutions, our results
suggest that we would pay approximately an extra $3.6 bil-

lion annually.

Given the differences in the structure of Canadian and
US health care systems, one might question the applicabil-
ity of our results to Canada. The structure of US health
care has, however, changed significantly over time (e.g., the
introduction of prospective payment systems for Medicare
patients and managed health care). The 5 studies that
demonstrated statistically significant higher payments for
care at private for-profit hospitals included data from 1983
to the end of 1994, and thus included results from both before and after these changes. Furthermore, these 5

studies had variations in their sources of payments (i.e.,
Medicare, private insurance or both). These findings sug-
gest that the higher payments for care at private for-profit
hospitals are manifest within a variety of health care con-
texts. Finally, should Canada open the door to private for-
profit hospitals, the very same large US hospital chains that
have generated the data included in this systematic review
will soon be purchasing Canadian private for-profit hospi-
tals. In summary, it is likely that our results are generaliz-
able to the Canadian context.

For-profit hospitals result in both higher mortality rates
and greater payments for care than do not-for-profit hospi-
tals. The evidence strongly supports a policy of not-for-
profit health care delivery at the hospital level.

This article has been peer reviewed.

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City Health Research Unit, St. Michael’s Hospital, and the Department of Medi-
cine (Bayoumi), Cancer Care Ontario and the Department of Health Policy Man-
agement and Evaluation, University of Toronto (Sullivan), and AXON Clinical
Research (McDonald), Toronto, Ont.; the Department of Medicine, University of
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Competing interests: None declared.

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tributed significantly to the systematic review’s data acquisition and interpreta-
tion of the data. Dr. Deborah Cook, Dr. Ahmed Bayoumi, Dr. John Lavis, Dr. Ter-
rence Sullivan, Dr. Greg Stoddart and Dr. Gordon Guyatt contributed significan-
tly to the systematic review’s concept and design and interpretation of the data.
All authors provided critical revisions to the manuscript and gave final approval of
the submitted manuscript.

Acknowledgements: We wish to acknowledge the outstanding work of Deborah
Maddock and Laurel Raftery, who coordinated the study, and Neera Bhatnagar,
the librarian, who undertook the searches involved in the study. We also thank all
the authors of the studies included in our systematic review who confirmed infor-
mation, provided information and performed additional analyses for our systematic
review.

This study was supported by an Arkison Foundation Research Grant and a
Hamilton Health Sciences Research Development Grant. Dr. P.J. Devereaux is
supported by a Canadian Institutes of Health Research, Senior Research Fellow-
ship Award. Dr. Karen Burns is supported by a Canadian Lung Association and
Merck Frosst Postdoctoral Fellowship Award. Dr. Deborah Cook is a Chair of the
Canadian Institutes for Health Research. Dr. Mohit Bhandari is supported by the
Dettwiler Fellowship from the Royal College of Physicians and Surgeons of
Canada, and a Department of Clinical Epidemiology and Biostatistics, McMaster
University, Clinical Scientist Fellowship Award. Dr. Peter Choi is supported by a
Vancouver Coastal Health Research Institute Mentored Clinician Scientist Award.
Dr. Ahmed Bayoumi is supported by a Career Scientist Award from the Ontario
HIV Treatment Network. Dr. John Lavis holds a Canada Research Chair in
Knowledge Transfer and Uptake.

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