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REVIEW ARTICLE

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Impact of hospitalists on the efficiency of inpatient care and patient satisfaction: a systematic review and meta-analysis

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ABSTRACT

Background: Over the past 20 years, hospitalists have assumed a greater portion of healthcare service for hospitalized patients. This was mainly due to reducing the length of stay (LOS) and hospital costs shown by many studies. In contrast, other studies suggested increased cost and resources utilization associated with hospitalist-run care models.

Aim: We aimed to provide class 1 evidence regarding the effect of hospitalist-run care models on the efficiency of care and patient satisfaction.

Design: Meta-analysis.

Methods: Four electronic medical databases were searched to retrieve all relevant studies. Two authors screened titles and abstracts of search results for eligibility according to predefined criteria. Initially eligible studies were screened for full text inclusion. Included studies were reviewed for data on LOS, hospital cost, readmission, mortality, and patient satisfaction. Available data were abstracted and analyzed using Comprehensive Meta-Analysis.

Results: Sixty-one studies were included for analysis. The overall effect size favored hospitalist-run care models in terms of LOS (MD = −0.67 day, 95% CI [−0.78, −0.56], $p < 0.001$). There was no significant difference in terms of hospital cost (MD = $92.1, 95% CI [−910.4, 1094.6], $p = 0.86$) whereas patient satisfaction was similar or even better in hospitalist compared to non-hospitalist (NH) service.

Conclusion: Our analysis showed that hospitalist care is associated with decreased LOS and increased patient satisfaction compared to NH. This indicates an increase in the efficiency of care that does not come at the expense of care quality.

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KEYWORDS
Hospital medicine; hospitalists; inpatient care; quality of life

1. Introduction

Hospital medicine is one of the fastest growing medical specialties in the USA [1,2]. A major cause of this growth has been empirical evidence that hospitalists provide more efficient, less costly inpatient care with equal or higher quality [3]. Several studies have investigated the impact of hospitalists on the efficiency and quality of patients' care. Results from these studies have been conflicting; with many of them suggesting shorter hospital stay and reduced cost for patients cared for by hospitalists [3–9]. However, other investigators failed to recognize significant advantages from implementing hospitalist care models compared to traditional care by non-hospitalists (NH) [10,11].

Given the non-conclusive results from different hospitalist programs in various clinical settings regarding the effect of hospitalist-based care model on the length of stay (LOS) and hospital costs, Rachoin *et al.* published a meta-analysis in 2012 to summarize the conflicting evidence [12]. However, they used a limited search strategy that was restricted to only one database so it is possible that potentially eligible articles might be missed. Authors reported data for LOS and hospital costs only. To further, several studies that compared hospitalist and NH care models have been published thereafter [13–16] adding more to the farrago of existing literature.

This prompted us to a comprehensive systematic review and meta-analysis to generate clear-cut evidence regarding the impact of hospitalists on LOS, costs, in-hospital mortality, readmission within 30 days, and patient satisfaction.

2. Experimental section

We followed the recommendation of the Preferred Reporting Items for Systematic Review and Meta-

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analysis (PRISMA) statement [17] during the preparation of this manuscript (Supplementary file 1). Moreover, all steps were done according to Cochrane handbook of systematic reviews of interventions [18].

2.1. Data sources and searches

We searched Medline via PubMed, the Cochrane Central Register of Controlled Clinical Trials (CENTRAL), Scopus, and ISI web of knowledge. A combination of these keywords was tailored for each database: ('hospitalists' OR 'hospitalist system' OR 'non-hospitalists') AND ('length of hospital stay' OR 'length of stay' OR 'cost' OR 'Hospital Costs' OR 'economics' OR 'outcomes' OR 'outcome' OR 'mortality' OR 'death' OR 'readmission' OR 'satisfaction'). Results were imported to the reference manager Endnote X7 for screening.

2.2. Inclusion and exclusion criteria

Studies were included if they used experimental (randomized clinical trial) or observational, retrospective or follow-up designs that compared hospitalists to non-hospitalists in terms of LOS, costs, in-hospital mortality, readmission within 30 days, or patient satisfaction. Pre-post designs were also included. We excluded review articles, editorials, case series and case reports. The corresponding authors of studies that did not report enough data were contacted for providing the missing data. Otherwise, studies with no sufficient data for meta-analysis were included for narrative review.

2.3. Study selection

Two authors independently reviewed the titles and abstracts of the retrieved articles against our inclusion and exclusion criteria. Initially eligible articles were considered for a second round of full-text screening. Conflicts were resolved by consensus and discussion with a third senior reviewer.

2.4. Data extraction

Data were extracted to a standard excel sheet that was designed specifically for this study. The following data were extracted from each study whenever available: (1) Demographics and baseline characteristics of the study's participants; (2) Summary of the study design, setting, year, timeline, and type of the hospitalist and comparison groups; (3) the studied outcomes including LOS, hospital costs, mortality or readmission, and patients' satisfaction. We extracted mean and standard deviation (SD) [or median, range/inter quartile range (IQR) or median and confidence interval (CI)] and number per group for numerical data, whereas number of events and total number of participants were extracted for dichotomous and categorical variables. Data were abstracted and reviewed twice for integrity and validity.

2.5. Data synthesis and analysis

Numerical data were pooled as mean and CI, and dichotomous data were pooled as odds ratio (OR) and CI. Whenever median and range/IQR were reported, we used equations of Cochrane handbook and Wan *et al.* [19] to get the approximate mean and SD. Due to substantial variation in studies design and setting, the Der-Simonian random effects model was adopted for all analyses. We performed sensitivity analysis to explore the effect of omitting single studies on the overall effect size. Also, cumulative meta-analysis was conducted to display the trend of LOS and cost over time. Our study was eligible for such analysis due to the high number of included studies that allows for clear display of trends. This analysis helps direct health care policy makers by showing how hospitalists' efficiency rise or decline over time. Breakpoints were selected when there was a major change in the mean difference between the hospitalist and non-hospitalist group (shift from significant difference to no difference or vice versa). Heterogeneity was quantified and assessed using the I-square test and publication bias was explored according to Egger's regression test. P value< 0.05 was considered statistically significant.

3. Results

3.1. Search results and characteristics of the included studies

Database searching retrieved 2,195 results that were abstracted to 1,291 unique records after automatic duplicate removal by Endnote software. Titles and abstracts were reviewed against our eligibility criteria, and 87 articles were found initially eligible for our review. Further screening of the full-text articles resulted in 61 finally included studies [3–8,10,11,13–16,20–68]; of them 47 were eligible for meta-analysis and 14 articles were narratively summarized (Figure 1. PRISMA Flow Diagram). Twenty-six studies were rejected during full text screening because they did not meet our eligibility criteria; 12 were single arm studies, 3 were expert opinions, 7 editorials, and 4 were book chapters. Characteristics of the included studies are summarized in Table 1.

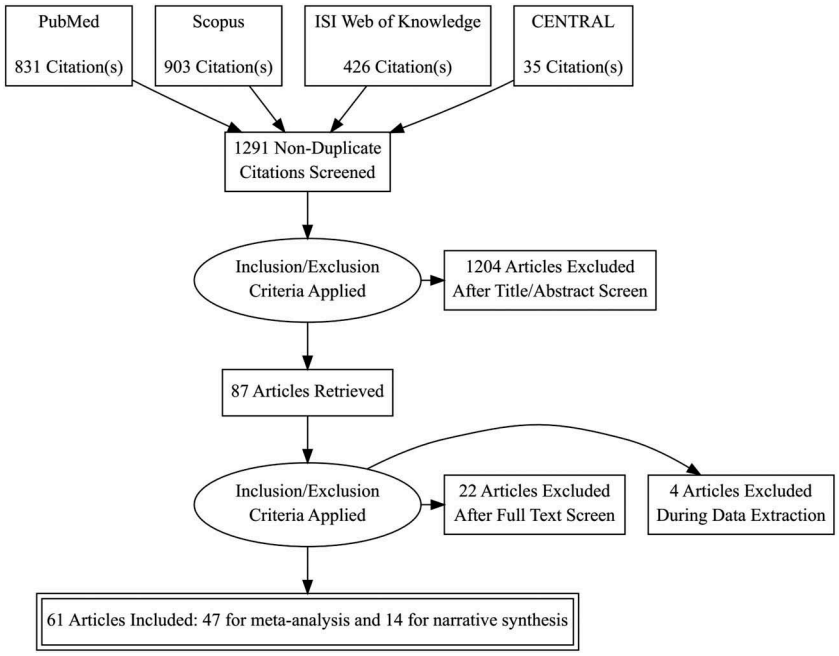

Figure 1. PRISMA flow diagram.

3.2. Outcomes

3.2.1. Hospital length of stay (LOS)

Data of hospital LOS in the hospitalist and NH groups were provided by 46 studies that enrolled 563,268 patients. Significant heterogeneity was identified among these studies (I^2 = 92%, p < 0.001), hence the random effects model was employed. Overall mean difference favored the hospitalist versus non-hospitalist healthcare models in terms of LOS (MD = −0.67 day, 95% CI [−0.78, −0.56], p < 0.001); Figure 2. This effect size persisted on a leave-one-out sensitivity analysis that was performed to explore the effect of single studies on the overall effect estimate (Figure A1).

Interestingly, cumulative meta-analysis showed decreasing trend of the MD in LOS between the hospitalist and NH groups. From 1998 to 2003, there was a cumulative MD of 2.4 days to 1 day that declined to less than 1 day (0.95 to 0.67) afterwards (Figure A2). Egger's regression test showed evidence of publication bias towards studies that favored the hospitalist group (p = 0.01).

3.2.2. Costs

Twenty-four studies (227,372 participants) reported data on the hospital costs for hospitalist- and NH-based service. Data from these studies were substantially heterogenous (I^2 = 99%, p < 0.001) and the random effects model was used for meta-analysis. The pooled analysis showed no significant difference in the cost of health care provided by hospitalists and NH (MD = $92.1, 95% CI [−910.4, 1094.6], p = 0.86); Figure 3. This result held true on sensitivity analysis by removing each study data at a time (Figure A3).

Cumulative analysis showed that till 2008, the cost of service was markedly decreased with hospitalists compared to NH. After 2008, there was no significant difference between hospitalist and NH groups (Figure A4). There was no dissemination bias as indicated by Egger's regression test (p = 0.79).

3.2.3. 30-day readmission or in-hospital mortality

Data from 39 heterogeneous studies (I^2 = 80%, p < 0.001) that included 375,570 participants contributed to the calculation of the summary effect estimate for readmission/mortality. Under the random effects model, the overall odds ratio showed marginal superiority of hospitalist over NH in terms of readmission/mortality (OR = 0.95, 95% CI [0.89 to 1], p = 0.06); Figure 4. However, this effect was sensitive to the removal of single studies in sensitivity analysis, taking the effect size towards significant superiority of hospitalist over NH (Figure A5).

3.2.4. Patients' satisfaction

Out of the included studies, six investigated patients' satisfaction with the healthcare service provided in both hospitalist- and non-hospitalist- based settings. The Press-Ganey survey was used in three of these studies. Pooled analysis of the commonly reported items of the Press-Ganey survey showed no significant difference in friendliness/courtesy of physician (p = 0.15), how well physician kept the patient informed (p = 0.13), skill of physician (p = 0.2), and time spent with his patient (p = 0.08). Physician's concern for patients' questions and worries (p = 0.01) and the overall score (p < 0.001) tended to favor the hospitalist over NH service (Figure 5).

Table 1. Summary of the included studies.

Author	Year	Setting	Patients	Timeline	Comparison Group
Hackner	2000	Cedars-Sinai Medical Center in Los Angeles (A university-affiliated, community medical center)	Patients from the emergency department and from private offices or from the hospital clinic population who were admitted directly to the hospital wards	12 months	Variety of private practitioners
Auerbach	2002	Mount Zion Hospital, a 280-bed community-based teaching hospital affiliated with University of California, San Francisco	Patients 18 years of age or older	24 months	Community-based physicians
Aplin	2014	Urban, academic, 600-bed teaching hospital in Camden, New Jersey	Patients discharged from medical–surgical units.	24 months	Medical-surgical
Burke	2013	Denver VA Medical Center	General inpatients	7 years	Urgent care physician
Chadaga	2012	Academic hospital in Denver, Colorado	General inpatients	NA	Hospitalists
Chavey	2014	US teaching hospitals	Adult non-pregnancy-related inpatients	9 years	Family physician
Chin	2014	Academic medical center	Internal medicine patients	4 years	Academic preceptors
Ding	2014	General internal medicine department of an Acute-care hospital in Singapore	Seniors aged 80 years and older with specific Focus on 2 subgroups with premorbid functional impairment and acute geriatric syndromes	3 years	Other internists
Douglas	2012	Tertiary care academic medical center.	Neurologic inpatients	48 months	Neuro-hospitalist
Shu	2011	National Taiwan University Hospital (NTUH), a Tertiary-care referral center in northern Taiwan	General inpatients	2 months	Internist
Duplantier	2016	Single teaching institution	Joint Arthroplasty Patients	4 years	Non-hospitalist
Desai	2014	University of Chicago Medical Center	Chronic Liver Disease	6 years	Conventional
Everett [1]	2011	Large, urban, Not-for-profit community teaching hospital in Florida.	Cardiovascular diseases	5 years	Cardiologist
Everett [2]	2011	Large, urban, Not-for-profit community teaching hospital in Florida.	Cardiovascular diseases	5 years	Internist
Fulton	2011	NA	General inpatients	NA	Non-hospitalist
Goldie	2012	Tertiary care hospital	Coronary artery bypass/valvular surgery	9 months	ACNPs
Gonzalo	2015	Penn State Hershey Medical Center, central Pennsylvania.	Internal medicine patients	3 years	Pre-hospitalist
Lee	2011	Singapore General Hospital.	General inpatients.	1 year	Specialists-based model
Hollier	2015	Tertiary Pediatric inpatient hospital in San Francisco, California.	RSWS (Asthma, cellulitis inpatients) HMS/RSWS (IBD, DKA patients)	2 years	RSWS
Howrey	2011	5% Medicare sample USA	Stroke	4 years	Non-hospitalist care
Huddleston	2004	Academic medical center.	Orthopedic	NA	Standard orthopedic
Iannuzzi	2015	Health institution.	Internal medicine inpatients.	3 years	Midlevel practitioner
Iberti	2016	Urban tertiary care hospital in New York City.	Vascular surgery	2 years	Hospitalists
Kociol	2013	Data from the Get With the Guidelines-Heart Failure registry	Heart failure inpatients.	3 years	Low hospitalist use
Koo	2015	a tertiary cancer center in New York	Oncology unit patients	5 months	Oncologist–led
Kuo	2011	Hospital care of Medicare patients	General inpatients	5 years	PCP
Okere	2016	Two medical units of a community Teaching hospital.	General inpatients	14 months	Post-PHC model

(*Continued*)

Table 1. (Continued).

Author	Year	Setting	Patients	Timeline	Comparison Group
Singh	2011	Urban Academic medical center in the Midwestern USA	General inpatients	12 months	Traditional Resident-Based Model
Tadros	2015	Urban tertiary care hospital and medical school, Metropolitan New York	High-risk surgical Patients.	12 months	Vascular surgeons
Tadros	2016	Urban tertiary care hospital and medical school, Metropolitan New York	High-risk surgical patients.	10 months	Vascular surgeons
Wise	2011	Urban academic community hospital affiliated with a major regional academic university.	Medical ICU patients	12 months	Intensivist-led team.
Diamond	1998	CTH, Northeast US	General inpatients	12 months	PCP
Craig	1999	Kaiser Permanente, CA	General inpatients	36 months	Internist
Davis	2000	Tertiary care center, Rural health care system, MI	General inpatients	12 months	Internist
Rifkin	2002	Tertiary care center, NY	CAP	12 months	PCP
Tingle	2001	CTH, TX	General inpatients	15 months	FMT
Meltzer	2002	Academic center, Chicago	General inpatients	24 months	NH
Scheurer	2005	All SC hospitals	Pneumonia	12 months	NH
Phy	2005	Academic medical center, MN	Hip fracture	24 months	NH
Rifkin	2007	CTH	Pneumonia	5 months	NH
Southern	2007	Teaching hospital, NY	General inpatients	24 months	NH
Lindenauer	2007	45 Hospitals across US	General inpatients	33 months	NH
Carek	2008	CTH	General inpatients	12 months	1. Private 2. FMT
Vasilevskis	2008	6 Academic medical centers	CHF	24 months	NH teaching
Roy	2008	CTH, FL	General inpatients	12 months	NH teaching
Dynan	2009	Academic medical center, OH	General inpatients	12 months	NH teaching
Go	2010	6 Academic medical centers GI bleed	NA	24 months	NH

Note: CAP: community-acquired pneumonia; CHF: congestive heart failure; CTH: Community Teaching Hospital; FMT: family medicine teaching; GI: gastrointestinal; LOS: length of stay; NH: non-hospitalist; PCP: primary care physician; RSWS: resident shift work schedule; HMS: hospitalist-led model system; ACNPs: Acute Care Nurse Practitioners.

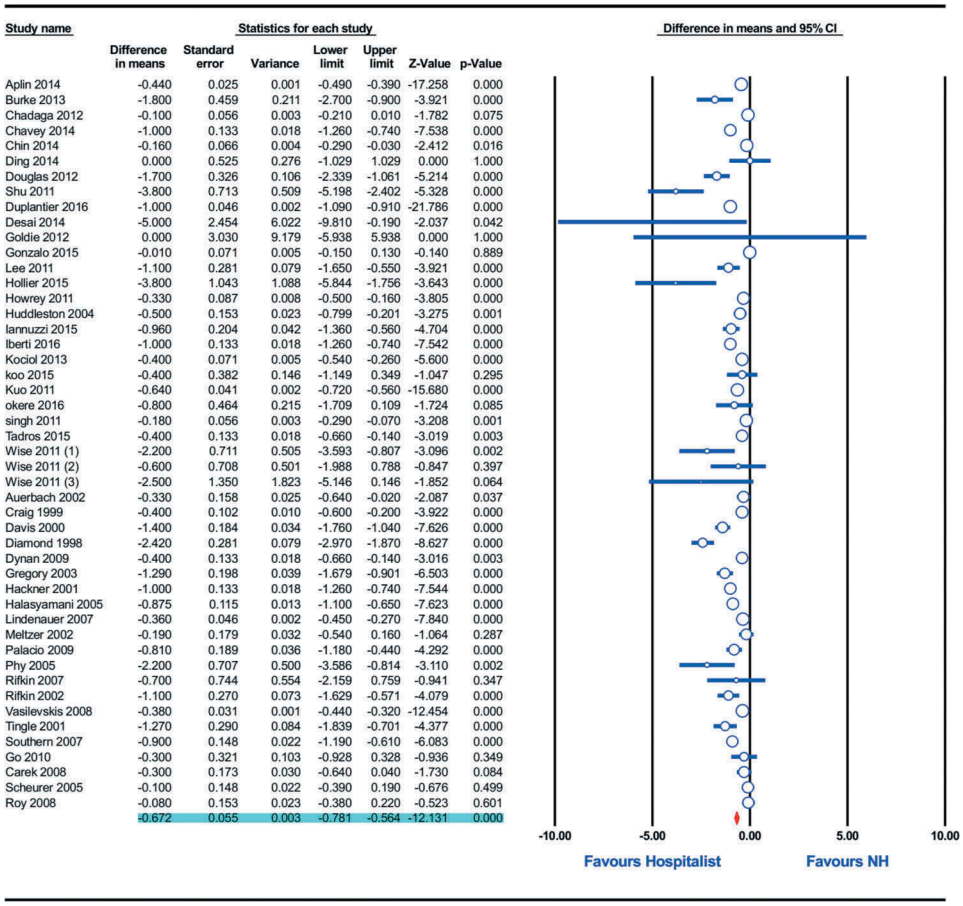

Figure 2. Forest plot of LOS in hospitalist- and non-hospitalist-based care models.

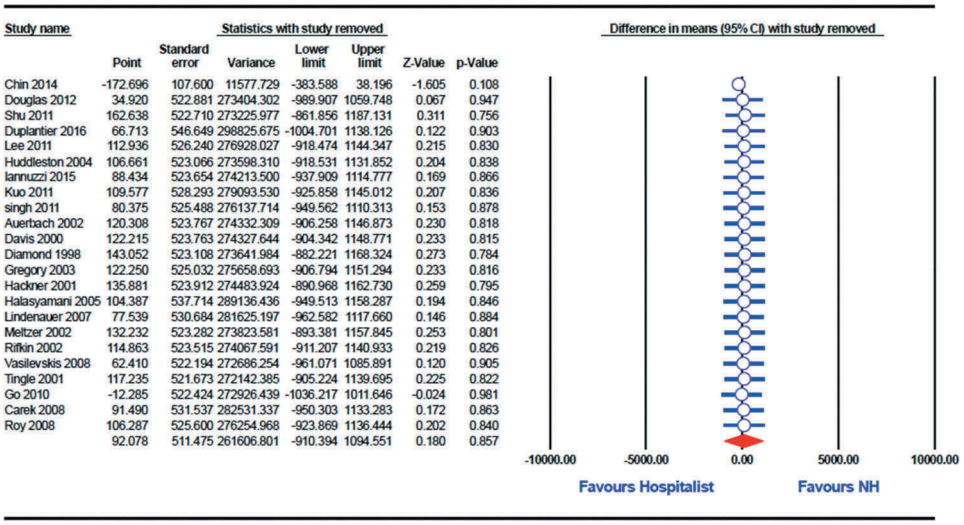

Figure 3. Forest plot of cost of service in Hospitalist- and Non-hospitalist-based care models.

The remaining three studies used self-designed questionnaires and Picker-Commonwealth patient satisfaction survey. Data provided by these studies showed no difference between hospitalist- and NH-treated cohorts in terms of physician ability to keep the patient and family informed ($p = 0.67$), physician courtesy and friendliness ($p = 0.87$), skill of the physician ($p = 0.22$), physician and staff ability to work together ($p = 0.30$), or likelihood of recommending the hospital ($p = 0.13$). Overall patient satisfaction

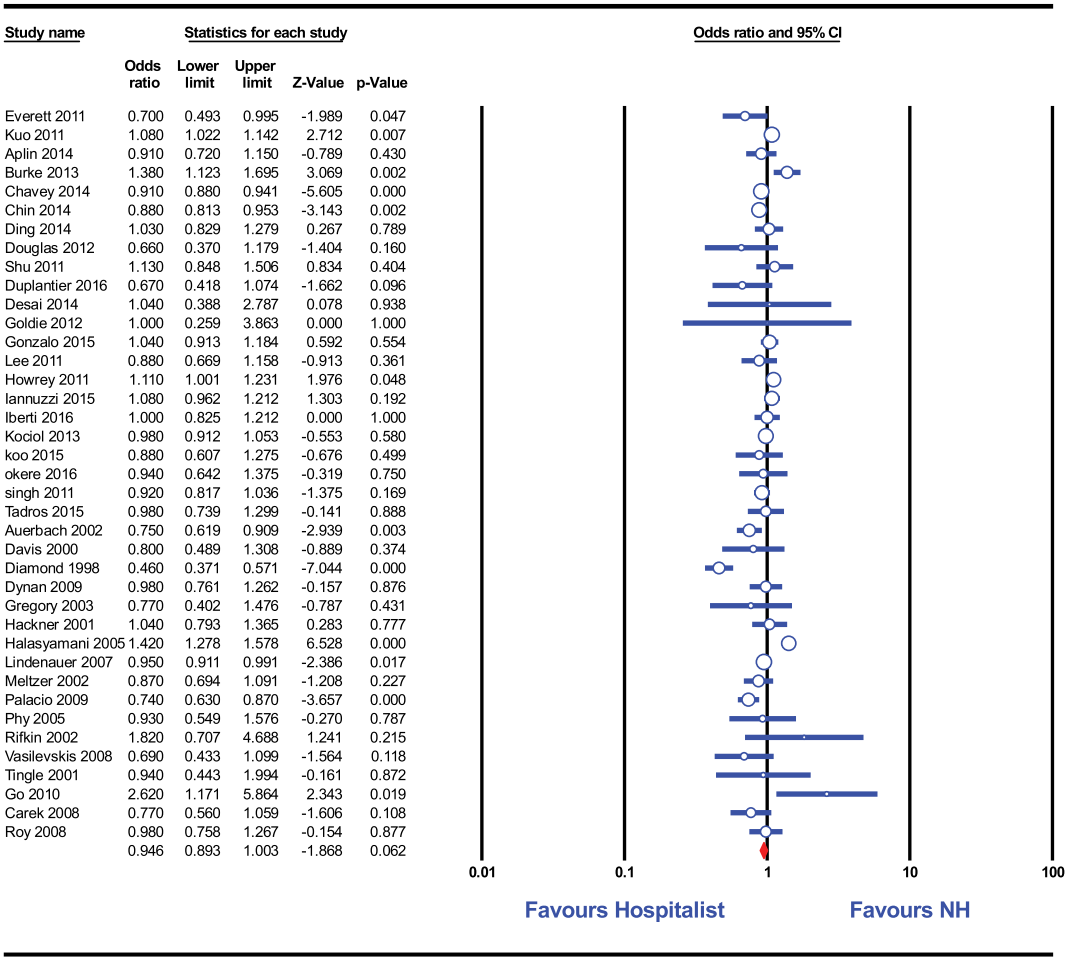

Figure 4. Forest plot of readmission or mortality for Hospitalist- and Non-hospitalist-based care models.

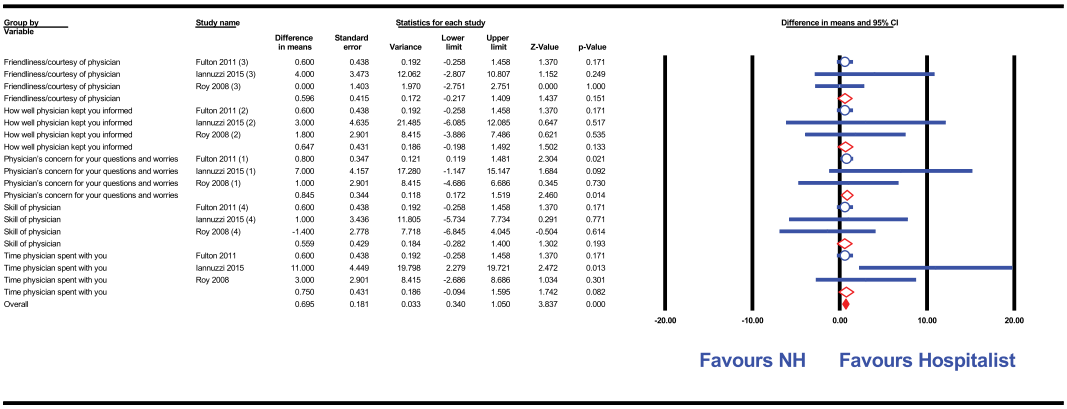

Figure 5. Forest plot of patient satisfaction for Hospitalist- and Non-hospitalist-based care models.

was not different according to the results of the Picker-Commonwealth survey (p = 0.2).

3.2.5. Studies with incomplete published data

In 12 out of the 14 studies that reported incomplete data, LOS was shorter for the hospitalist service. Hospital cost was lower for the hospitalist model in seven studies, similar in six, and higher in one study.

4. Discussion

Our analysis showed that hospitalists reduce LOS, readmissions and in-hospital mortality. The overall summary estimate showed marginally significant result that was sensitive to the effect of few singles studies which removal draw the results towards favoring the hospitalist model. Hospitalists increased the efficiency of

inpatient care without compromising the quality of service. Inversely, patients' satisfaction was similar or even higher in patients cared for by hospitalists compared to NH. On the other hand, there was no difference in terms of hospital cost between hospitalist and NH services. Beyond these benefits, there is compelling evidence that hospitalists promoted clinical care development and integration [56,69,70]. Particularly, they supported the development of patient safety guidelines [71] and became more efficient in teaching [72]. Rifkin *et al.* reported that hospitalists are more likely to comply with national guidelines of care in pneumonia patients [56]. Another report by Hauer *et al.* showed that trainee satisfaction was higher in the case of hospitalist than non-hospitalist teachers [72]. In our meta-analysis of published studies to date, we found a significantly shorter LOS among hospitalists compared with NHs, which persisted on leave out one sensitivity analysis even though cumulative meta-analysis showed decreasing trend of the MD in LOS between the hospitalist and NH groups from 2.4 days in 1998 to 0.67 in 2016.

Our results describe for the first time interesting trends displayed by cumulative meta-analysis. Cumulative analysis for the cost of service over years revealed an interesting movement towards equality of cost in both groups. From the inception of studies that evaluated the hospitalist-based healthcare service till 2008, the cost of service was significantly decreased with hospitalists compared to the NH groups. After 2008, there was no significant difference between hospitalist and NH groups. Since last 10 years there is an increasing role of hospitalists been primary attending in higher risk patients with higher comorbidities including intensive care units (Due to the concept of Open ICU getting more popular with Intensivist and surgeons taking the role of consultants) which might explain change to overall cost after 2008.

The declined mean difference in hospital charges overtime might be attributed to the increased average case mix index (CMI) [73]. Despite being originally created for calculating hospital costs, CMI has been recently used as an indicator of disease severity and the large volume of comorbidities being treated. Tadros *et al.* argued that the increased cost of hospitalization is expected because of the increased resources required to treat patients with higher CMI [73,74].

Continuity of care for hospitalized patients was documented to be associated with favorable outcomes such as lower risk of hospitalization, fewer emergency department visits, and higher patient satisfaction [75–77]. In this regard, Turner and colleagues studied the effect of discontinuity of hospitalist care on costs and readmission. They showed that hospital physician discontinuity was associated modest rise in hospital charges [78]. On the contrary Hansen et al did a retrospective observational study, which concluded that hospitalist physician continuity does not appear to be associated with the incidence of adverse events [79]. From the conflicting studies we are unable to draw conclusions regarding whether continuity of care explained the declining mean differences in cost or LOS. Perhaps, team dynamics and intra-hospitalist variability should be indubitably researched.

Cross-Sectional study done by Kripalani et al from Emory university showed that hospitalists are considered highly effective educators by trainees in setting of academic center and were more effective than subspecialists [80]. There has been an increase in academic hospitalists serving as teaching faculty in academic centers. Chung et al studied the effectiveness of academic Hospitalists on clinical education and concurred not only more resident satisfaction among residents rotating under hospitalist teaching service but also cultivate awareness of cost effectiveness and systems-based improvements in the field of inpatient medicine [81]. As inpatient leaders hospitalists collaborate well with emergency physicians in discharging patients, which meet observation criteria but could be well managed as outpatient. Hospitalists are also used to managing complex patients themselves, minimizing use of subspecialists like nephrology and infectious diseases. Hospitalists are well aligned with health care system and collaborate well with primary care providers, case managers and other subspecialists decreasing length of stay and improving resource utilization and decreasing readmissions [82,83]. Most hospitalists are acquiesced taking care of immediate high acuity inpatient issues in hospital, often deescalate treatment at the earliest, delegating non-emergent tests to primary care and subspecialists to be done as outpatient and been physically onsite coordinating care in a timely manner all factors leads to fewer resources utilized [32,36]. Primary providers can focus their practice more on outpatient care avoiding complexities of hospital based medicine and the physical need to be in the hospital to dealing with inpatient emergencies.

Data from randomized controlled trials (RCTs) are scarce on the discussion of hospitalist care model. The majority of the included studies were retrospective with the exception of few RCTs that included small number of participants [35,42]. The findings of an RCT conducted by Huddleston *et al.* is consistent with the results of the present study in terms of LOS and hospital charges [42]. However, another RCT with small sample size showed no difference in LOS and readmission rate [35].

Future studies should adopt a randomized prospective design to explore the effect of potential confounders that have not been controlled for so far. Moreover, data are still not available to answer the question raised by Rachion *et al.* [12] in 2012 regarding the time of LOS and cost reduction after implementation of a hospitalist program. Therefore,

further study of the issue in longitudinal studies with extended follow-up periods would be of interest.

This study has some limitations. First, we could not assess the risk of bias in the included studies due to heterogenous study design adopted in different settings. In addition, evidence from meta-analysis of RCTs was lacking due to the paucity of randomized data identified in the literature.

5. Conclusion

To recapitulate, the introduction of hospitalists to inpatient service translates to changes in LOS and readmission rates. Hospitalist model was beneficial in the reduction of LOS and in-hospital mortality/30-day readmission rates, yet not in the containment of hospital costs. We acquiesce that there has been an increase in academic hospitalists over time and the role they undertake in furthering medical education. Many questions still remain unanswered regarding post-discharge short term mortality (90 Day Mortality) for inpatients comparing programs using hospitalists or NH which needs further investigation.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Study name	Point	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Diamond 1998	-0.635	0.054	0.003	-0.740	-0.529	-11.765	0.000
Craig 1999	-0.682	0.057	0.003	-0.793	-0.571	-12.029	0.000
Davis 2000	-0.651	0.055	0.003	-0.759	-0.543	-11.801	0.000
Hackner 2001	-0.661	0.056	0.003	-0.771	-0.552	-11.855	0.000
Tingle 2001	-0.661	0.056	0.003	-0.770	-0.552	-11.872	0.000
Auerbach 2002	-0.682	0.056	0.003	-0.792	-0.572	-12.106	0.000
Meltzer 2002	-0.685	0.056	0.003	-0.795	-0.574	-12.185	0.000
Rifkin 2002	-0.664	0.056	0.003	-0.773	-0.554	-11.893	0.000
Gregory 2003	-0.656	0.055	0.003	-0.764	-0.547	-11.815	0.000
Huddleston 2004	-0.678	0.056	0.003	-0.788	-0.567	-12.017	0.000
Halasyamani 2005	-0.666	0.056	0.003	-0.775	-0.556	-11.872	0.000
Phy 2005	-0.664	0.055	0.003	-0.772	-0.555	-11.988	0.000
Scheurer 2005	-0.688	0.056	0.003	-0.798	-0.578	-12.251	0.000
Lindenauer 2007	-0.688	0.058	0.003	-0.802	-0.574	-11.837	0.000
Rifkin 2007	-0.672	0.056	0.003	-0.781	-0.563	-12.092	0.000
Southern 2007	-0.666	0.056	0.003	-0.775	-0.556	-11.874	0.000
Vasilevskis 2008	-0.694	0.060	0.004	-0.813	-0.576	-11.501	0.000
Carek 2008	-0.682	0.056	0.003	-0.792	-0.572	-12.125	0.000
Roy 2008	-0.688	0.056	0.003	-0.798	-0.578	-12.263	0.000
Dynan 2009	-0.681	0.056	0.003	-0.792	-0.570	-12.056	0.000
Palacio 2009	-0.669	0.056	0.003	-0.779	-0.559	-11.921	0.000
Go 2010	-0.678	0.056	0.003	-0.788	-0.569	-12.130	0.000
Shu 2011	-0.654	0.055	0.003	-0.761	-0.547	-11.953	0.000
Lee 2011	-0.664	0.056	0.003	-0.773	-0.555	-11.900	0.000
Howrey 2011	-0.685	0.057	0.003	-0.796	-0.573	-12.056	0.000
Kuo 2011	-0.679	0.058	0.003	-0.793	-0.565	-11.690	0.000
singh 2011	-0.689	0.057	0.003	-0.800	-0.578	-12.190	0.000
Wise 2011 (1)	-0.664	0.055	0.003	-0.772	-0.555	-11.989	0.000
Wise 2011 (2)	-0.673	0.056	0.003	-0.782	-0.564	-12.098	0.000
Wise 2011 (3)	-0.669	0.055	0.003	-0.778	-0.560	-12.076	0.000
Chadaga 2012	-0.689	0.056	0.003	-0.799	-0.580	-12.363	0.000
Douglas 2012	-0.655	0.055	0.003	-0.763	-0.546	-11.830	0.000
Goldie 2012	-0.673	0.055	0.003	-0.781	-0.564	-12.126	0.000
Burke 2013	-0.660	0.055	0.003	-0.768	-0.551	-11.909	0.000
Kociol 2013	-0.684	0.057	0.003	-0.796	-0.572	-11.964	0.000
Aplin 2014	-0.698	0.062	0.004	-0.820	-0.576	-11.209	0.000
Chavey 2014	-0.662	0.056	0.003	-0.771	-0.552	-11.855	0.000
Chin 2014	-0.689	0.056	0.003	-0.800	-0.579	-12.224	0.000
Ding 2014	-0.678	0.056	0.003	-0.787	-0.569	-12.178	0.000
Desai 2014	-0.670	0.055	0.003	-0.778	-0.561	-12.104	0.000
Gonzalo 2015	-0.691	0.055	0.003	-0.799	-0.582	-12.475	0.000
Hollier 2015	-0.663	0.055	0.003	-0.771	-0.555	-12.030	0.000
Iannuzzi 2015	-0.665	0.056	0.003	-0.775	-0.555	-11.887	0.000
koo 2015	-0.676	0.056	0.003	-0.785	-0.566	-12.105	0.000
Tadros 2015	-0.681	0.056	0.003	-0.792	-0.570	-12.056	0.000
Duplantier 2016	-0.645	0.052	0.003	-0.746	-0.544	-12.482	0.000
Iberti 2016	-0.662	0.056	0.003	-0.771	-0.552	-11.855	0.000
okere 2016	-0.671	0.056	0.003	-0.780	-0.562	-12.041	0.000
	-0.672	0.055	0.003	-0.781	-0.564	-12.131	0.000

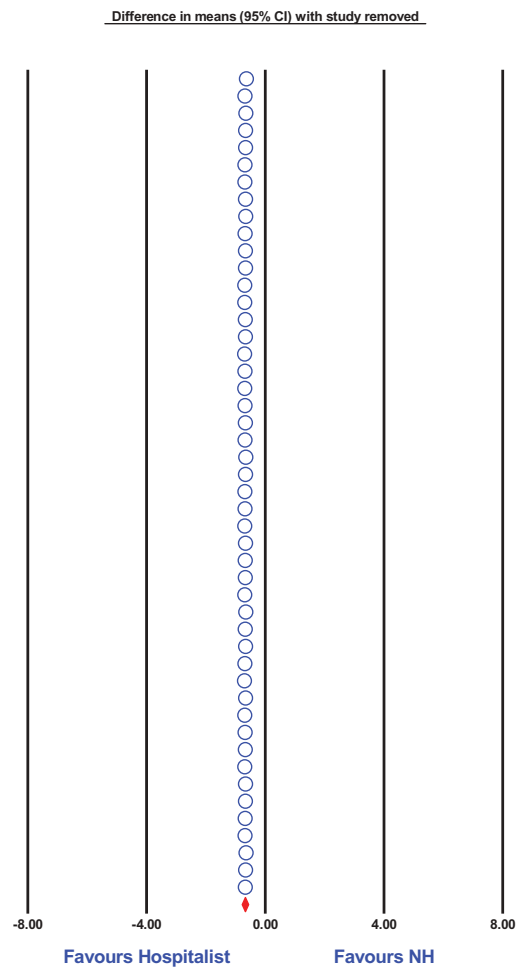

Figure A1. Forest plot of sensitivity analysis of LOS in Hospitalist- and Non-hospitalist-based care models.

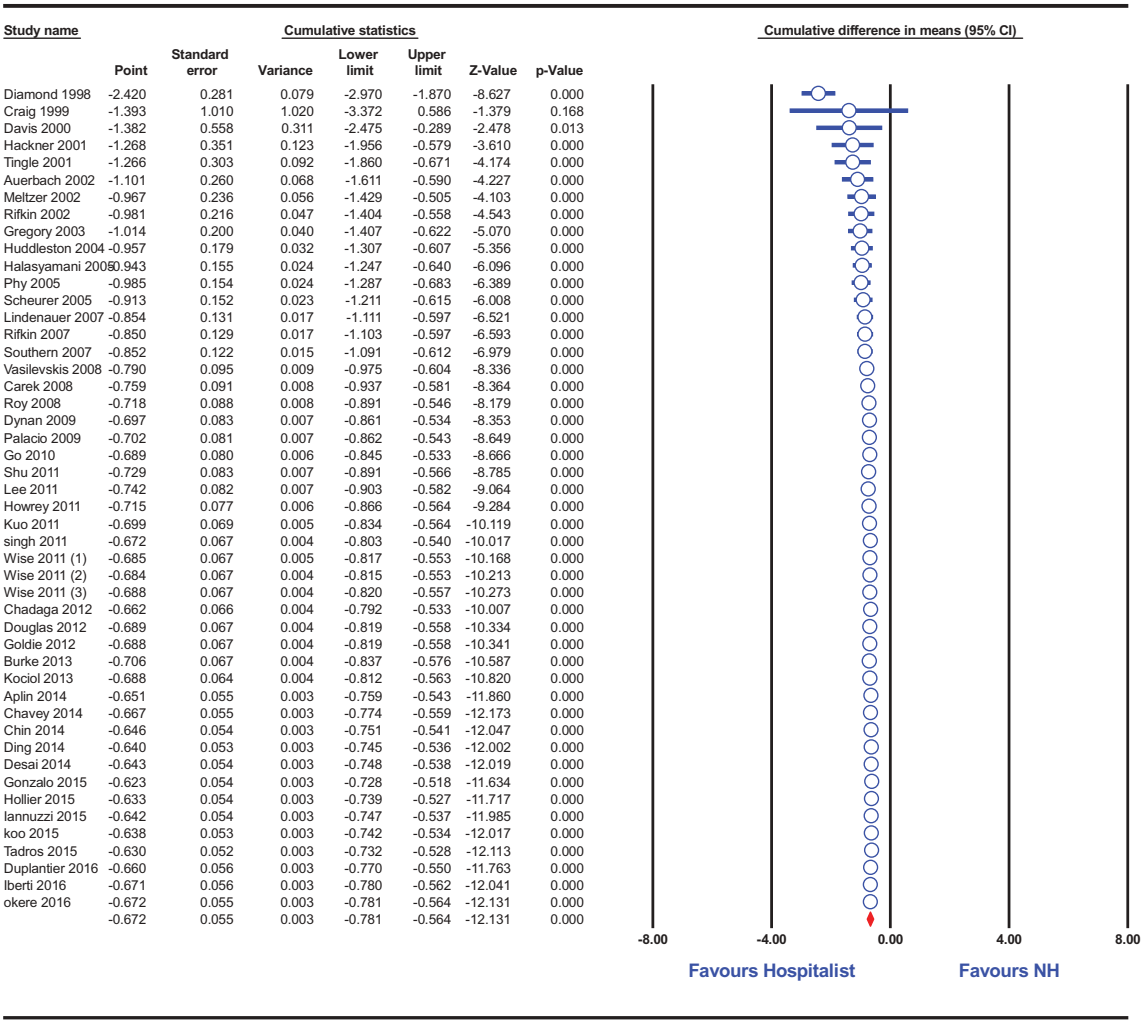

Figure A2. Forest plot of cumulative LOS in Hospitalist- and Non-hospitalist-based care models.

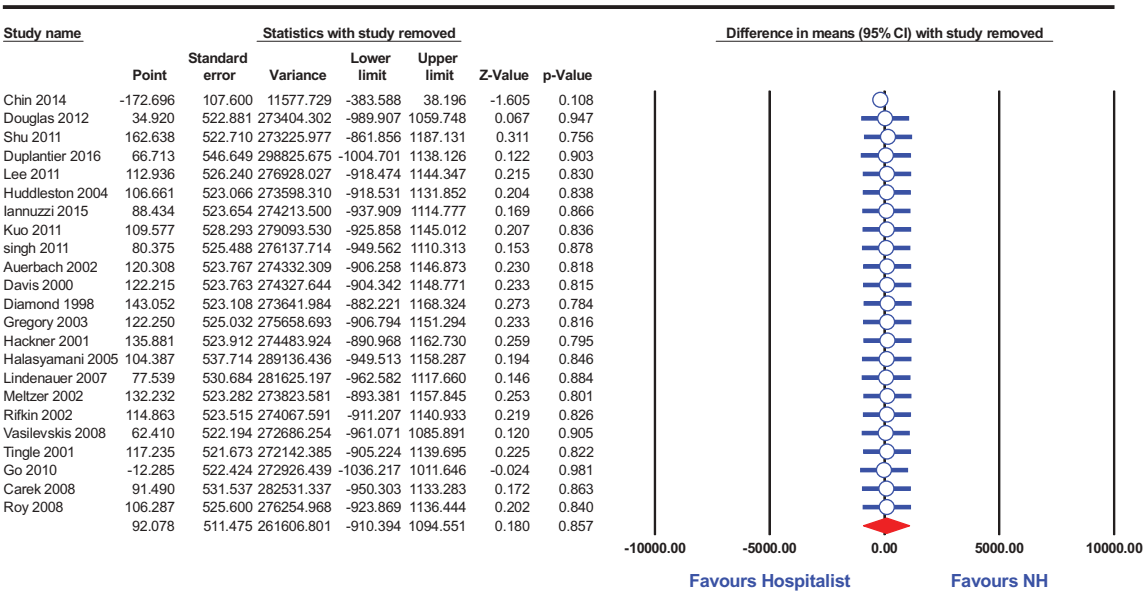

Figure A3. Forest plot of cost of service in Hospitalist- and Non-hospitalist-based care models.

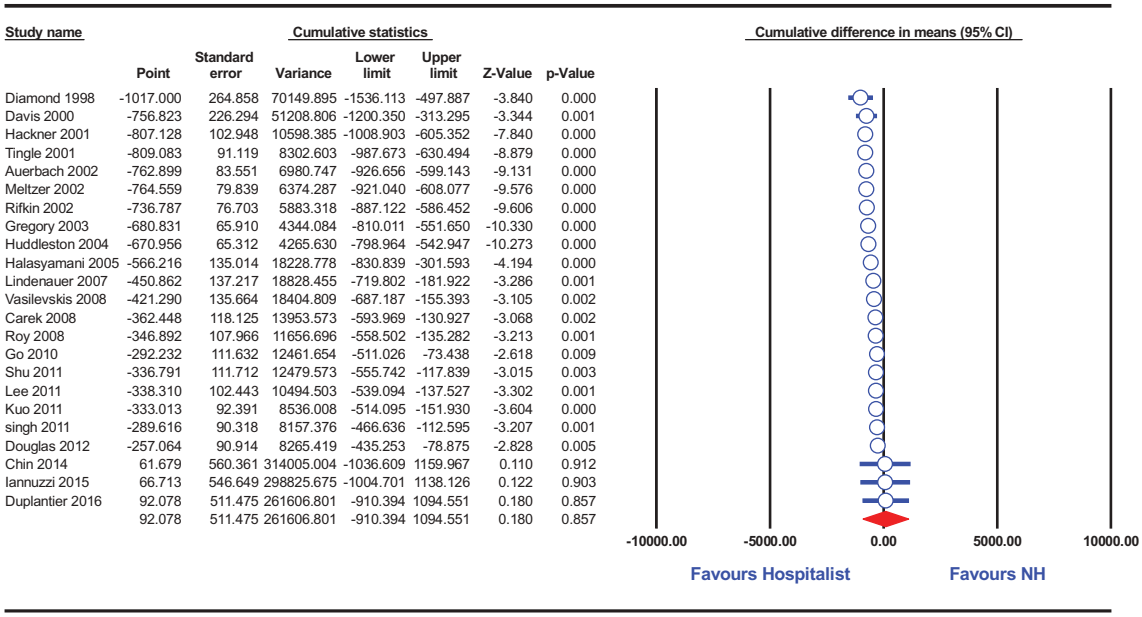

Figure A4. Forest plot of cumulative cost in Hospitalist- and Non-hospitalist-based care models.

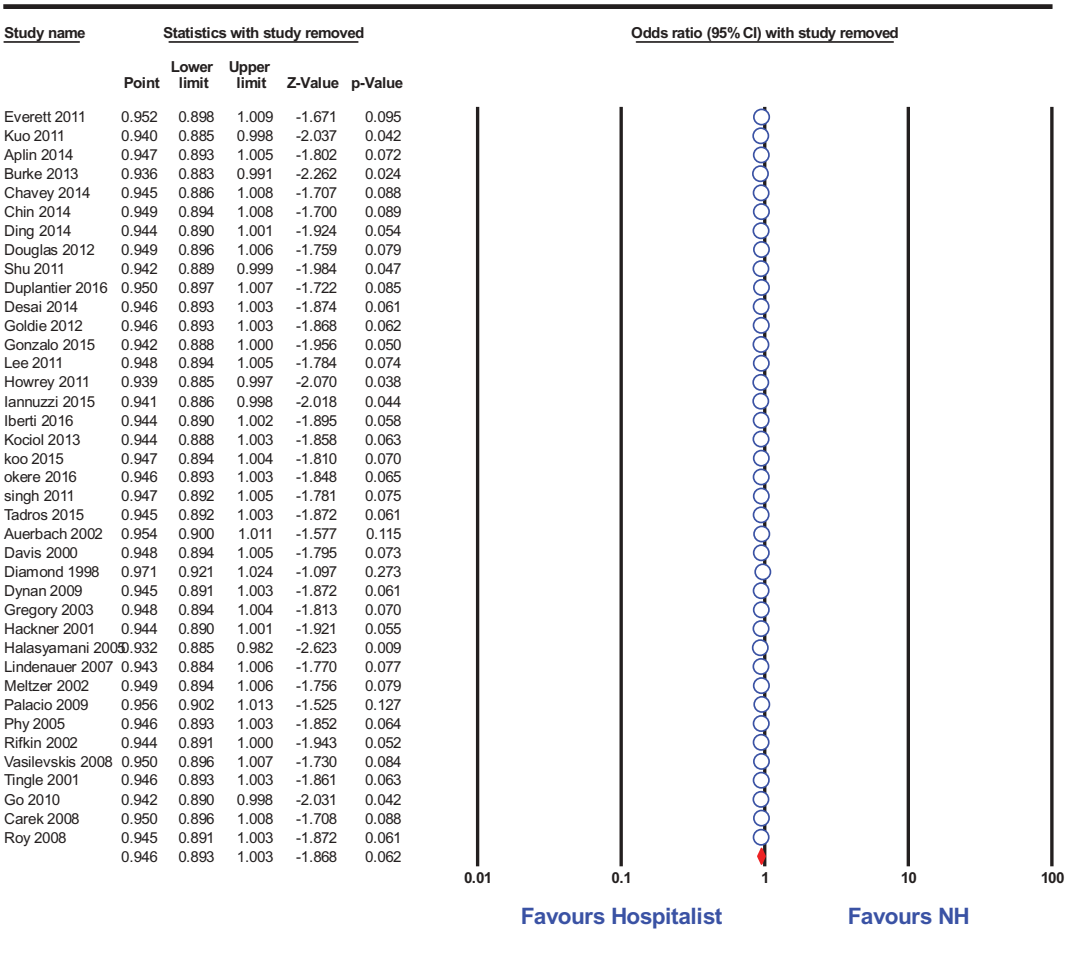

Figure A5. Forest plot of readmission/mortality in Hospitalist- and Non-hospitalist-based care models.