National Institute for Health and Care Excellence

Final

Chapter 26 Frequency of consultant review

Emergency and acute medical care in over 16s: service delivery and organisation

NICE guideline фп

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Chapter 26 Frequency of consultant review

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26 Frequency of review by a consultant

26.1 Introduction

The frequency of review of patients by a consultant may be a factor that affects patient flow through the acute hospital. Maximising patient flow is, of course, very important to ensure that the hospital resource is used most effectively and that, in the interests of patient safety, there is prompt and efficient care for each individual. While acute medical and critical care units have suggested standards that require each patient to be reviewed on a daily basis in the downstream, in patient wards a consultant review has traditionally been only twice a week. The question posed tries to address whether the disparate practices of consultant review will affect overall patient care, the patient experience and the efficiency by which the hospital resource is used.

26.2 Review question: What is the most clinically and cost-effective frequency of review by a consultant in AMU, ICU, CCU, stroke units and general medical wards?

For full details see review protocol in Appendix A.

Table 1: PICO characteristics of review question

Population	Adults or young people (>16 years of age) with a suspected or confirmed AME
Interventions	• Consultant ward round- Once daily • Consultant ward round- Twice daily • Consultant ward round- Weekend • Consultant ward round- Weekdays • Consultant ward round- Weekdays + Weekend • Rolling review • ICU-Daytime consultant • ICU-24 hours consultant
Comparison	All interventions will be compared with each other, unless otherwise stated
Outcomes	• Quality of life (CRITICAL) • Length of stay in hospital (CRITICAL) • Number of readmissions up to 30 days (IMPORTANT) • Mortality (CRITICAL) • Patient and/or carer satisfaction (CRITICAL) • Number of diagnostic tests (IMPORTANT) • Avoidable adverse events (CRITICAL) • Family satisfaction (IMPORTANT)
Study Design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.

26.3 Clinical evidence

Five studies were included in the review.[1,2,10,16,24,34] These are summarised in Table 2 below. Evidence from these studies is summarised in the GRADE clinical evidence summary (Table 3; Table 5 and Table 6). See also the study selection flow chart in Appendix B, study evidence tables in Appendix D and excluded studies list in Appendix G.

We searched for randomised trials and observational studies to identify the optimum frequency of consultant review required to improve outcomes.

One randomised study for the ICU population strata was identified for the intervention ICU 24 hour consultant versus ICU daytime consultant. No randomised trials were identified for the other defined population strata and following the review strategy, observational studies were considered. Four non-randomised studies were subsequently identified of which:

- three studies were before and after studies
- one study was a prospective cohort study.

A variety of frequency of consultant ward rounds and comparisons were evaluated in the studies which are summarised in Table 2. The before and after studies failed to adequately give baseline characteristics (such as age or disease) of the populations they were observing or inclusion and exclusion criteria.

Summary of included studies

Table 2: Summary of studies included in the review

Study	Intervention and comparison	Population and setting	Outcomes	Comments
Ahmad 2011[1] Ahmad 2015[2] Before/after study with multi-variate analysis.	Twice daily consultant ward rounds versus Twice weekly consultant ward rounds (supplemented with 2 register ward rounds and junior doctors performing ward rounds on the final 2 days)	Medical wards; 2 with intervention and 2 with comparison. The Royal Liverpool teaching hospital. n=unknown. All patients over a 12 month period	Mortality, readmission, length of stay.	No information on patient numbers in each group. Not analysable. Results presented as reported in study.
Bray 2014[10] Prospective cohort study.	Presence of physician ward rounds 7 days a week versus Physician ward round < 7 days week	Adults (n=56,666). Stroke units across 103 hospitals, United Kingdom.	Mortality at 7 and 30 day	Hazard ratios only reported for weekend versus weekday admissions, crude mortality data extracted
Fisher 2006[16] Before/after study	Weekly geriatric consultant review, with daily registrar care. Geriatricians were also on-call overnight and at weekends versus Geriatric medicine consultation-only service	Adults > 60 years old (n = 951), admitted non-pathological hip fracture over a 7 year period. Australia.	Avoidable adverse events, mortality, length of stay	Before/ after study (prospective observational study with retrospective control). Set in Australia and not acute medical emergency.
Kerlin 2013[24] RCT	Exposure on first night of admission to a single night-time (7pm – 7am)	All ICU admissions (median age 60; n=1609) in an academic medical	In-hospital mortality, Length of stay	Length of stay reported as median, interquartile range and the rate ratio is

Study	Intervention and comparison	Population and setting	Outcomes	Comments
	intensivist in addition to usual care (excluding intensivist available by phone at night) versus Usual care – exposure to intensivist during daytime hours (7am-6pm). Daytime intensivist available by phone at night	ICU (24 bed) at the Hospital of the University of Pennsylvania, USA		presented as reported in the study. Mortality includes categorisation as alive if discharged to home hospice and dead if discharged to hospital hospice. Follow-up is 90 days post ICU discharge when in-hospital – unclear if any patients missing.
Singh 2012[34] Before/after study	Daily consultant ward rounds, followed by MDT meeting versus 2 consultant ward rounds per week	Medical/ gastroenterology patients in a 26-bed gastroenterologist ward (n=1010). Study set in The Royal Bolton Hospital NHS foundation Trust.	30 day mortality, length of stay, Readmission at 30 days.	Before/ after study. A comparison of the first 12 months of the new method of working (daily consultant ward rounds) with the preceding 12 month period was made.

Table 3: ICU: 24 hour consultant versus daytime consultant

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Daytime consultant	Risk difference with 24 hour consultant (95% CI)
Mortality (in-hospital mortality)	1598 (1 study) 90 days	⨁⨁⊖⊖ LOW[a,b] due to risk of bias, imprecision	RR 1.09 (0.91 to 1.3)	228 per 1000	21 more per 1000 (from 21 fewer to 68 more)
Length of stay	1598 (1 study) 90 days	⨁⨁⊖⊖ LOW[a] due to risk of bias	Rate ratio 0.91 (0.82 to 1.01)	The median length of stay in the daytime consultant group was 166 hours (IQR 84 to 328)	The median length of stay in the 24 hour consultant group was 174 hours (IQR 91 to 361)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 4: General medical ward: Weekly consultant and daily registrar versus geriatric medicine consultation-only service

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with geriatric medicine consultation-only service	Risk difference with weekly consultant + daily registrar (95% CI)
Mortality (in-hospital mortality)	951 (1 study) 7 years	⨁⊖⊖⊖ VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	RR 0.61 (0.36 to 1.02)	77 per 1000	30 fewer per 1000 (from 49 fewer to 2 more)
Length of stay	951 (1 study) 7 years	⨁⊖⊖⊖ VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	-	The mean length of stay in the control groups was 11 days	The mean length of stay in the intervention groups was 0.5 lower (2.57 lower to 1.57 higher)
Avoidable adverse events	951 (1 study) 7 years	⨁⊖⊖⊖ VERY LOW[a,b,c] due to risk of bias,	RR 0.7 (0.62 to 0.78)	710 per 1000	213 fewer per 1000 (from 156 fewer to 270 fewer)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with geriatric medicine consultation-only service	Risk difference with weekly consultant + daily registrar (95% CI)
		indirectness, imprecision			

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(b) Downgraded by 1 increment for indirectness as service provision in Australia not directly comparable to UK.
(c) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 5: General medical ward : Once daily rounds versus twice weekly

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with twice weekly	Risk difference with once daily rounds (95% CI)
Mortality	1899 (1 study) 30 days	⨁⊖⊖⊖ VERY LOW[b] due to risk of bias	RR 0.55 (0.43 to 0.72)	146 per 1000	66 fewer per 1000 (from 41 fewer to 83 fewer)
Readmission	1899 (1 study) 30 days	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 1.01 (0.79 to 1.29)	120 per 1000	1 more per 1000 (from 25 fewer to 35 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.
(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(c) Clinical difference was indeterminable as standard deviations were not reported.

Singh 2012[34] reported an outcome that was not analysable:

Mean length of stay:

Twice weekly rounds group: 11.5 days.

Once daily rounds group: 8.9 days.

Table 6: Stroke unit : 7 day rounds versus less than 7 days

Outcomes	No of Participants	Quality of the evidence	Relative effect	Anticipated absolute effects

	(studies) Follow up	(GRADE)	(95% CI)	Risk with less than 7 days	Risk difference with 7 day rounds (95% CI)
Mortality	56666 (1 study) 7 days	⊕⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 0.78 (0.73 to 0.83)	72 per 1000	16 fewer per 1000 (from 12 fewer to 19 fewer)
Mortality	56666 (1 study) 30 days	⊕⊖⊖⊖ VERY LOW[a] due to risk of bias	RR 0.79 (0.76 to 0.83)	149 per 1000	31 fewer per 1000 (from 25 fewer to 36 fewer)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Bray 2014 reported outcomes that were not analysable:

Mortality hazard ratio; adjusted for patient case mix, organisational characteristics, staffing, and care quality:

- 7 day rounds weekday admission – 1 (Reference)
- 7 day rounds weekend admission– 0.96 (0.85-1.10)
- <7 days weekday admission – 1.05 (0.97-1.14)
- <7 days weekend admission – 1.04 (0.91-1.18)

General medical ward: Twice daily rounds versus twice weekly

One study[1] reported outcomes that were not analysable (number of participants was not reported)

Mean length of stay in twice weekly rounds was 9.7 ± 1.7 days compared to 5.2 ± 0.5 days in the twice daily rounds

Mean mortality in the twice weekly rounds was 2.9 ± 1.4 percent compared to 2.7 ± 1.3 percent in the twice daily rounds

Mean readmission rate in twice weekly rounds 18.8 ± 2.1 percent compared to 19.3 ± 2.4 percent in the twice daily rounds.

26.4 Economic evidence

Published literature

One economic evaluation was identified with the relevant comparison and has been included in this review.[2] This is summarised in the economic evidence profile below (Table 7) and the economic evidence tables in Appendix E.

The economic article selection protocol and flow chart for the whole guideline can found in the guideline's Appendix 41A and Appendix 41B.

Original modelling

An original cost-effectiveness analysis was conducted for this topic – see the economic evidence profile below (Table 7) and Chapter 41 for more detail.

Table 7: Economic evidence profile: More frequent versus less frequent consultant ward round

Study	Applica-bility	Limit-ations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Ahmad 2015[2] ([UK])	Partially applicable[(a)]	Potentially serious limitations [(b)]	Study design: **Cohort study** –Before-and-after initiation of the intervention. Evaluation type: CCA Population: Patients admitted to two general medical wards from A&E, acute admissions unit and the clinical at Royal Liverpool University Teaching hospital. Follow-up: 2 years before 2 years after Intervention: **Twice-daily** ward rounds (week-on the ward and a week-off the ward job plan) vs twice weekly.	-£108	**Mortality:** -0.2% (MD) **Readmission**: 0.5% (MD) **Length of stay**: -4.5 days (MD) **Total number of investigations:** -5.28 (MD) **Patient throughput:** 1289 (MD)	Twice daily dominates twice weekly	**Mortality**: p>0.05. **Readmission**: p >0.05. **Length of stay:** p <0.01. **Total number of investigations:** p=NR. **Patient throughput (Annual mean):** p <0.01
National Guideline Centre 2017 UK	Directly applicable	Potentially serious limitations [(c)]	Study design: **Lifetable model** Evaluation type: Cost-utility Intervention: **Daily** consultant review Population: Patients admitted to medical wards.	+£65	+0.0014 QALYs	£48,229 per QALY gained	With more optimistic treatment effect assumptions, the ICER dropped to £19,739 per QALY. The results were otherwise robust
National Guideline Centre 2017 UK	Directly applicable	Potentially serious limitations [(c)]	Study design: **Discrete event simulation** Evaluation type: Cost-utility Intervention: **Daily** consultant review Population: All patients presenting with an acute illness.	+£7.70	+0.00007 QALYs	£106,504 per QALY gained	With more optimistic treatment effect assumptions, the ICER was £66k per QALY.

Abbreviations: CCA: cost-consequences analysis; ICER: incremental cost-effectiveness ratio; MD: mean difference; n/a: not applicable; QALY: quality-adjusted life-year.

(a) QALYs are not used as an outcome measure. Cost data collected over 4 years (2007-2011) but no discounting is reported.

(b) An observational, before and after study with no adjustment for confounding or temporal variation. Evidence of intervention effectiveness is based on 1 study, so not reflecting all evidence in this area. No patient reported health outcomes included in the study. Local unit costs were used and it is not clear whether they are reflective of National unit costs. No sensitivity analysis reported.

(c) Treatment effects were elicited from experts.

26.5 Evidence statements

Clinical

ICU: 24 hour consultant versus daytime consultant

One study comprising 1598 participants evaluated the role of a 24 hour consultant compared to a day time consultant in ICU, in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that increased consultant reviews found no difference on mortality and length of stay (low quality).

General medical ward: Weekly consultant and daily registrar versus geriatric medicine consultation-only service

One study comprising 951 participants evaluated the role of weekly consultant geriatrician review and daily medical care from a geriatric medicine registrar compared to geriatric medicine consultation only service, in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that increased ward rounds may provide benefits in reduced mortality and avoidable adverse events; however, there was no effect on length of stay (very low quality).

General medical ward : Once daily rounds versus twice weekly

One study, comprising 1899 participants, evaluated once daily consultant ward rounds compared to twice weekly consultant ward rounds in general medical wards, in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that increased ward rounds may provide benefits in reduced mortality; however, there was no effect on readmission at 30 days (very low quality).

Stroke unit : 7 day rounds versus less than 7 days

One study comprising 56,666 participants evaluated 7 day rounds compared to less than 7 day rounds in a stroke unit. The evidence suggested that increased ward consultant reviews found no difference on mortality at 7 and 30 days (very low quality).

Economic

One cost–consequence analysis found that twice daily consultant ward rounds was less costly than twice weekly consultant ward rounds for treating AME patients (£108 less per patient). Twice daily consultant ward rounds also had a lower mortality rate, shorter length of stay and fewer investigations but had a larger readmission rate. This analysis was assessed as partially applicable with potentially serious limitations.

Two original cost-utility analyses (cohort model and discrete event simulation) found that daily consultant ward rounds on medical wards was not cost effective compared to twice weekly consultant ward rounds (ICER:£48k-£106kper QALY gained). This analysis was assessed as directly applicable with potentially serious limitations.

26.6 Recommendations and link to evidence

Recommendations	**10. For people admitted to hospital with a medical emergency, consider providing the following, accompanied by local evaluation which takes into account current staffing models, case mix and severity of illness:** • **Consultant assessment within 14 hours of admission to determine the person's care pathway** • **Daily consultant review, including weekends and bank holidays** • **More frequent (for example, twice daily) consultant review based on clinical need.**
Research recommendation	**-**
Relative values of different outcomes	Mortality, length of stay, avoidable adverse events, patient and/or carer satisfaction, and health-related quality of life were considered by the guideline committee to be critical outcomes. Number of diagnostic tests ordered, readmission (up to 30 days) and family satisfaction were considered by the committee to be important outcomes.
Trade-off between benefits and harms	A total of 5 studies were identified that assessed consultant frequency in AME patients in hospital. Three of these studies were conducted in general medical wards, 1 study in ICU and 1 study in a stroke unit. **General medical wards** Three studies provided the evidence for general medical wards. **General medical wards: weekly consultant and daily registrar versus geriatric medicine consultation-only service** One study evaluated the role of weekly consultant geriatrician review and daily medical care from a geriatric medicine registrar compared to geriatric medicine consultation only service. The evidence suggested that increased ward rounds may provide benefits in reduced mortality and avoidable adverse events; however, there was no effect on length of stay. There was no evidence for quality of life, readmission, patient and/or carer satisfaction, number of diagnostic test and family satisfaction. **General medical ward: once daily rounds versus twice weekly** One study evaluated once daily consultant ward rounds compared to twice weekly consultant ward rounds in general medical wards. The evidence suggested that increased ward rounds may provide benefits in reduced mortality; however, there was no effect on readmission at 30 days. There was no evidence for quality of life, length of stay in hospital, patient and/or carer satisfaction, number of diagnostic tests, avoidable adverse events and family satisfaction. **ICU population: 24 hour consultant versus day time consultant** One study evaluated the role of 24 hours consultant compared to day time consultant in ICU. The evidence suggested that increased consultant reviews found no difference on mortality and length of stay. There was no evidence for quality of life, readmissions, patient and/or carer satisfaction, and number of diagnostic tests, avoidable adverse events and family satisfaction. **Stroke units: 7 day rounds versus less than 7 days** One study evaluated 7 day rounds compared to less than 7 day rounds in a stroke unit. The evidence suggested that increased consultant reviews found no difference

	on mortality at 7 and 30 days. The committee also took into consideration the hazard ratios reported narratively in the stroke population for mortality. These summary statistics compared weekend versus weekday admission when the frequency of consultant ward rounds was daily for 7 days, or less than 7 days. The hazard ratios were adjusted for patient case mix, organisational characteristics, staffing and care quality. The hazard ratios increased when the frequency of consultant ward rounds was less than 7 days. The committee deemed this applicable, considering it likely that when ward rounds are conducted at a frequency of less than daily, it is weekend admissions that are least likely to receive stroke consultant review. There was no evidence for quality of life, length of stay, number of readmissions, patient and/or carer satisfaction, number of diagnostic tests, avoidable adverse events and family satisfaction. **CCU and AMU** No evidence was identified for any outcomes for CCU and AMU. **Overall** The committee noted that although no harms were identified related to daily consultant review, there would either be costs associated with increased consultant provision, or an opportunity cost associated with consultants not undertaking other currently scheduled duties. Given the benefits observed and absence of harms, particularly for people in general medical wards, the committee considered that there was sufficient evidence to recommend that Trusts consider implementing daily consultant review. The committee chose to develop a recommendation for daily consultant review on general medical wards including weekends. Although there was no evidence supporting more frequent consultant review for patients in ICU, the committee noted that these patients will require reviewing more often as they are sicker, clinical status can change quickly and timely decisions about management are needed. The committee chose to develop a recommendation to consider more frequent (for example, twice daily) consultant involvement depending upon patient need. The committee recognised that for some specialities, for example, intensive care medicine, twice daily consultant review was already a national standard.[15]
Trade-off between net effects and costs	Increasing the consultant time spent on ward rounds has an opportunity cost; it might lead to reduced consultant involvement in outpatient clinics or teaching sessions. Alternatively, more consultants (or longer hours) will be required. Some costs could be offset by changes in rotas and cross-covering of clinics by specialists delivering services as a group rather than as individuals. Annualised job plans may be beneficial in these circumstances. The evidence from some studies showed that time to discharge was reduced by more frequent consultant review and in 1 study this led to a cost saving. This study increased ward round frequency without increasing the total amount of consultant time. A limitation of this study is that we do not know the opportunity cost of the consultant time – the activities that were foregone by participating in more frequent ward rounds. No other studies considered the impact on cost. A new cost-utility analysis was conducted, comparing daily consultant ward rounds 7 days a week with consultant ward rounds twice a week – see Chapter 41. The model used inputs from bespoke data analysis, national statistics and treatment effects (primarily length of stay reduction and modest reductions in adverse events) that were informed by the above review but elicited from the committee members. Daily consultant review was assumed to have an incremental cost of consultant time but also at the weekend an incremental cost of junior doctor and nursing staff, since ward rounds were assumed not to take place at the weekend under usual care. In the cohort model, daily consultant review was not cost-effective at a £20,000

	threshold in the base case, with an ICER of £48k. . However, it cost £20k per QALY gained when more optimistic treatment effects were assumed. The committee noted that the intervention was staff intensive and therefore expensive. However, they also noted that the intervention costs could be offset if the intervention caused significant improvements to hospital flow through large reductions in medical outliers. The simulation model showed reductions in outliers but the QALY reduction was small. Consequently, the cost per QALY was even higher although due to long run time, the number f runs conducted were limited and therefore the results imprecise. The committee noted that daily consultant review should only be implemented where significant improvements to hospital flow in the general medical wards and medical outliers could be seen. There are benefits of daily consultant review that were not captured in the model and are difficult to quantify, including impact on quality of life from quicker diagnosis and treatment and more appropriate location of/better quality of death. The committee concluded that daily consultant review could be cost-effective in hospitals where significant improvements to the hospital flow can be achieved. However, it was agreed that this would not be the case nationwide and any intervention should only be evaluated at the local level. For patients that are more acutely ill or critically ill, the consultant's experience might play a greater role and therefore more frequent consultant review could be more effective and cost effective. To implement this recommendation, some Trusts may wish to reorganise their consultant workloads and some might need to increase their consultant input. There might also be an impact on nurses and junior doctors at the weekend. However, these costs would be offset by reduced length of stay and investigations as well as health gain.
Quality of evidence	Three before and after studies within the general medical ward population strata were identified. The quality of outcomes was very low due to study design and very serious risk of bias. Some of these outcomes were also downgraded for indirectness and imprecision. Two of the studies were conducted in the UK and 1 in Australia. The committee agreed that these 3 studies were not comparable and as such, the studies were not pooled for meta-analysis. One prospective cohort study was identified within the stroke unit population strata which reported the outcome mortality. Outcome quality was very low due to study design, very serious risk of bias and imprecision in 1 of the mortality outcomes. This study was conducted in the UK across 103 hospitals. One RCT was identified for the ICU population strata. Outcome quality was low due to risk of bias and imprecision. This study was conducted in the USA. Original health economic modelling was assessed to be directly applicable but still had potentially serious limitations due to the treatment effects being based on expert opinion, albeit conservative and informed by the guideline's systematic review.
Other considerations	The experience of both the clinicians and the patient representatives in the committee favoured increased frequency of consultant review, recognising that research in this area was currently in progress; survey evidence from Trusts in England in 2014[4] indicated that daily consultant review was the norm for 50% of acute medical units, 27% of acute general wards, and 100% of intensive care units. Mechanisms of benefit were postulated to include better control of the patient's journey through more accurate and efficient decision making, particularly at weekends when patients often experience a sense of 'drift'. It was also felt that although the recommendation would result in more frequent visits to the ward, the greater in-depth knowledge of the patients would mean that the actual reviews would take less time. The committee noted the importance of patient communication and, in particular, being informed when they have been reviewed by

	a consultant. The committee highlighted that further research may help to strengthen the recommendation and would benefit from measuring the downstream effects of increased consultant involvement, for example, the impact on outpatient clinics if consultants were not released from concurrent duties. The committee considered that the limits placed on junior doctor working hours also impacted adversely on continuity of care and that this could be modified by more frequent involvement by consultants. Other mechanisms of benefit included better support of medical and nursing staff, enhanced patient flow, and greater patient and family satisfaction. The committee emphasised that consultants should not work in isolation but rather with adequate support from the multidisciplinary team[25] and ready availability of diagnostic services. Recommendations on the provision of care via a multidisciplinary team can be found in Chapter 29.

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Appendices

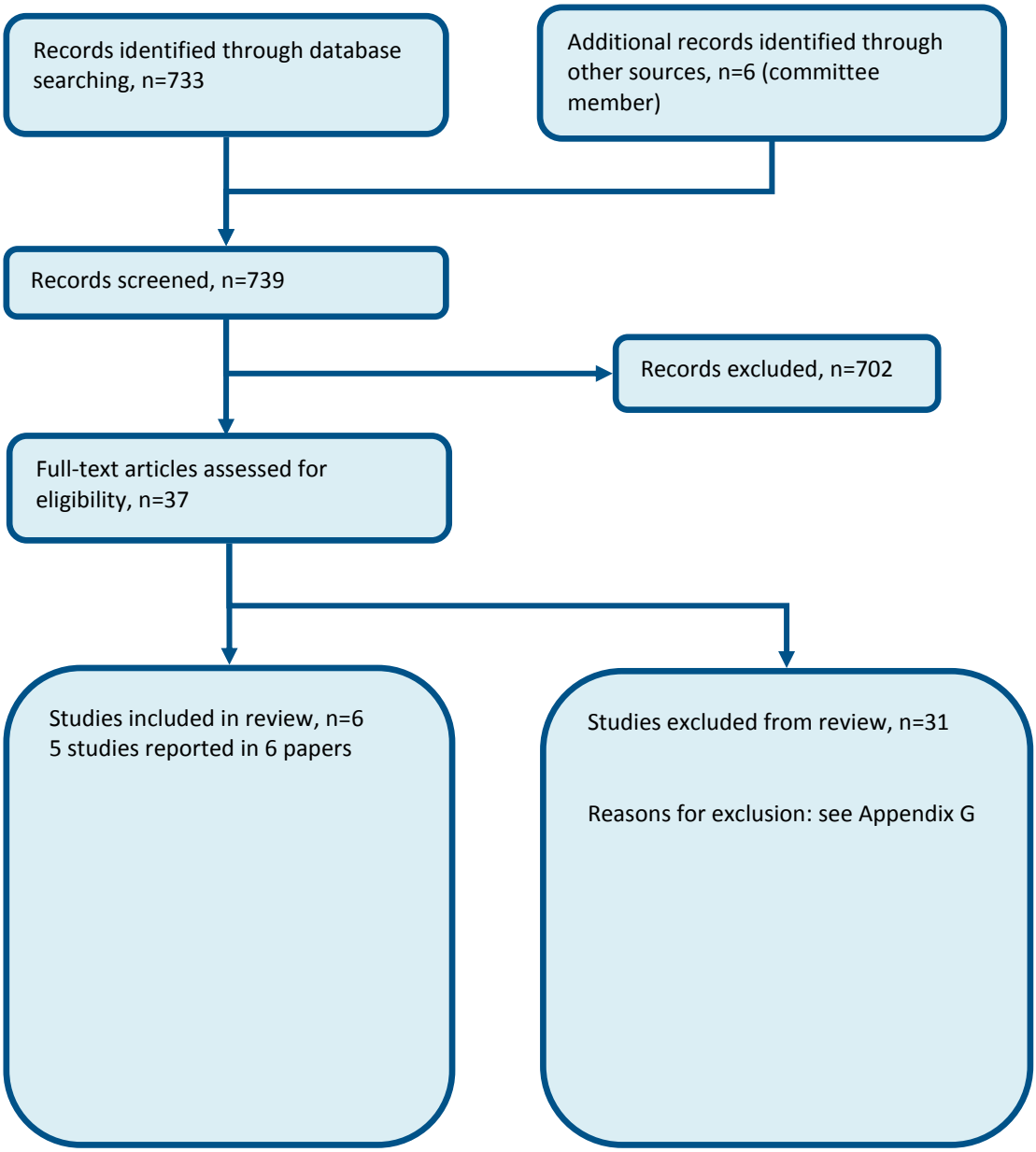
Appendix A: Review protocol

Table 8: Review protocol: Frequency of consultant ward rounds in hospital

Review question	Frequency of consultant ward rounds in hospital
Guideline condition and its definition	Acute Medical Emergencies. Definition: People with suspected or confirmed acute medical emergencies or at risk of an acute medical emergency.
Objectives	To establish the optimum frequency of consultant ward rounds in hospital.
Review population	Adults or young people (>16 years of age) with a suspected or confirmed AME
	Adults and young people (>16 years of age)
	Line of therapy not an inclusion criterion
Interventions and comparators: generic/class; specific/drug (All interventions will be compared with each other, unless otherwise stated)	Consultant ward round- Once daily Consultant ward round- Twice daily Consultant ward round- Weekend Consultant ward round- Weekdays Consultant ward round- Weekdays + Weekend Rolling review ICU-Daytime consultant ICU-24 hours consultant
Outcomes	- Quality of life within the study period (Continuous) CRITICAL - Length of stay in hospital within the study period (Continuous) CRITICAL - Number of readmissions up to 30 days (Dichotomous) - Mortality within the study period (Dichotomous) CRITICAL - Patient and/or carer satisfaction within the study period (Dichotomous) CRITICAL - Number of diagnostic tests within the study period (Dichotomous) - Adverse events within the study period (Dichotomous) - Family satisfaction within the study period (Dichotomous)
Review strategy	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.
Unit of randomisation	Patient
Crossover study	Permitted
Minimum duration of study	Not defined
Population stratification	AMU ICU CCU Stroke Unit General medical wards
Reasons for stratification	The optimal frequency of consultant ward rounds may vary in different settings.
Subgroup analyses if there is heterogeneity	None specified
Search criteria	Databases: Medline, Embase, the Cochrane Library Date limits for search: None Language: English language only

Appendix B: Clinical article selection

Figure 1: Flow chart of clinical article selection for the review of consultant frequency



Appendix C: Forest plots

C.1 General medical ward: Weekly consultant and daily registrar versus geriatric medicine consultation-only service

Figure 2: In-hospital mortality

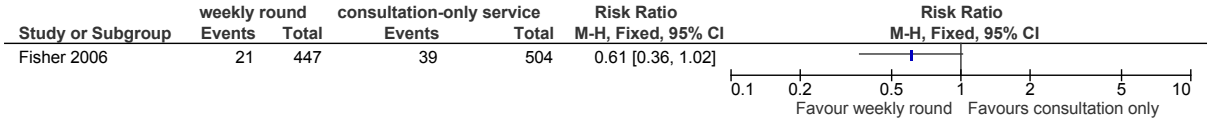


Figure 3: Length of stay

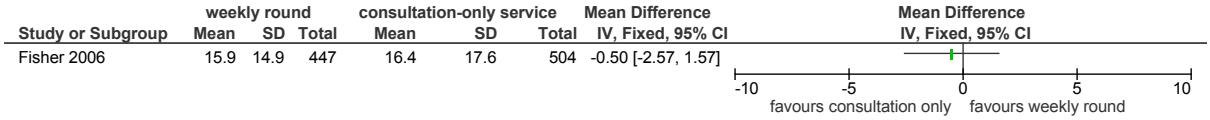
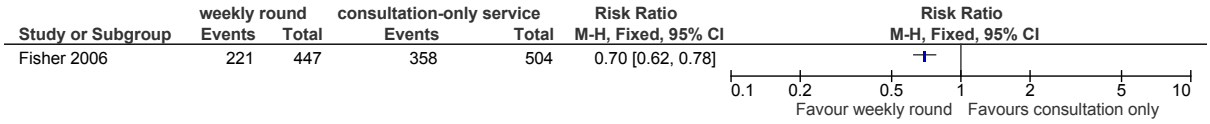


Figure 4: Avoidable adverse effects



C.2 General medical ward : Once daily rounds versus twice weekly

Figure 5: Mortality

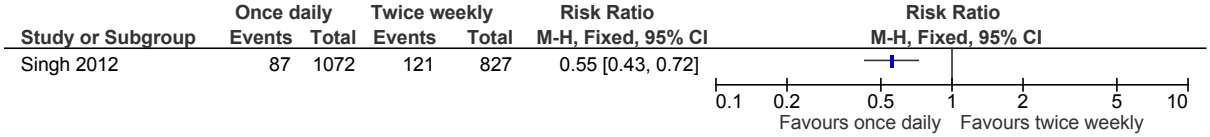
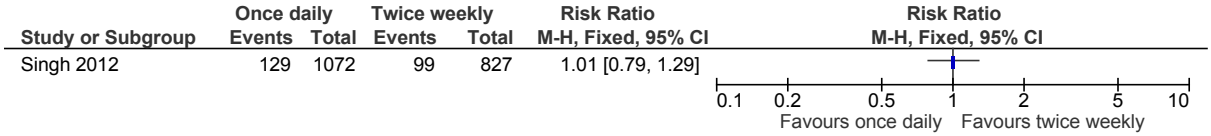


Figure 6: Readmission at 30 days



C.3 ICU: 24 hour consultant versus daytime consultant

Figure 7: In-hospital mortality

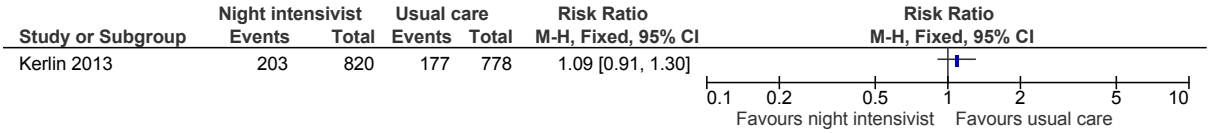
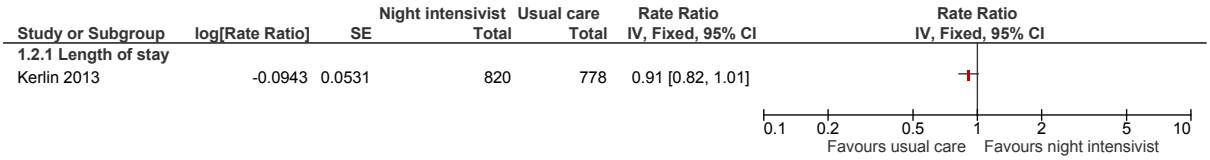
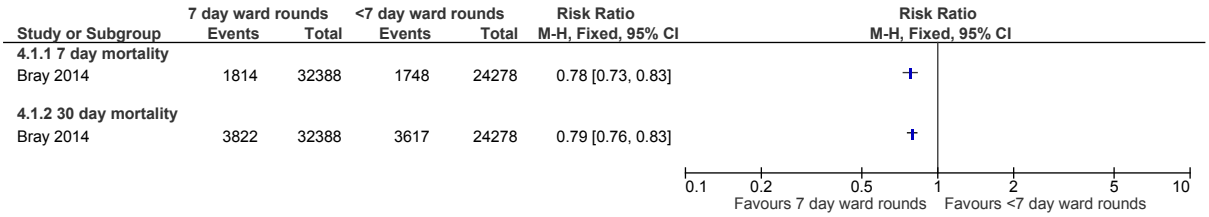


Figure 8: Length of stay



C.4 Stroke units: 7 day ward round versus less than 7 days

Figure 9: Mortality



Appendix D: Clinical evidence tables

Study (subsidiary papers)	Ahmad 20111 (Ahmad 20152)
Study type	Before/ after study
Number of studies (number of participants)	n/a (n=Not stated)
Countries and setting	Conducted in United Kingdom; Setting: Department of General Medicine, Royal Liverpool University Hospital.
Line of therapy	Not applicable
Duration of study	Intervention time: 12 months
Method of assessment of guideline condition	--
Stratum	General medical wards
Subgroup analysis within study	Not applicable
Inclusion criteria	Not stated.
Exclusion criteria	Not stated.
Recruitment/selection of patients	Any patients admitted to the 3 included general medical wards.
Age, gender and ethnicity	Age - --: Not stated Gender (M:F): n/a. Ethnicity: Not stated
Further population details	None
Indirectness of population	No indirectness
Interventions	(n=1) Intervention 1: Consultant ward round - twice daily. Two consultants were timetabled to provide twice-daily WRs on their respective wards on a week-on and week-off (5 days a week) basis alternating with the other 2 consultants who only manage the outpatient clinics during that week. Duration 12 months. Concurrent medication/care: While based on the wards, each consultant provides inpatient cover for the week with only 1 specialty clinic session in the outpatient department. This was a radical shift from the twice-weekly WRs by each consultant prior to the change. The inpatient consultants lead the discharge planning and decision making while providing continuity of care to patients and ensuring discharges are completed with no delays due to lack of decision making. New admissions following discharges on the same day are then reviewed by consultants on the late afternoon WR following the same process. The proposed changes did not increase the working hours or sessions of the consultants or any other staff, and did not require extra resources, thus, being cost-neutral. The consultants were providing 6 to 7 direct clinical care sessions per week including 2 WRs and 3 to 4 clinics in the

Study (subsidiary papers)	Ahmad 20111 (Ahmad 20152)
	old system and continued to provide 6 to 7 direct clinical sessions with the new job plan with alternating ward rounds and clinics each week, thus, not requiring any clinic cancellations or income loss for the trust. (n=2) Intervention 2: Consultant ward round - weekdays. Traditionally, each consultant would provide 2 ward rounds (WRs) per week to their half of the patients on their respective ward (2 consultants based on each ward). An additional senior WR was provided by specialist registrars (SpRs) leaving the junior doctors performing WRs on the other 2 days on each ward. Patient management by consultants was, therefore, limited to 2 days a week resulting in patients being reviewed and managed by junior doctors for up to 5 days. Duration 12 months. Concurrent medication/care: The Royal Liverpool University Hospital is a large teaching hospital managing unselected acute admissions. Two medical wards are supervised by 4 consultants, supported by a full medical team. Each ward has 25 beds and patients admitted with unselected acute medical problems are managed and then discharged or transferred to community hospitals.
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: TWICE DAILY CONSULTANT WARD ROUNDS versus CONSULTANT WARD ROUND - TWICE WEEKLY Protocol outcome 1: Length of stay in hospital - Actual outcome: Average length of stay: the difference, in days, between date of discharge and date of admission in the index episode at 12 months; Group 1: mean 5.3 (SD 0.8), Group 2: mean 10.4 (SD 1.5); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Number of readmissions up to 30 days - Actual outcome: Readmission (%): any readmission to any specialty within 28 days divided by live discharges. at 12 months; Group 1: mean 18.1 (SD 3.7), Group 2: mean 17.6 (SD 3.2); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Mortality - Actual outcome: Mortality (%): total deaths divided by the total discharges. at 12 months; Group 1: mean 3.4 (SD 3.2), Group 2: mean 3.2 (SD 2); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Ahmad 2015 - Mortality (%) at 12 months; Group 1: mean 2.7 % (SD 1.3), Group 2: mean 2.9 % (SD 1.4);	

Study (subsidiary papers)	Ahmad 20111 (Ahmad 20152)
Risk of bias: High; Indirectness of outcome: No indirectness - Actual outcome: Ahmad 2015 - Length of stay at 12 months; Group 1: mean 5.2 days (SD 0.5), Group 2: mean 9.7 days (SD 1.7); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness- Actual outcome: Ahmad 2015 - Readmission (%) at 12 months; Group 1: mean 19.3 % (SD 2.4), Group 2: mean 18.8 % (SD 2.1); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life at Define; Number of diagnostic tests at Define; Adverse events at Define; Family satisfaction at Define; Patient and/or carer satisfaction at Define

Study	Bray 2014[10]
Study type	Prospective cohort study
Number of studies (number of participants)	(n=56666)
Countries and setting	Conducted in United Kingdom; Setting: 103 hospitals (stroke units) in England.
Line of therapy	Not applicable
Duration of study	Intervention time: 18 months
Method of assessment of guideline condition	Adequate method of assessment
Stratum	Overall
Subgroup analysis within study	Not stratified but pre-specified: Stroke specialist physician rounds <5 days a week, 5 days a week and 6 days a week.
Inclusion criteria	All patients with ischaemic stroke or primary intake cerebral haemorrhage. Ischaemic stroke was subtyped according to the Oxfordshire Community Stroke Project classification, using clinical characteristics.
Exclusion criteria	Patients with subarachnoid haemorrhage or transient ischaemic attack were not included.
Age, gender and ethnicity	Age - Median (IQR): 7 days per week: 76 (65-84). <7 days per week: 78 (67-85). Gender (M:F): not stated. Ethnicity: Not stated
Further population details	
Extra comments	Stroke patients (ischaemic and haemorrhage)
Indirectness of population	No indirectness
Interventions	(n=32388) Intervention: Consultant ward round - Weekdays + Weekend. Ward rounds 7 days a week. Duration 18 months. Observational studies have reported higher mortality for patients admitted on weekends. It is not known whether this

Study	Bray 2014[10]
	'weekend' effect is modified by clinical staffing levels on weekends. (n=24278) Control: Consultant ward round- Weekdays. Stroke specialists ward rounds less than 7 days a week. Duration 18 months. Stroke specialists ward rounds less than 7 days a week.
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: WARD ROUNDS BY STROKE SPECIALISTS PHYSICIANS 7 DAYS PER WEEK versus CONSULTANT WARD ROUND- LESS THAN 7 DAYS A WEEK Protocol outcome 1: Mortality - Actual outcome: Mortality (percent) at 7 days; Group 1: 1814/32388, Group 2: 1748/24278; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Mortality (percent) at 30 days; Group 1: 3822/32388, Group 2: 3617/24278; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life within the study period; Number of readmissions up to 30 days; Patient and/or carer satisfaction within the study period; Number of diagnostic tests within the study period; Adverse events within the study period; Family satisfaction within the study period; Length of stay in hospital within the study period

Study	Fisher 2006[16]
Study type	Before/ after study
Number of studies (number of participants)	(n=951)
Countries and setting	Conducted in Australia; Setting: The Canberra Hospital, Australia.
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 7 years (1995-2002)
Method of assessment of guideline condition	Adequate method of assessment
Stratum	Overall
Subgroup analysis within study	Not applicable: none
Inclusion criteria	Age 60 or above admitted with a primary diagnosis of non-pathological hip fracture.
Exclusion criteria	None stated

Study	Fisher 2006[16]
Age, gender and ethnicity	Age - Mean (SD): 81.9 ±8.0. Gender (M:F): 114/333. Ethnicity: Not stated
Further population details	None
Extra comments	Hip fracture patients are at high risk of an acute medical emergency.
Indirectness of population	No indirectness
Interventions	(n=447) Intervention: Consultant ward round - weekdays. Weekly consultant review, with daily registrar ward rounds. Duration 1998-2001. In 1998, a part-time orthogeriatric geriatric medicine registrar was appointed to oversee daily medical care with weekly consultant geriatrician review. A half-time orthogeriatric geriatric medicine registrar worked 5 days a week and was available for consultation from 0800 to 1700. On weekends and after-hours, geriatric medicine care was usually provided by 1 of 2 geriatrician's on-call. These 2 specialists were the consultants who reviewed all hip fracture patients in routine weekly and in case of need. This provided management of concurrent medical problems, postoperative complications and advice on rehabilitation and discharge planning. (n=504) Control: Consultant ward round- Once daily. Duration 1995-1997. Between 1995 and 1997, patients with hip fractures were managed exclusively by the orthopaedic team and geriatric medicine advice limited. All medical problems were managed by a consultation-only service.
Funding	No funding

Study	Fisher 2006[16]
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: WEEKLY CONSULTANT REVIEW, WITH DAILY REGISTAR WARD ROUNDS. versus CONSULTAION-ONLY SERVICE (GERIATRIC MEDICINE) Protocol outcome 1: Length of stay in hospital within the study period - Actual outcome: Length of hospital stay at 7 years (before/ after study); Group 1: mean 16.4 days (SD 17.6); n=447, Group 2: mean 15.9 days (SD 14.9); n=504; Risk of bias: All domain - High, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Key confounders: Retrospective control group Protocol outcome 2: Mortality - Actual outcome: Mortality (%) at 7 years (before/ after study); Group 1: 21/447, Group 2: 39/504; Risk of bias: All domain - High, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Key confounders: Retrospective control group Protocol outcome 3: Adverse events - Actual outcome: Incidence (%) of main postoperative medical complications in older patients with hip fracture at 7 years (before/ after study); Group 1: 358/447, Group 2: 221/504; Risk of bias: All domain - High, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Key confounders: Retrospective control group	
Protocol outcomes not reported by the study	Quality of life within the study period; Patient and/or carer satisfaction within the study period; Number of diagnostic tests within the study period; Family satisfaction within the study period; Number of readmissions up to 30 days

Study	Kerlin 2013[24]
Study type	RCT
Number of studies (number of participants)	(n=1609)
Countries and setting	Conducted in USA; Setting: academic ICU, Hospital of the University of Pennsylvania
Line of therapy	Not applicable
Duration of study	Intervention time: 12 months (excluding December 17th – January 2nd). Follow-up at ICU discharge to in-hospital ward: 90 days
Method of assessment of guideline condition	Adequate method of assessment
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Admission to ICU

Study	Kerlin 2013[24]
Exclusion criteria	Readmission to the ICU (first admission analysed), no APACHE III score, brief ICU admission which did not include a night
Recruitment/selection of patients	All admissions
Age, gender and ethnicity	Age - Median (IQR): Intervention - 60 (IQR: 48-69), Control - 60 (IQR: 48-69); Gender (M:F): Intervention – 55:45 Control - 54:46; Ethnicity: Black 40%, White 50%, Asian 1%, Other 9%
Further population details	Median APACHE III score: 67 (IQR: 47-91). Median LoS in ICU: 52.7 hours (IQR: 29.0-113.4)
Extra comments	Mortality - Patients discharged to in-hospital hospice categorised as dead. While patients discharged to home hospice categorised as alive
Indirectness of population	No indirectness
Interventions	Intervention (n=824) – Exposure on day of admission to ICU to a single night-time (7pm – 7am) intensivist in addition to usual the 3 night-time medical residents. Night-time intensivists were drawn voluntarily from the pool of daytime intensivists (excluding those on service) and assumed primary responsibility for all ICU patients during the night. Allocation was randomised in consecutive 7-day blocks, within a 2 week strata which followed daytime intensivist schedules (14 day blocks). Cumulative exposure to night-time intensivist for intervention admissions had a median of 100% (IQR: 67-100). Control (n=778) – usual practice, daytime staffing consisted of 2 teams each of which comprises 1 intensivist, 1 critical care fellow, 6 medical residents and 1 advanced practitioner, all of whom are typically present from 7am through at least 6pm. Daytime intensivists were rotated in 14 day blocks and on control nights in addition to the critical care fellows maintained primary responsibility for patients and were available by telephone to in-hospital residents and nurses. For control group cumulative exposure to night-time intensivist had a median of 0% (IQR: 0-33).
Funding	University of Pennsylvania Health System and others; NCT01434823
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: ICU 24 HOURS CONSULTANT versus ICU DAYTIME CONSULTANT Protocol outcome 1: Mortality - Actual outcome: In-hospital mortality: Group 1: 203/820, Group 2: 177/778; Risk of bias: All domain - High, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low, Other 1 - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: missing APACHE III data; Group 2 Number missing: 7, Reason: missing APACHE III data Protocol outcome 2: Length of stay in hospital	

Study	Kerlin 2013[24]
- Actual outcome: rate ratio of length of stay: in hours, between ICU admission to hospital discharge: 0.91 (0.82 to 1.01); Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low, Subgroups - Low, Other 1 - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 4, Reason: missing APACHE III data; Group 2 Number missing: 7, Reason: missing APACHE III data	
Protocol outcomes not reported by the study	Quality of life within the study period; Patient and/or carer satisfaction within the study period; Number of diagnostic tests within the study period; Adverse events within the study period; Family satisfaction within the study period; Number of readmissions up to 30 days

Study	Singh 2012[34]
Study type	Before/ after study
Number of studies (number of participants)	Not stated
Countries and setting	Conducted in United Kingdom; Setting: Gastroenterology ward, The Royal Bolton Hospital.
Line of therapy	Not applicable
Duration of study	Intervention time: 12 months
Method of assessment of guideline condition	Adequate method of assessment
Stratum	Overall: Primary diagnosis was gastroenterological in 90% of cases
Subgroup analysis within study	Not applicable
Inclusion criteria	None given
Exclusion criteria	None given
Recruitment/selection of patients	Unknown
Age, gender and ethnicity	Age – not given. Gender (M:F): not stated. Ethnicity: not stated
Further population details	No population details given
Extra comments	The Royal Bolton Hospital is part of a Foundation Trust delivery secondary care to a population of 260000.
Indirectness of population	No indirectness
Interventions	(n=1072) Intervention 1: Consultant ward round- Once daily. Daily consultant ward rounds, followed by an MDT meeting. Duration 12 months. In September 2009, an alternative model was designed and subsequently implemented in December 2009, with the introduction of daily consultant wards, followed by an MDT meeting. One consultant now takes sole responsibility for

Study	Singh 2012[34]
	the gastroenterology ward. Clinical ward rounds take place Monday to Friday between 09:15 and 11:45. At 11:45, there is an MDT meeting for the ward, lasting 30-40 minutes, involving the nursing staff, alcohol specialist nurses, physiotherapists, occupational therapists, social workers and dieticians. It is patient-centred, each problem being prioritised and discussed, with input from all relevant healthcare professionals. A predicted date of discharge is reviewed daily, so that individual members of the team complete their responsibilities in parallel rather than in series. While covering the wards, the consultant is now free from all other programmed activities. Hence, in the afternoon, they can visit the MAU/ HDU, see referrals from other specialties, cover emergencies in endoscopy, meet relatives on the ward and review the progress of gastroenterology ward patients. With 1 consultant accepting the inpatient workload for 2 weeks at a time, the other 3 consultants are free to focus on outpatient clinics, endoscopy and all other supporting activity, without interruption from the acute inpatient workload. (n=827) Control: Consultant ward round- twice weekly. As with most doctors, the consultant job plans included 2 ward rounds a week. Duration 12 months. Four consultant gastroenterologists cover the workload, supported by an associate specialist, a staff grade physician, 1 registrar, a nurse consultant, 2 nurse endoscopists and 4 specialists' nurses. The gastroenterology ward is a 26-bed unit. Historically, 2 consultants were on at any time, each covering 13 patients. Responsibility was also assumed for medical outliers on 2 surgical wards. As with most doctors, the consultant job plans included 2 ward rounds a week.
Funding	No funding
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: CONSULTANT WARD ROUND- ONCE DAILY. FOLLOWED BY AN MDT MEETING. versus CONSULTANT WARD ROUND- TWICE WEEKLY Protocol outcome 1: Mortality - Actual outcome: 30 day mortality; Group 1: 87/1072, Group 2: 121/827; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Very high, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Readmission up to 30 days - Actual outcome: Readmission at 30 days; Group 1: 121/1072, Group 2: 89/827; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Very high, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life within the study period; Patient and/or carer satisfaction within the study period; Number of diagnostic tests within the study period; Adverse events within the study period; Family satisfaction within the study period;

Study	Singh 2012[34]
	Number of readmissions up to 30 days

Appendix E: Economic evidence tables

Study	Ahmad 2015[2]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA (health outcome: mortality, hospital readmissions, length of stay) **Study design:** observational study (before and after analysis) **Approach to analysis:** Before and after comparative analysis of the mean monthly and annual number of investigations per patient using one-way analysis of variance. Unit costs of investigations applied to calculate mean annual cost. Mean annual and monthly pharmacy cost per patient over the same period were also calculated and compared. **Perspective:** UK NHS **Follow-up**: 4 years (2 years before and 2 years after, 2007-2011)). **Treatment effect duration:** 2 years **Discounting:** NR	**Population:** Patients admitted to two general medical wards from A&E, acute admissions unit and the clinical at Royal Liverpool University Teaching hospital. **Cohort settings:** Start age: NR, Male: NR **Intervention 1:** Twice weekly consultant ward rounds in two general medical wards. **Intervention 2:** Twice daily consultant ward rounds implemented in 2 general medical wards. The intervention delivered daily consultant input in clinical decision making as well as bedside teaching and supervision of junior staff.	**Total costs (mean per patient):** Incremental (2−1): -£108 (95% CI: NR; p=NR) **Currency & cost year:** 2007-2011 UK pounds **Cost components incorporated:** Investigations (urea and electrolytes, liver function tests, full blood count, chest X-ray, CT, MRI, ventilation/ perfusion scan, endoscopy and colonoscopy) Medications Staff costs and overheads assumed equal	**Mortality (mean per patient):** 1: 2.9%, 2: 2.7% (2−1): -0.2% (95% CI: NR; p p>0.05) **Readmission (mean per patient):** 1: 18.8%, 2: 19.3%, (2−1): 0.5% (95% CI: NR; p >0.05) **Length of stay (mean per patient):** 1: 9.7 days, 2: 5.2 days (2−1): -4.5 days, (95% CI: NR; p <0.01) **Total number of investigations (mean per patient):** 1: 9.96, 2: 4.68, (2−1): - 5.28 (95% CI: NR; p=NR) **Patient throughput (Annual mean):** 1: 1827, 2: 3116 I (2−1): 1289 (95% CI: NR; p <0.01)	**ICER:** Twice daily dominates twice weekly **Analysis of uncertainty:** No sensitivity analysis reported
Data sources				
Health outcomes: Data on mortality, readmissions, length of stay were collected from hospital records over 4 years period. **Quality-of-life weights:** NA **Cost sources:** Royal Liverpool University Teaching hospital finance department and pharmacy department provided information regarding test unit costs, total investigation costs and total medication costs.				
Comments				
Source of funding: self-funded study. **Applicability and limitations:** QALYs are not used as an outcome measure. Cost data collected over 4 years (2007-2011) but no discounting is reported. An observational, before and after study with no adjustment for confounding or temporal variation. Evidence of intervention effectiveness is based on 1 study, so not reflecting all				

evidence in this area. No patient reported health outcomes included in the study. Local unit costs were used and it is not clear whether they are reflective of National unit costs. No sensitivity analysis reported.
Overall applicability[(a)]: Partially applicable **Overall quality[(b)]:** Potentially serious limitations

Abbreviations: 95% CI: 95% confidence interval; BNF: British national formulary; CUA: cost–utility analysis; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER: incremental cost-effectiveness; NR: not reported; PSSRU: personal social services research unit; QALYs: quality-adjusted life years.

(a) Directly applicable / Partially applicable / Not applicable.

(b) Minor limitations / Potentially serious limitations / Very serious limitations.

Appendix F: Grade tables

Table 9: ICU: 24 hour consultant versus daytime consultant

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	24 hour consultant	Daytime consultant	Relative (95% CI)	Absolute		
Mortality (follow-up 90 days; assessed with: in-hospital mortality)												
1	Randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	203/820 (24.8%)	22.8%	RR 1.09 (0.91 to 1.3)	21 more per 1000 (from 21 fewer to 68 more)	⊕⊕OO LOW	CRITICAL
Length of stay (follow-up 90 days; Better indicated by lower values)												
1	Randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	820	778	-	Rate ratio 0.91 higher (0.82 to 1.01 higher)	⊕⊕OO LOW	CRITICAL

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
[2] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 10: General medical ward: Weekly consultant and daily registrar versus geriatric medicine consultation-only service

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Weekly consultant + daily registrar	Geriatric medicine consultation-only service	Relative (95% CI)	Absolute		
Mortality (follow-up 7 years; assessed with: in-hospital mortality)												
1	observational studies	very serious[1]	no serious inconsistency	serious[2]	serious[3]	none	21/447 (4.7%)	7.7%	RR 0.61 (0.36 to	30 fewer per 1000 (from 49 fewer to 2	⊕OOO VERY	CRITICAL

									1.02)	more)	LOW	
Length of stay (follow-up 7 years; Better indicated by lower values)												
1	observational studies	very serious[1]	no serious inconsistency	serious[2]	serious[3]	none	447	504	-	MD 0.5 lower (2.57 lower to 1.57 higher)	⊕OOO VERY LOW	CRITICAL
Avoidable adverse events (follow-up 7 years)												
1	observational studies	very serious[1]	no serious inconsistency	serious[2]	serious[3]	none	221/447 (49.4%)	71%	RR 0.7 (0.62 to 0.78)	213 fewer per 1000 (from 156 fewer to 270 fewer)	⊕OOO VERY LOW	CRITICAL

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
[2] Downgraded by 1 increment for indirectness as registrar ward rounds and control is PRN service.
[3] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 11: General medical ward : Once daily rounds versus twice weekly

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Once daily rounds**	**Twice weekly**	**Relative (95% CI)**	**Absolute**		
Mortality (follow-up 30 days)												
1	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	87/1072 (8.1%)	14.6%	RR 0.55 (0.43 to 0.72)	66 fewer per 1000 (from 41 fewer to 83 fewer)	⊕OOO VERY LOW	CRITICAL
Readmission (follow-up 30 days)												
1	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	129/1072 (12%)	12%	RR 1.01 (0.79 to 1.29)	1 more per 1000 (from 25 fewer to 35 more)	⊕OOO VERY LOW	IMPORTANT

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
[2] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 12: Stroke unit : 7 day rounds versus less than 7 days

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	7 day rounds	Less than 7 days	Relative (95% CI)	Absolute		
Mortality (follow-up 7 days)												
1	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	1814/32388 (5.6%)	7.2%	RR 0.78 (0.73 to 0.83)	16 fewer per 1000 (from 12 fewer to 19 fewer)	⊕OOO VERY LOW	CRITICAL
Mortality (follow-up 30 days)												
1	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	3822/32388 (11.8%)	14.9%	RR 0.79 (0.76 to 0.83)	31 fewer per 1000 (from 25 fewer to 36 fewer)	⊕OOO VERY LOW	CRITICAL

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
[2] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Appendix G: Excluded clinical studies

Table 13: Studies excluded from the clinical review

Study	Exclusion reason
Ahmed 2010[3]	No outcomes of interest
Anderson 1988[5]	Observes how to decrease bed days in hospital
Beckett 2013[6]	Incorrect intervention. Does not look at frequency of ward rounds
Blucher 2014[7]	Intervention is ward round checklists
Boyle 2008[8]	Incorrect intervention. Does not look at frequency of ward rounds
Braide 2013 [9]	Incorrect study design
Bray 2013[11]	Examines the organisation of services
Campbell 2012[12]	Editorial
Duffin 2010[13]	Newspaper article
Dy 2011[14]	Intervention is MDT care and not frequency of ward rounds
Gilligan 2008[17]	Article
Guggenheim 1982[18]	Incorrect intervention. Ward round teaching models
Hakim 1998[19]	No control group
Halpern 2014[20]	Editorial
Harrington 2013 [21]	Incorrect study design
Hutchings 2012 [22]	No extractable outcomes
Kajdacsyballa 2014[23]	Observational cohort. RCT identified for intervention of interest
Looi 2008[26]	Incorrect intervention. Looks at how often medication charts are reviewed on ward rounds
Martin 2015[27]	Report
Montague 2004[29]	Qualitative paper. Views of staff on daily ward rounds
Montague 2006[28]	Qualitative study. Questionnaire to assess patients' perceptions of ward rounds
Navani 2014 [30]	Incorrect population
Radcliffe 2012[31]	Newspaper article
Reineck 2013[32]	Retrospective cohort. RCT identified for intervention of interest
Rowlands 2014[33]	No outcome of interest
Smith 2015[35]	Article
Story 2013[36]	Incorrect intervention. No consultant input. Surgical patients
Wallace 2012[32]	Retrospective cohort. RCT identified for intervention of interest
Western 2011[37]	No control group
Wild 2004[38]	Incorrect invention. Interdisciplinary ward rounds
Yoo 2014[39]	No outcomes of interest. Intervention is looking at MDTs

Appendix H: Excluded economic studies

No studies were excluded.