Appendix 2: EPOC Risk of bias

Paramedic (PP) / emergency care practitioner (ECP) interventions

Study: Mason 2007 RCT - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'We used cluster randomisation to reduce the risk of contamination (practice in the control group being influenced by the presence of the paramedic practitioner in the community) and to allow service level, rather than individual patient level, evaluation of the intervention. Weeks were randomised before the start of the study (to allow for rostering of the paramedic practitioners) to the paramedic practitioner service being active (intervention) or inactive (control), when the standard 999 service was available'
Was allocation adequately concealed?	Low risk	'Episode of care with some form of centralised randomisation scheme'
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. ED attendance
Were baseline characteristics similar?	Low risk	Baseline characteristics of intervention and control groups were reported and similar
Were incomplete outcome data adequately addressed?	Low risk	Flow of patients through trial was presented and intention-to-treat analysis used
Was knowledge of allocated interventions adequately prevented during study?	Low risk	Majority of outcomes were objective but there was one about satisfaction with service i.e. subjective
Was study adequately protected against contamination?	Low risk	'We used cluster randomisation to reduce the risk of contamination (practice in the control group being influenced by the presence of the paramedic practitioner in the community) and to allow service level, rather than individual patient level, evaluation of the intervention'.
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study: Gray 2008 historical controls - older people with falls

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	'From January to April 2006 inclusive, all the patients seen by the ECP service who had rung 999 with a diagnosis of either breathing difficulties or an elderly patient (.65 years of age) with a fall were reviewed.' 'Comparison data were taken from January to April 2005 inclusive for attendances to the same ED for patients with the same criteria as above seen by non-ECP ambulance service personnel'
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. ED attendance
Were baseline characteristics similar?	Unclear risk	No details given other than 'elderly patients >65yrs with a fall'
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	Outcome measures were all objective
Was study adequately protected against contamination?	Low risk	Different data collection time-periods were reported for each group
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Only used half of the study population

Study: Mason 2012 'quasi experimental' - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	'Potential 'intervention' trust sites were selected on the basis of their heterogeneity of service delivery of ECP care. 'Control' trust sites that did not employ ECPs, but were in close geographical proximity (i.e. within the same or in a neighbouring county) and which offered the same service configurations as the intervention trusts, were then selected'
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. ED attendance
Were baseline characteristics similar?	High risk	For the care home subgroup, figures were given on selected baseline characteristics but no formal comparison appeared to be made. On face value, clinical characteristics were not balanced e.g. adult medical 30 vs.41%, adult trauma 46 vs.13%
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	Outcome measures were all objective
Was study adequately protected against contamination?	Low risk	Intervention and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Emergency Department (ED) interventions

Study: Sun 2014 RCT - syncope

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'Patients were block randomized (n=4) by site in a 1:1 ratio to either the observation protocol or routine inpatient admission'
Was allocation adequately concealed?	Low risk	'A computer generated the study arm assignment at randomization, and no research personnel had advance knowledge of study arm assignment. We could not blind this health service intervention to patients, providers, or research personnel.'
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. inpatient admission rates
Were baseline characteristics similar?	Low risk	Baseline characteristics of intervention and control groups were reported and similar
Were incomplete outcome data adequately addressed?	Low risk	Flow chart of participants provided and intention-to-treat analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Low risk	Outcome measures were objective but one secondary outcome - participant satisfaction – was subjective
Was study adequately protected against contamination?	Unclear risk	Treatment and control were allocated and delivered in same location so possible for participants to swap allocation
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study: Salvi 2008 CT - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	'Trained research assistant (VM) screened patients presenting to the ED for Monday to Friday from 9:00 a.m to 6:00 p.m using a standard information sheet explaining the study protocol to patients and proxies'
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. number of initial admissions
Were baseline characteristics similar?	High risk	Intervention and control groups were unbalanced – age, 78.1(7) vs.82.5(7.2) p<0.001, female 47 vs. 68% p=0.004, married 70 vs. 40% p<0.001, SPMSQ 2.5(3.3) vs. 5.2(4.2) p<0.001, ADL4.3(2) vs. 3.2(2.5) p=0.001
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcome measures were objective
Was study adequately protected against contamination?	Unclear risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study: Benaiges 2014 CT - hyperglycaemia

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	'Patients were assigned to the DH group if they were admitted to hospital within DH opening hours (weekdays from 8:00 a.m to 4:00 p.m); otherwise they were treated in the emergency department and subsequently hospitalized'
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. number of ER visits
Were baseline characteristics similar?	Low risk	Baseline characteristics of treatment and control groups were reported and similar
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcome measures were objective
Was study adequately protected against contamination?	Low risk	'Patients were treated with same protocol for both DH and CH' so contamination was possible
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Community hospital interventions

Study: Vicente 2014 RCT

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'The dispatchers at the EMCC randomized older adults into the study. A sealed envelope randomization procedure was initiated when the dispatcher received the incoming call and identified the participant as an individual aged 65 who resided in the specified geographical area and was assigned a priority level 2 or 3, and the call occurred between 8:00 a.m. and 10:00 p.m'
Was allocation adequately concealed?	Low risk	'The envelope contained the name of the EMS Company 1 or the name of the EMS Company 2. There was an equal chance (1:1) of being assigned to either of the ambulance companies'
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. number of individuals sent direct to community hospital
Were baseline characteristics similar?	High risk	There was a difference in the priority level when ambulance sent out (% individuals) – Level 1) 1.6 vs. 0%, Level 2) 59 vs. 47%, Level 3) 39 vs.53%, p=0.001
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcome measures were objective
Was study adequately protected against contamination?	Low risk	Separate sealed envelope opened for each individual case
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study: Garasen 2007/8 ab RCT - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'When an eligible patient was identified and accepted for inclusion, a blinded randomisation was performed by the Clinical Research Department using random number tables in blocks to ensure balanced groups'
Was allocation adequately concealed?	Low risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. number of readmissions for index disease
Were baseline characteristics similar?	Unclear risk	Baseline characteristics of intervention and control groups were described but no formal comparison reported
Were incomplete outcome data adequately addressed?	Unclear	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcome measures were objective
Was study adequately protected against contamination?	Low risk	Participants were allocated using a clear process but 8 individuals originally assigned to CH were later assigned to GH
Was study free from selective outcome reporting?	Low risk	All outcomes described in methods section were reported in results section plus 12-month data was used in Garasen 2008
Was study free from other risks of bias?	Low risk	Nothing obvious

Hospital-at-Home (HAH) interventions: heart failure

Study: Patel 2008 pilot RCT - heart failure

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	Open pilot RCT
Was allocation adequately concealed?	Unclear risk	Used 'random number generator under direction of specialist nurse or hospital admission staff' but no further detail provided
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since majority of outcomes were related to process
Were baseline characteristics similar?	Low risk	Baseline characteristics of intervention and control groups were reported and small differences seen in gender, education and two particular co-morbidities
Were incomplete outcome data adequately addressed?	High risk	Flow of patients was described although description of analysis was lacking
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	No detail provided
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Unclear risk	Difficult to understand the description of outcomes in methods section but all were reported in results section
Was study free from other risks of bias?	Unclear risk	Description of analysis and results was possibly too assertive for a feasibility study

Study: Mendoza 2009/Garcia-Soleto 2013 RCT - heart failure

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'Randomly assigned (1:1) to one of the intervention groups according to an externally generated sequence, which was hidden from the clinicians until the patient had given consent to participate'
Was allocation adequately concealed?	Low risk	As above
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process but functional status and health-related QoL were similar
Were baseline characteristics similar?	Low risk	Baseline characteristics of intervention and control groups were reported and similar
Were incomplete outcome data adequately addressed?	Low risk	Patient flow through trial was described and 'per protocol' analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	No detail provided
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study: Tibaldi 2009 RCT - heart failure

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	'By the use of a set of computer-generated random numbers in a 1:1 ratio. The allocation sequence was unknown to any of the investigators and was contained in a set of sealed envelopes, each bearing on the outside only the name of the hospital and a number, which was opened after the acceptance of the patient'
Was allocation adequately concealed?	Low risk	Participants were enrolled within 12-24 hours of ED admission by research assistants, masked to both allocation and hypotheses being tested
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process but depression, function and nutrition measures were similar
Were baseline characteristics similar?	Unclear risk	Baseline characteristics of intervention and control groups were reported and heart rate was significantly different p=0.006
Were incomplete outcome data adequately addressed?	Low risk	Patient flow through trial described and intention-to-treat analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	No detail available
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Hospital-at-Home (HAH): COPD

Study: Ricauda 2008 RCT - COPD

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	Patients were randomised using a set of computer-generated random numbers in a 1:1 ratio.
Was allocation adequately concealed?	Low risk	Allocation sequence was unknown to any of the investigators and kept in a set of sealed envelopes, each bearing on the outside only the name of the hospital and a number. After acceptance of a patient, the ED nurse coordinator, who was not involved in the study, opened the appropriately numbered envelope
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process but clinical outcomes e.g. depression were similar
Were baseline characteristics similar?	Low risk	Recorded in DE table
Were incomplete outcome data adequately addressed?	Low risk	Drop outs/loss-to-follow-up were recorded and intention-to-treat analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	Single-blind study since patients were aware of the treatment assignment although physicians and nurses evaluating patients were blinded to the patient's allocation
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Hospital-at-Home (HAH): Pulmonary embolism

Study: **Rodriguez-Cerillo 2009 nRCT - non-massive pulmonary embolism**

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	nRCT
Was allocation adequately concealed?	High risk	nRCT
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process
Were baseline characteristics similar?	Low risk	Baseline characteristics of treatment and control groups were reported and only difference was prior thromboembolic disease, with these cases all being allocated to hospital
Were incomplete outcome data adequately addressed?	High risk	No patient flow or analysis was described
Was knowledge of allocated interventions adequately prevented during study?	High risk	nRCT
Was study adequately protected against contamination?	Low risk	Clinical decision-making at study entry and any subsequent changes were recorded – although none made in practice
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	High risk	Reported some 'external' decision-making

Hospital-at-Home (HAH): Pneumonia

Study: Carratala 2005 open RCT - pneumonia

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	Randomisation was performed by using a computer-generated random code with a block size of 10
Was allocation adequately concealed?	Low risk	Randomisation was stratified by hospital site, and the random code was held centrally, in a sealed envelope, by the clinical epidemiologist. In the emergency department, the infectious disease consultant (in most cases not a study investigator) opened sealed, sequentially numbered opaque envelopes to randomly assign patients who had provided written informed consent and met the study criteria
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process
Were baseline characteristics similar?	Low risk	Detailed in DE table
Were incomplete outcome data adequately addressed?	Low risk	Patient flow through trial was reported and intention-to-treat analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	Trial was described as 'unblinded '
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Unclear risk	Lack of blinding in terms of assessment could be problematic

Hospital-at-Home (HAH): Stroke

Study: Kalra 2005 RCT - stroke

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	Low risk	Randomisation was not stratified and was undertaken using the block randomisation technique. This ensured that the number of patients allocated to the stroke unit or to domiciliary services at any one time did not exceed their capacity
Was allocation adequately concealed?	Unclear risk	Randomisation was conducted in blocks of 30 in an office remote from patient treatment areas, so that it would not be possible for those enrolling patients to guess allocation for the vast majority of subjects
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process
Were baseline characteristics similar?	Low risk	Baseline characteristics with regard to stroke type, severity, level of impairment and initial disability were well-matched across the three groups
Were incomplete outcome data adequately addressed?	Low risk	Patient flow through trial was reported and intention-to-treat analysis performed
Was knowledge of allocated interventions adequately prevented during study?	Unclear risk	No detail provided
Was study adequately protected against contamination?	Unclear risk	Patients were brought to hospital from domiciliary care if that was considered to be clinically appropriate
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	High risk	In order to ensure that participants were treated in the most appropriate setting, swapping of groups was possible

Hospital-at-Home (HAH): Uncomplicated diverticulitis

Study: Rodriguez-Cerrillo 2013 nRCT - uncomplicated diverticulitis

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	nRCT
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Low risk	Mostly not relevant since outcomes were related to process
Were baseline characteristics similar?	Low risk	Very limited details provided about age, gender and presenting complaint
Were incomplete outcome data adequately addressed?	High risk	No flow of patients was given and only basic analysis reported
Was knowledge of allocated interventions adequately prevented during study?	High risk	No detail provided
Was study adequately protected against contamination?	Low risk	Treatment and control were delivered in different locations
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Unclear risk	Both analysis and reporting of results were limited

Hospital-at-Home (HAH): Mixed population

Study: Leff 2005/2009 'quasi experimental' - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	'During the acute care hospital observation phase (1 November 1990 to 30 September 2001), eligible patients were identified and followed through usual hospital care.' During the intervention phase (1 November 2001 to 30 September 2002), eligible patients were identified at the time of admission and were offered the option of receiving their care in hospital-at-home rather than in the acute care hospital'
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. time before evaluation
Were baseline characteristics similar?	High risk	Populations differed in measures of poverty, living alone and medication. This was acknowledged but not adjusted for.
Were incomplete outcome data adequately addressed?	Low risk	Intention-to-treat analysis was conducted although there were substantial missing data e.g. in relation to functional status
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcomes were objective in Leff 2005 (main publication) but Leff 2009 used self-reported i.e. subjective daily activity of living as an outcome
Was study adequately protected against contamination?	Low risk	Unlikely that control group received intervention and vice versa. Rather, patients were allocated HaH or admitted and, if HaH was unacceptable they were admitted
Was study free from selective outcome reporting?	Low risk	All outcomes described in methods section were reported in results section. Whilst there is no mention of activities of daily living in Leff 2005, this outcome was reported in Leff 2009
Was study free from other risks of bias?	Unclear risk	Possible selection bias related to differences in baseline characteristics e.g. functional status

Study: Lau 2003 historical controls

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	Control trial with historical control group
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. palliative care received
Were baseline characteristics similar?	High risk?	There was an imbalance in patient characteristics which may have been due to recruitment bias since the provider was responsible for recruiting patients into the trial. There were more dementia patients treated outside of hospital – although presumably their symptoms were 'fairly mild' since more pronounced behavioural problems were excluded from HaH group
Were incomplete outcome data adequately addressed?	Unclear risk	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcomes were objective
Was study adequately protected against contamination?	Low risk	Unlikely that control group received intervention and vice versa. Rather, patients were allocated HaH or admitted and, if HaH was unacceptable they were admitted
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious

Study name: Crilly 2010 'quasi experimental' - older population with mixed conditions

Bias	Authors' judgement	Support for judgement
Was allocation sequence adequately generated?	High risk	Intervention group included 62 Aged Care Facility (ACF) residents who were enrolled in the Hospital in Nursing home programme during the first 12 months that the programme was operational, from 1 July 2003–30 June 2004. All sample members were ACF residents who presented to the ED and were subsequently admitted to hospital
Was allocation adequately concealed?	High risk	As above
Were baseline outcome measurements similar?	Unclear risk	No baseline measure of outcomes since they were related to receiving intervention e.g. palliative care received
Were baseline characteristics similar?	Low risk	Baseline characteristics of the study and control are reported and similar
Were incomplete outcome data adequately addressed?	Unclear	No reference to missing data or how it might be handled
Was knowledge of allocated interventions adequately prevented during study?	Low risk	All outcomes were objective
Was study adequately protected against contamination?	Low risk	Unlikely that control group received intervention and vice versa. Rather, patients were allocated HaH or admitted and, if HaH was unacceptable they were admitted
Was study free from selective outcome reporting?	Low risk	All outcome measures described in methods section were reported in results section
Was study free from other risks of bias?	Low risk	Nothing obvious