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What are physiotherapists and occupational therapists doing in services that replace acute hospital admission? A systematic review

Abstract

Background: Alternatives to acute hospital admission are required to accommodate the increasing pressures on health services. Since physiotherapists and occupational therapists are integral to inpatient teams, they may also be integral to admission replacement services, and thus their roles in these services merit investigation.

Aims: Primarily to determine the presence and roles of physiotherapists and occupational therapists in services replacing acute hospital admission. The secondary outcome is to determine the impact of therapists in such services.

Methods: Five electronic databases were searched, with keywords related to therapy, discharge and admission replacement. Inclusion criteria were that studies explicitly described at least one therapist role within a service replacing acute hospital admissions. Two authors independently reviewed all potentially eligible studies. Two reviewers independently assessed data extracted from included studies into a standardised data extraction form.

Results: Fifteen studies (3 Hospital at Home, 12 Early Supported Discharge) were included. Both clinical (e.g. exercise prescription) and non-clinical (e.g. organisation and study outcome assessments) therapist roles were described in different admission substitution services. Some roles were only reported among teams, not individually ascribed to therapists.

Conclusions: The roles of therapists in services that replace hospital admission are rarely described in detail, with wide variation in reported roles, including across service types and patient populations. This review could not determine the impact of individual therapists on patient or service-level outcomes. Future studies need to more clearly define therapist roles and impact.

Trial registration: PROSPERO registration number: CRD42018110172

Extra Information:

How did you gather, select and analyze the information you considered in your review?

- Five electronic databases (MEDLINE, EMBASE, OVID, PEDro and OTseeker) were searched with no language or date restrictions, for terms relating to therapy, discharge and admission replacement.
- Pre-defined inclusion criteria were used, and included studies had to describe the role of at least one therapist (physiotherapist and/or occupational therapist) in a service replacing in-hospital care.
- A standardised data extraction form was used, and data were analysed and presented narratively.

What is the 'take-home' message for the clinician?

- Physiotherapists and Occupational Therapists undertake wide ranging clinical and non-clinical roles in services replacing in-hospital care, which differ between teams
- The impact of different aspects of therapy or team input on outcomes cannot be determined from current literature
- Further research is needed to determine the core set of therapist roles in services replacing acute hospital care in community settings and to determine the impact on patient and service level outcomes.

Key Words: Admission Replacement, Ambulatory Care, Physiotherapy, Occupational Therapy, Hospital at Home, Early Supported Discharge

Introduction

In response to limited resources and increasing demand on healthcare, services replacing hospital admission, have been introduced in many countries ¹⁻⁸. Although their day-to-day operation differs, they share an overall aim – to deliver acute healthcare to patients, where at least some components of inpatient, overnight care are replaced with out-of-hospital care ⁹. This may constitute Admission Avoidance (where the entire episode of care is delivered without overnight admission ¹⁰) or Early Supported Discharge (where an admitted patient's discharge is accelerated and ongoing, hospital-level care is provided at home ¹¹). Provision can be through an Ambulatory Care unit (where same day treatment is provided to avoid admission ¹², and patients may return to the unit for treatment, but remain at home overnight), or a Hospital at Home model (where all care is provided at the patient's home). Services may focus on patients with specific conditions (e.g. stroke ^{8,13}, heart failure ^{5,14}, COPD ¹⁵), or they may be more generic ^{2-4,7,16}.

Although the optimal professional composition of teams delivering care replacing hospital admission has not been determined, the importance of therapist provision for certain acute conditions has previously been highlighted ¹⁷⁻²². As Hospital at Home aims to replace the provision of inpatient care, the roles of therapists should be maintained for patients treated outside hospital.

The framework for advanced clinical practice (ACP) ²³ in the UK exists to allow health and care professionals, including therapists, to extend their competence beyond traditional skills and roles. ACP professionals may be particularly well suited to working in Hospital at Home teams, as with their wider scope of practice and increased independence in patient assessment and treatment, due to developing

cross-professional skills, they can provide more holistic care. Additionally, it is encouraged that ACP professionals can work in non-traditional service delivery models ²³. However, the extent to which this extended role has been described in published reports is unknown.

Therefore, the aim of this review is to answer these questions: 1) Are therapists (physiotherapists and/or occupational therapists (OTs)) involved in services replacing hospital admission? 2) Is the therapist's role explicitly defined? 3) Can the impact of therapists on outcomes be determined?

Methods

This systematic review's protocol was registered with PROSPERO (registration number: CRD42018110172), and the methods are reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines ²⁴.

Data Sources and Searches

A systematic, all-language search was conducted in five electronic databases (OVID, EMBASE, MEDLINE, PEDro and OTSeeker), from the earliest date in each database until August 2018. All searches were updated in November 2018 and August 2019. Search keywords focussed on Hospital at Home and Ambulatory Care, acuity, therapy and discharge (MEDLINE search strategy is in *appendix 1*). One author (CH) screened titles and abstracts to identify studies eligible for further screening; pre-defined criteria were used to review these full texts. All potentially eligible full texts were independently reviewed by two authors (CH and AI) against

the pre-defined inclusion criteria. Disagreements were resolved by discussion, with clarification among all reviewers.

Study Selection

All study designs, except review articles, were acceptable and no language or date restrictions were applied. Inclusion criteria were: presence of a specific description of at least one therapist's (physiotherapist / physical therapist and/or OT) role, in an acute healthcare service with an out of hospital component, which replaced overnight inpatient care ⁹. This may include 'Hospital at Home' (HaH), Early Supported Discharge (ESD) and other service designs. The terms 'physiotherapist' and 'physical therapist' were included separately, as the terms are used synonymously, with international variation. The databases were searched separately for adult and paediatric results.

Data Extraction and Quality Assessment

A standardized form was used for data extraction, including details of study characteristics (e.g. study type, participant information, location and year(s) of data collection and service type (HaH, ESD, or Other)). Data was also extracted regarding the therapists involved, including their roles individually (by therapist type), jointly (both therapist types) and as team members. Two reviewers independently assessed the extracted data of the included studies.

Relevant quality assessment tools were utilised for all included studies - the PEDro scoring system ²⁵ for randomised controlled trials (RCTs), CASP ²⁶ for cohort

studies, and Murad et al.'s tool ²⁷ for case series' and reports. Common assessments across all the utilised tools include questions regarding adequacy of exposure and outcome measurement, follow-up sufficiency, and reporting of results. No studies were excluded on the basis of quality score. Cochrane's risk of bias tool ²⁸ was used to assess all studies.

Data Synthesis and Analysis

The results are reported narratively and no statistical analyses were undertaken. Data regarding the frequency and range of roles described are presented graphically.

The primary outcome was the roles and treatments provided by therapists. The secondary outcome was the impact that the individual therapists had on clinical and/or system-level outcomes. Sub-group analyses were performed for each service type and patient population, aiming to identify any systematic differences in therapists' roles between different services. Further sub-group analysis separating adult and paediatric data was planned, if there were sufficient numbers of included studies in each group.

Results

Included studies

In total, 15 studies were included, from a total of 667 identified studies (*figure 1*). They reported on 13 adult services providing acute, out-of-hospital care to patients, and described their therapists' roles.

FIGURE 1

The majority of included studies describe ESD services (12/15), and the remainder describe HaH type services. Two of these studies self-identified their service as 'Hospital at Home', but described ESD-type services ^{29,30}, where patients were admitted to hospital for a period prior to being managed at home. These two services have therefore been analysed as ESD. A table of included studies is in appendix 2.

Among the 15 papers, two reported on different aspects of the same service in Stockholm, Sweden, including five year patient outcomes ^{31,32}, and two reported on different outcomes following treatment in the same ESD service in Bergen, Norway as part of a larger RCT ^{33,34}. Although each of these pairs of studies were describing the same services, they did not report consistent therapist roles. Considering these pairs as only one study each, nine included studies were conducted in Europe, two in North America and two in Asia.

A range of study types were included, with ten RCTs and five non-randomised studies. The study quality varied – RCT PEDro scores ranged from four to nine (out of a possible ten). Non-randomised study quality was also variable. A number of included studies lacked sufficient information to determine quality. Lack of blinding among participants and treating staff reduced the quality of the majority of RCTs , however, most did use blinded assessors. Half of the RCTs also lacked intention-to-treat analyses, and four of them had a loss to follow-up of greater than 15%. Among the non-RCTs, the most common problems related to sample representativeness, length of follow-up and detail level when reporting results. Risk of bias among the

included studies was mixed, and no included study had low risk of bias in all criteria. The most common area of high risk of bias was lack of blinding.

Therapist roles

Therapist roles were described in two main ways – as roles specifically assigned to a physiotherapist and/or OT (*figure 2*), and team roles (*figure 3*). ‘Therapist-specific roles’ are clearly stated as being carried out by one, or more, of the therapists involved with the team. ‘Team roles’ are those where it was not stated which team member completed the task, or where it was stated that multiple team members were involved, and therefore therapist involvement was deemed to be likely.

Medical and nursing input (either from team nurses or those external to the team, such as district nurses) was common in the included studies, with only three studies not appearing to provide skilled nursing care ^{31,32,35}. In all of these cases the care providers were therapists only, and two of these described the same service ^{31,32}.

Others described as being involved in patient care included rehabilitation assistants, consulting social workers and pharmacists. Medication reconciliation and review, by pharmacists or doctors, have been identified as important elements of care, aiming to reduce medication discrepancies and affect clinical outcomes. However, evidence of their actual impact on clinical outcomes, including readmission rates, is inconclusive ^{36,37}. In this review, only one study reported pharmacist involvement ³⁸. Although a number of other studies reported nurses or doctors providing advice regarding medication, the impact of this provision was not assessed in any study.

A wide range of therapist roles were described in the specific and team categories. More roles were reported among physiotherapists than OTs in the therapist-specific

category, and more roles were undertaken by both therapists than either individually in the team roles.

Therapist-specific roles

Physiotherapy roles: The most commonly reported physiotherapist role (in 46.7% of included studies) was conducting baseline and outcome measure assessments for the study ^{30-32,34,39-41}. These assessments included the modified Barthel Index and Rankin Scale, Borg rating scale, Mini Mental State Examination, nine-hole peg test, Katz ADL index, 10m walk test and Sickness Impact profile, among others. The next most commonly reported roles (in 33.3% of included studies each) were rehabilitation ^{35,39,40,42,43}, mobility practice ^{30,39,40,42,43} and exercise prescription ^{35,39,40,42,43}.

The details of what constituted 'rehabilitation', among those studies reporting it, differed in level of detail provided and exact components. Only one role – exercise prescription – was reported among all physiotherapists providing rehabilitation. Other components of rehabilitation that physiotherapists undertook included activity prescription, mobility, activities of daily living (ADL) practice, stair climbing, passive range of movement and task-orientated training, some of which were also reported among OTs.

One role that was uniquely reported among physiotherapists, and not shared with OTs, was respiratory interventions (three included studies ^{38,43,44}), although the level of detail of what this included was similarly variable. Two of these studies ^{38,43}, provided no indication of the criteria for respiratory physiotherapy intervention, although in one ⁴³ it appeared to be standard practice for all patients to receive basic

respiratory physiotherapy. The third included study reporting respiratory physiotherapy interventions included only patients with respiratory compromise ⁴⁴. Objective markers (e.g. oxygen saturation and changes in ventilator requirements) were used in this study to determine timing of input and to guide length of treatment sessions.

In addition to their clinical treatment roles, physiotherapists were also involved in carer education, discharge planning, referrals and safety screening.

Occupational Therapy roles: Two studies reported specific OT roles ^{29,45}. Both of these reported roles focussed on the patients' homes, with OTs advising on suitable home adjustments and conducting home visits (separately to attendance at the patient's home for regular input, e.g. these visits may occur prior to the patient's discharge home, to assess home suitability).

Both therapists' roles: Four studies reported roles undertaken by both physiotherapists and OTs. The most commonly reported role attributed to both therapist groups was the provision of a personalised, or individualised, care plan for each patient (reported in three studies each for physiotherapists and both professions). This individualising of care provision may have contributed to the lack of detail provided on what 'rehabilitation' involved for patients in different teams. A number of the roles reported in studies where physiotherapists provided rehabilitation, were also attributed to both therapy professions in other studies. Only one included study reported both OTs and physiotherapists conducting study assessments ³³, but with this addition, this becomes the only role reported in more than half of included studies.

FIGURE 2

Team roles, including therapists

Many of the previously described roles were also reported in other included studies, in which they were attributed to the multi-disciplinary team, rather than to a specific therapist. Alongside this, a number of additional roles were described only in the context of teams, and not attributed to a specific therapist in any included study - these are reported below.

Physiotherapy roles: Four additional team roles were reported in services without an OT, and were thus potentially carried out by a physiotherapist. Each of these was reported in only one included study. These additional roles were the assessment of ongoing medical needs, communication with patients' general practitioners, patient education and organisation. The latter two of these roles were also reported in other study teams that included both an OT and a physiotherapist.

Occupational Therapy roles: None of the included studies reported on general team roles, in which the only therapist involved was an OT.

Both therapists' roles: Among those roles exclusively attributed to teams, rather than individual team members, physiotherapy and/or OT staff could have carried out most of them. The most commonly reported team role was organisation (three studies ³²⁻³⁴), followed by attendance at regular team meetings ^{32,38} and provision of support to service users ^{29,33} (reported in two studies each). A range of other roles were reported in only one study each.

FIGURE 3

Service type

Further analyses were undertaken to differentiate the roles reported for therapists in HaH and ESD services separately.

In HaH services (n = 3), a limited number of roles were reported, both specific to therapists (*figure 4a*) and among teams overall (*appendix 3*). Only physiotherapist provision of respiratory interventions was reported in more than one included study (two studies ^{38,44}). The other reported roles in HaH teams were reported only once each. The only role uniquely reported in HaH was the provision of home adjustment advice by an OT (reported in one study ⁴⁵).

The larger number of ESD studies (n = 12), led to more roles being reported in these services than in HaH (*figure 4b*). Four therapist-specific roles were reported in at least half the included studies in this sub-analysis, for either physiotherapists or both therapist groups. The most commonly reported role was conducting study assessments (eight included studies ^{30-34,39-41}, of which seven reported that a physiotherapist conducted the assessments), followed by the provision of personalised care plans ^{29,33,34,40-42}, mobility practice ^{30,33,39,40,42,43} and exercise prescription ^{34,35,39,40,42,43} (each reported in six studies). There was also a wide range of less frequently reported roles, with 61% of roles described in two or fewer included studies.

FIGURES 4a AND 4b

Patient Population

Sub-group analyses defined by the patient population treated in the service were conducted. The most common population was patients with acute stroke (7 studies). The other patient groups in these sub-group analyses were: orthopaedic patients (4 studies), general medical patients (3 studies), and patients with a neuromuscular disease (1 study).

Among these sub-groups, some roles were only reported in one group (e.g. passive range of movement was only reported in orthopaedic services ^{39,41}), but none were exclusively reported in all studies of any sub-group. Additionally, there was no role that was reported in all services managing any one patient group (excluding neuromuscular diseases).

Therapist Impact

None of the included studies attempted to assess the impact of any individual component of their service, including therapist roles, therefore it was not possible to assess the impact of any therapist role.

Discussion

We found that physiotherapists and OTs have a wide range of clinical and non-clinical roles in services replacing hospital admission, but there is no consensus over a core set of roles across studies. Furthermore, it is not possible to evaluate the impact of therapists on patient or service outcomes from the current literature.

Therapists undertook both clinical and non-clinical roles. Clinical roles included activity and exercise prescription, mobility and stairs practice, and providing advice to patients and their caregivers. Non-clinical roles included conducting study outcome assessments, organisation, and attendance at team meetings. More of the non-clinical roles were attributed to team members generically, rather than directly to a therapist. This may have been due to the increased likelihood of different professionals engaging in the same non-clinical tasks, whereas clinical tasks are more likely to be differentiated to the appropriate professional. However, this does not account for all the variation.

There were a number of roles that were specifically reported as being carried out by a therapist in some studies, but not specifically linked to a therapist in others, such as rehabilitation, carer education and individualised care planning. None of the included studies discussed the interventions of therapists in advanced clinical practice ²³ roles. Therefore, the responsibilities and impact of those working in these extended scope roles could not be established within this review.

It is notable that even in the two cases of multiple studies reporting on the same service (^{33,34} and ^{31,32}), the roles that each study described were not consistent. Additionally, the range of roles reported in ESD services was greater than that reported in HaH services. It is, however, plausible that the smaller sample size in the HaH group produced this difference, rather than a true difference existing between the interventions provided in different service types.

The variation in inpatient therapy input for different patient groups, in response to different patient requirements ^{46,47}, may offer one explanation for the variability in therapists' interventions across different services that replace hospital admission.

This may also apply among teams managing similar patient groups, as guidelines may support a range of treatment options in a given group ^{48,49}, or there may be a lack of consensus on best treatment options ^{50,51}.

A clearer understanding of the roles and impacts of therapists on outcomes at both a patient and service level, may be especially important for those developing such teams in new areas (geographically or clinically). This is, to the authors' knowledge, the first review to try to address this.

Although none of the included studies specifically investigated therapists' impact on outcomes, this does not mean that they do not have an important impact. A number of the reported roles have been investigated in other healthcare settings – for example, passive range of movement following shoulder arthroplasty ⁵², ADL practice ⁵³⁻⁵⁵, mobility practice ^{54,55}, task-specific training ⁵⁶ and augmented coughing ⁵⁷. Additionally, services replacing acute hospital admission, including those in the studies included in this review, have demonstrated effectiveness in improving patient and service level outcomes (e.g. lower cost, greater short-term survival and reduced readmission rate) following presentation for an acute deterioration in health status ^{30,32,43,44}. Given that at least some of the roles that therapists are undertaking in these services have proven effective in other contexts ^{17,47,52,53,57}, the absence of evidence within this setting is not evidence of absence of effect ⁵⁸.

Previous work has demonstrated that physiotherapy interventions are often poorly reported in trials, with description level of the control groups being worse than in the intervention groups ^{59,60}. Among the included studies in this systematic review, the group of interest was the intervention group – i.e. the group receiving care outside hospital, but despite this, descriptions were still limited. Further contributing to this

challenge is that there does not appear to be a published evidence base specifically considering the contribution of physiotherapists and/or occupational therapists to acute care at home, despite a broad and exhaustive search. Thus the included studies did not focus on the contribution of these team members.

There are a number of limitations to this review. The only types of service delivering acute care that replaced hospital admission were HaH and ESD. Pre-specified definitions of HaH and ESD were used due to the established issue of lack of consistency in terminology within this clinical area ⁶¹. Although this increased consistency in 'include or exclude' and 'service type' decisions, it did mean that there were two instances where the study authors described a service as HaH, but it was deemed to be ESD for the analyses in this review ^{29,30}. There were also two services which provided both HaH and ESD services, these were included in the HaH analyses in this review ^{38,45}.

The data of interest for this review were not the included studies' results, but were more often a component of their methods. This does mean, however, that although the included studies were of varying quality, this variability should have limited impact on the interpretation of this review's results.

Another limitation of this review was that studies were excluded if they did not explicitly state one or more therapist's roles. This led to a large number of studies which reported on teams that had therapists, but did not specifically report any therapist roles, being excluded, although generic team roles may have been reported. This also meant that no paediatric studies fit the inclusion criteria.

Finally, as the primary aim of this review was to determine the roles undertaken by therapists in acute care services outside hospital, overall service cost-effectiveness

and patient satisfaction were outside its scope. This limits our interpretation of the impact of therapists on the function of the MDT in terms of cost-effectiveness and patient satisfaction. These are important concepts ^{62,63} and will need exploration in further work.

In future research, it would be beneficial for reporting to include clear indications of the roles and interventions that therapists, and other team members, individually engage in. Additionally, investigation of the roles and impact of different team members, including therapists, at a patient and/or service level, would help to ensure that these services can provide optimal care for their patients. This is especially important in services that have limited access to therapists, to ensure cost-effectiveness as well as clinical effectiveness.

Conclusion

Overall, therapists are frequently members of the acute care at home team, and they operate a wide range of individual practices, both clinical and non-clinical, which vary between teams. The lack of evaluation of these practices in this setting makes determining the most effective strategy difficult. While the therapists have the potential to positively impact on respiratory and functional outcomes, and are undertaking a range of roles that could support this impact, the literature to date does not enable a determination of whether any one aspect (of therapist practice or the service overall) is more effective than another.

Author Contributions

Concept / Research Design: CH, DSL

Data collection and analysis: CH, AI

Drafting of manuscript: CH

Writing and Review of manuscript before submitting: CH, AI, DSL

All authors read and approved the final version of this manuscript.

Disclosures and Presentations

No conflicts of interest declared.

A poster presentation of this study was given at the World Confederation for Physical Therapy Congress 2019, Geneva, Switzerland; and a poster presentation of a subgroup of this review was given at the World Hospital at Home Congress, Madrid, Spain.

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Tables

n/a

Figure Legends

Figure 1. PRISMA flowchart of study screening

Figure 2. Therapist Roles in services replacing admission.

ADL = Activities of Daily Living.

Figure 3. All team roles (including therapists) in services replacing admission.

*GP = General Practitioner, Ax = Assessment, Rx = Treatment, ADL =
Activities of Daily Living.*

Figure 4a. Therapist Roles in Hospital at Home services

Figure 4b. Therapist Roles in Early Supported Discharge Services

ADL = Activities of Daily Living

Appendices

Appendix 1: MEDLINE Search Strategy

1	"hospital at home" [searched as title only, not keyword]
2	"hospital in the home" [searched as title only, not keyword]
3	Home hospitali#ation [searched as title only, not keyword]
4	"home hospital" [searched as title only, not keyword]
5	"early supported discharge" [searched as title only, not keyword]
6	"home based" [searched as title only, not keyword]
7	"home based care" [searched as title only, not keyword]
8	homecare [searched as title only, not keyword]
9	"home care" [searched as title only, not keyword]
10	ambulatory [searched as title only, not keyword]
11	"ambulatory care" [searched as title only, not keyword]
12	"ambulatory medicine" [searched as title only, not keyword]
13	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14	Acut*
15	Acuit*
16	14 or 15
17	Rehabilitat*
18	Physiotherap*
19	Physical therap*
20	Occupational therap*
21	17 or 18 or 19 or 20
22	Discharg* AND home
23	Discharg* AND "nursing home"
24	Discharg* AND "residential home"
25	Discharg* AND "care home"
26	Discharg* AND "nursing care"
27	Discharg* AND "residential care"
28	Discharg* AND "extra care"
29	22 or 23 or 24 or 25 or 26 or 27 or 28
30	13 and 16 and 21 and 29

31	limit 30 to english language [Limit not valid in Journals@Ovid; records were retained]
32	limit 31 to human [Limit not valid in Journals@Ovid; records were retained]
33	limit 32 to humans [Limit not valid in Journals@Ovid; records were retained]
34	33 NOT "mental health"
35	34 NOT psychiatr*
36	35 NOT obstetr*
37	36 NOT gynae*
38	37 NOT pregna*
39	Remove duplicates from 38

Adult searches:

40	39 NOT paediatric*
41	40 NOT pediatric*
42	41 NOT child*
43	42 NOT infant*
44	43 NOT adolescent*
45	44 NOT teenager*

Paediatric Searches:

40	paediatric*
41	peditric*
42	child*
43	infant*
44	adolescent*
45	teenag*
46	40 or 41 or 42 or 43 or 44 or 45
47	39 AND 46
48	limit 47 to "all child (0 to 18 years)" [Limit not valid in Embase,Journals@Ovid; records were retained]

Appendix 2: Table of Included studies

Authors	Title	Year	Population	Place and Year	Service Type
Lee GA; Pickstone N; Facultad J; Titchener K	The future of community nursing: Hospital in the Home	2017	Patients aged >18 years, in the catchment area of Guy and St Thomas' Trust, who would otherwise be admitted/be at risk of being admitted to hospital.	England. 2013 - 2017	HaH and ESD (same service, accepts referrals of both kinds)
Bernocchi P.; Vanoglio F.; Baratti D.; Morini R.; Rocchi S.; Luisa A.; Scalvini S.	Home-based telesurveillance and rehabilitation after stroke: A real-life study.	2016	Patients aged >18 years, admitted to inpatient rehab institute following a stroke (ischaemic or haemorrhagic), with upper limb functional deficit, no cognitive deficits and with an informal caregiver available. 26 patients enrolled.	Italy. 2010 - 2011	ESD
Gregersen M.; Zintchouk D.; Borris L.C.; Damsgaard E.M.	A Geriatric Multidisciplinary and Tailor-Made Hospital-At-Home Method in Nursing Home Residents With Hip Fracture	2011	Patients aged 65 years or older, living in a nursing home and admitted to the orthopaedic surgery ward with a hip fracture (intertrochanteric or neck of femur). 2 consecutive cohorts recruited. 238 patients included.	Denmark. 2006 – 2007 and 2008 - 2010	ESD
Mahomed, N.N.; Davis, A.M.; Hawker, G.; Badley, E.; Davey, J.R.; Syed, K.A.; Coyte, P.C.; Gandhi, R.; Wright, J.G.	Inpatient Compared with Home-Based Rehabilitation Following Primary Unilateral Total Hip or Knee Replacement: A Randomized Controlled Trial	2008	Patients aged >18 years, living in the same city as the institutions, who were fluent English speakers, admitted for unilateral hip or knee replacement due to inflammatory arthritis, osteoarthritis or osteonecrosis. Exclusion: joint replacement for another reason (e.g. fracture or revision), malignant tumour, bilateral replacement. 234 patients included.	Canada. 2000-2002	ESD

Capdevila, X.; Dadure, C.; Bringuier, S.; Bernard, N.; Biboulet, P.; Gaertner, E.; Macaire, P.	Effect of Patient- controlled Perineural Analgesia on Rehabilitation and Pain after Ambulatory Orthopedic Surgery: A Multicenter Randomized Trial	2006	Patients aged 18 years or older, with American Society of Anesthesiologists physical status I, II, or III, who had capacity and had a home care nurse available twice daily and for catheter removal, who were due to have an “ambulatory, unilateral, acromioplasty, or hallux valgus surgery” and wanted a peripheral nerve block perioperatively. Exclusion: patients in whom psychological or language difficulties would inhibit pain assessment, specific medical conditions, current or recent participation in another therapeutic trial, lack of consent. 85 patients enrolled.	France. Year not stated	ESD
Thorsén, A.-M.; Holmqvist, L.W.; de Pedro-Cuesta, J.; von Koch, L.	A Randomized Controlled Trial of Early Supported Discharge and Continued Rehabilitation at Home After Stroke: Five- Year Follow-Up of Patient Outcome	2005	Follow-up of previous study (Holmqvist et al., 1998, also included) - patients assessed 5-7 days after first or recurrent stroke (stroke defined as per WHO criteria), who were expected to have a hospitalisation of 4 weeks in routine care, were independent with feeding and continence (according to Katz ADL index), had MMSE score >23, impaired motor capacity according to Lindmark scale and/or dysphasia. Exclusion: “discharged before 5 days of hospitalisation; progressive stroke; subdural haematoma; subarachnoid hemorrhage; clinical sign of massive perceptual deficit; renal, heart, or respiratory failure; non-stroke epilepsy; alcoholism; psychiatric disease; other comorbidity likely to shorten length of life dramatically”. 83 included	Sweden. Original RCT - 1993- 1996. Follow-up - not stated, assumed 1998- 2001	ESD

			patients in initial trial, 66 were alive 5 years later.		
Askim, T.; Mørkved, S.; Engen, A.; Roos, K.; Aas, T.; Indredavik, B.	Effects of a Community-Based Intensive Motor Training Program Combined With Early Supported Discharge After Treatment in a Comprehensive Stroke Unit: A Randomized, Controlled Trial	2010	Patients diagnosed with an acute stroke (as per WHO definition) and admitted to the stroke unit, who gave informed consent. Patients had to have a pre-admission modified Rankin score <3, <45 on Berg balance score, >14 points on Scandinavian Stroke Scale, <6 on leg or <12 on transfer item of Scandinavian Stroke Scale and > 20 points on MMSE. Exclusion: patients who were unable to manage the increased activity required for motor training due to an underlying cardiovascular (e.g. uncompensated HF with dyspnoea, angina with chest pain at rest), or other functional impairment (e.g. severe rheumatoid arthritis or Parkinson's disease). 62 included patients.	Norway. 2004 - 2007	ESD
Ilfeld, B.M.; Vandenborne, K.+; Duncan, P.W.; Sessler, D.I.; Enneking, F.K.; Shuster, J.J.; Theriaque, D.W.; Chmielewski, T.L.; Spadoni, E.H.; Wright, T.W.	Ambulatory Continuous Interscalene Nerve Blocks Decrease the Time to Discharge Readiness after Total Shoulder Arthroplasty: A Randomized, Triple-masked, Placebo-controlled Study	2006	Patients aged ≥ 18 years, due to have a unilateral total shoulder arthroplasty, who wanted post-operative analgesia via a continuous interscalene nerve block, had capacity to understand potential complications, information and instructions provided, and who had an available caretaker to stay with them post-transfer to home. Exclusion: any reason the patient could not have trial intervention (e.g. contraindication to interscalene nerve block, previous opioid dependence or ongoing chronic analgesic treatment, study medication allergy); baseline oxygen	Florida, USA. 2005 - 2006	ESD

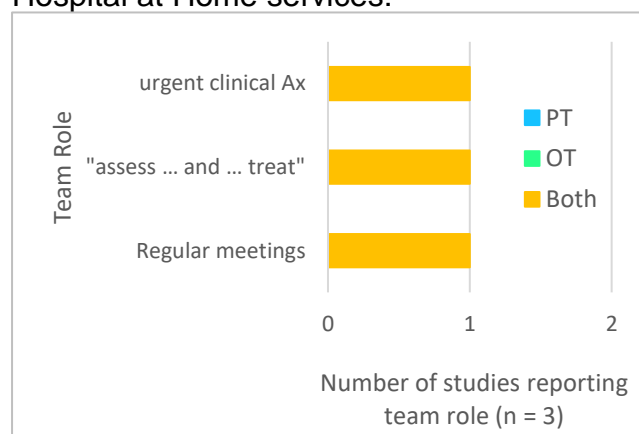
			saturation (on room air) below 96%; or significant co-morbidities (hepatic / renal insufficiency or disease, peripheral neuropathy, morbid obesity, other co-morbidity causing moderate / severe functional restriction). 30 included participants.		
Luk H.K.Y.; Chao C.Y.L.; Poon M.W.M.; Chan M.M.P.; Mak G.H.F.; Lau P.M.Y.; Fong W.C.	Early Supported Discharge after Stroke: A Home-Based Physiotherapy Rehabilitation Program	2013	Patients admitted to the stroke unit with a modified Barthel Index score between 65 and 94 (inclusive). 149 included patients.	Hong Kong. 2011 - 2012	ESD
Maaravi, Y.; Cohen, A.; Hammerman-Rozenberg, R.; Stressman, J.	Home Hospitalization	2002	Patients with an acute / subacute condition (acceptable conditions not pre-specified) requiring hospitalisation, who have a suitable home environment, patient and family consent, and are referred by hospital staff or a community physician.	Israel. 1992-1999	HaH and ESD (same service, accepts referrals of both kinds)
Donald, I.P.; Baldwin, R.N.; Bannerjee, M.	Gloucester Hospital-at-Home: A Randomized Controlled Trial	1995	Older people initially being managed on medical wards, who lived within the catchment area, were anticipated to gain from MDT rehabilitation, who wanted to go home and had willing carers. 60 included patients.	England. 1992 - 1993	ESD
Vianello, A.; Savoia, F.; Pipitone, E.; Nordio, B.; Gallina, G.; Paladini, L.; Concas A, Arcaro, G.; Gallan, F.; Pegoraro, E.	"Hospital at Home" for Neuromuscular Disease Patients With Respiratory Tract Infection: A Pilot Study	2013	Patients with a neuromuscular disease, referred to the emergency department or outpatient clinic with a respiratory tract infection requiring hospitalisation. Exclusion: need for 24 hour critical care monitoring, living outside the area the district nurses' serve, lack of non-professional caregiver, advance directive in place	Italy. 2009 - 2011	HaH

			declining intubation and/or CPR. 53 included patients.		
Gjelsvik, B.E.B.; Hofstad, H.; Smedal, T.; Eide, G.E.; Naess, H.; Skouen, J.S.; Frisk, B.; Daltveit, S.; Strand, L.I.	Balance and walking after three different models of stroke rehabilitation: early supported discharge in a day unit or at home, and traditional treatment (control)	2014	Component of larger RCT. Eligible patients were seen within 7 days following stroke occurrence, had been admitted to the hospital stroke unit 6-120 hours prior to inclusion, were awake, scored between 2-26 on the National Institutes of Health Stroke Scale, had been assessed with the Postural Assessment Scale for Stroke, lived at home within the local area prior to admission, and were discharged straight from the stroke unit to home. Exclusion: significant co-morbidity (e.g. terminal cancer, serious psychiatric disorder), ongoing abuse of substances or alcohol, inadequate Norwegian language. 167 included patients.	Norway. 2008 - 2012	ESD
Holmqvist, L.W.; von Koch, L.; Kostulas, V.; Holm, M.; Widsell, G.; Tegler, H.; Johansson, K.; Almazan, J.; de Pedro-Cuesta, J.	A Randomized Controlled Trial of Rehabilitation at Home After Stroke in Southwest Stockholm	1998	Patients admitted to the hospital with a stroke (WHO definition) and screened at 5-7 days. Included patient who were continent and independent with feeding by 1 week post-stroke, were anticipated to require 4 weeks of routine care hospitalisation, scored >23 on MMSE, and had reduced motor capacity and/or dysphagia Exclusion: "discharged before 5 days of hospitalisation; progressive stroke; subdural haematoma; subarachnoid hemorrhage; clinical sign of massive perceptual deficit; renal, heart, or respiratory failure; non-stroke epilepsy; alcoholism; psychiatric disease; other comorbidity	Sweden. 1993 - 1996	ESD

			likely to shorten length of life dramatically". 83 patients randomised.		
Taule, T.; Strand, L.I.; Assmus, J.; Skouen, J.S.	Ability in daily activities after early supported discharge models of stroke rehabilitation	2015	<p>Component of larger RCT. Eligible patients were those between 1-7 days post stroke onset and between 6-120 hours from stroke unit admission, scoring 2-26 on the National Institute of Health Stroke Scale or an increase of 2 points on modified Rankin Scale if it was previously 0 or 1, who gave informed consent (or family gave on their behalf), were tested with the Assessment of Motor and Process skills and went straight to home on discharge.</p> <p>Exclusion: significant co-morbidities (e.g. psychiatric disorders, substance abuse), insufficient knowledge of Norwegian language prior to stroke. 154 included patients.</p>	Norway. 2008 - 2011 (with additional 3 months re-testing in 2012)	ESD

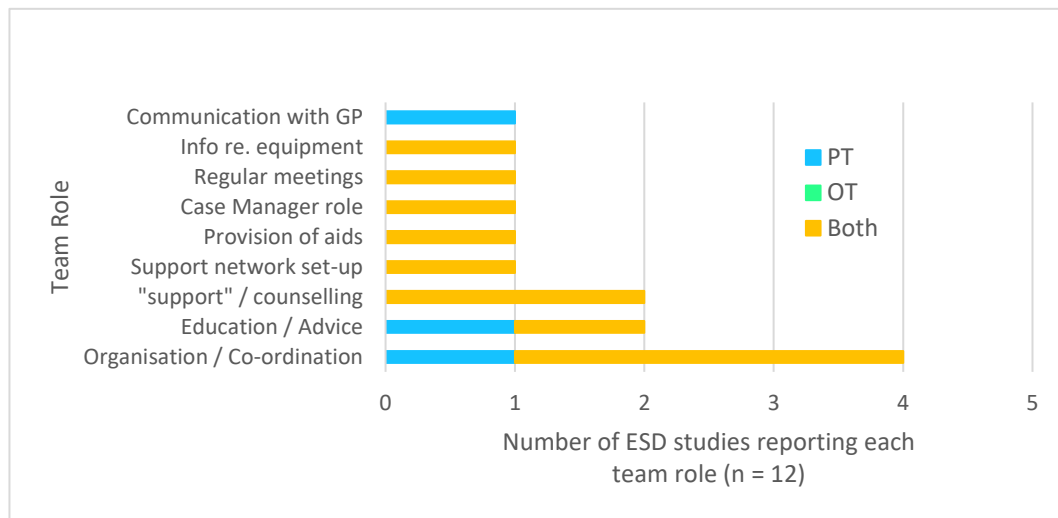
Appendix 3: Team roles (in addition to therapist roles) by service type

Hospital at Home services:



Team Roles (including therapists) in Hospital at Home services, in addition to therapist roles. Ax = assessment

Early Supported Discharge services:



Team Roles (including therapists) in Early Supported Discharge services, in addition to therapist roles.
GP = General Practitioner.