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| Source | Type of Study | Study Design | Methods | Country | Total # of Study Sites | Setting | Duration | Data Collected | Relevant Findings to Physical Environment  |
| Al Sayah et al., 2014 | Qualitative | Exploratory; Ethnographic | Interview | Canada | 3 | OP | 10 months | Interviews: 20 | Related to the physical environment, facilitators of teamwork were availability of space, computers and EMR; barriers to teamwork included a decentralized model. |
| Batch et al., 2015 | Qualitative | Exploratory; Ethnographic | Observation, field notes, semi- structured one to one interviews and focus groups | Australia | 4 | IP | 2 years | Observation: 60 hrs;Interviews: 26;Focus group: 3 | The unit layout determined team‐member proximity and thus was linked to team relationships and interactions. Limitations in proximity exacerbated challenges felt by the presence of "casual workers", who needed to build relationships quickly with other clinical staff. |
| Bayram-zadeh et al., 2014 | Quantitative | Exploratory; Cross sectional | Survey | USA | 2 | IP | 2 weeks | Surveys: 70 | There is no statistically significant difference between the use of communication technology in hybrid vs centralized nursing units, nurses on both units use face‐to‐face communication more than technology. The need for communication technologies changes depending on the unit type. |
| Brown et al., 2015 | Mixed Methods | Exploratory; Triangulation | Semi-structured interview and survey | Canada | 19 | OP | Not reported | Interviews:107; Surveys: 317 | Qualitatively identified nine significant dimensions of highly functioning teams, provided evidence of what constitutes teamwork in primary care. Proximity was identified as one of the central dimensions of team functioning and was found to have a weak but statically significant correlation with the Providing Effective Resources and Knowledge (PERK) teamwork-scale scores and staff-reported outcomes.  |
| Burton et al., 2010 | Mixed Methods | Exploratory; Quasi- experimental pre/post study | Questionnaire, Observation | USA | 2 | IP | 15 days | Surveys: 47(Pre: 36 ;Post: 21) | By changing the physical space, and operational norms of hand‐offs clinical staff could improve the value and participation in hand‐offs. |
| Dean et al., 2016 | Qualitative | Exploratory; Ethnographic | Interview and organizational shadowing | USA | 1 | ED | 8 months | Shadowing: 70 hrs | The physical environment boundaries serve to exacerbate professional problems in teamwork and interprofessional relationships. |
| Fay, et al., 2017 | Mixed Methods | Exploratory; Comparative single-case study, (pre/post) | Pedometer, observation, and questionnaires | USA | 5 (4 pre,1 post) | IP | Not reported | Pedometers:11 pairs (Pre:119 , Post:114)Observation: 48 hr; Survey:153 (Pre:45;Post: 98) | The comparison between centralized and decentralized nursing unit design yielded mixed results. Nursing station design, overall layout, and care culture and process need to be considered as a system that is linked to teamwork. |

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| Source | Type of Study | Study Design | Methods | Country | Total # of Study Sites | Setting | Duration | Data Collected | Relevant Findings to Physical Environment |
| Fernando et al., 2016 | Qualitative | Exploratory; Ethnographic comparative case study | Observations (shadowing) and semi-structured interviews | Canada | 2 | IP | 8 months | Observation: 126 hrs;Interviews: 32 | As each profession claimed ownership over certain spaces and modes of occupying space, they projected a sense of territory and made is difficult for inter‐professional communication. Distributed satellite stations diminished the development of rapport between nurses and doctors. |
| Goldman, et al. 2010 | Qualitative | Exploratory; Qualitative multiple case- | Semi-structured interview | Canada | 14 | OP | 8 months | Interviews: 32 | Teamwork was impeded by geographic separation, which resulted in a lack of shared time and space. Team spaces needed to optimize opportunities for communication. |
| Gonzalez- Martinez et al., 2016 | Mixed Methods | Exploratory; Single case study | Videography analysis | Switzerland | 1 | OP | 59 hours | Video Observation: 59 hrs | Important coordination activities occur in the corridor. Corridor conversations are frequent, brief, and work/care focused, and integral to the flow of work on a hospital unit. |
| Gum et al., 2012 | Qualitative | Exploratory; Longitudinal multi- phase | Interview and observation | Australia | 3 | IP | 9 days | Interviews: 33;Focus Grp: 1;Obs: 44 hr | Barriers to IP collaboration were identified as lack of space, lack of privacy and frequent interruptions, and that the title of “nurses’ station” creates a symbolic ownership by solely nurses. |
| Gunn et al., 2015 | Qualitative | Exploratory; Comparative case study | Interview and observation (field notes, onlinediary photograph) | USA | 19 | OP | 2-4 days/site | Interviews: Not reported, Obs: Not reported | Found two layout types to have more face-to-face coordinating (41.5% vs 11.7%, *p*<.05). Practices need balance between professional proximity and private/focus space (i.e., team- vs. task‐work). |
| Gurascio- Howard etal., 2007 | Mixed Methods | Exploratory; ;Comparative Case Study | Observation and interview | USA | 2 | IP | Not reported | Shadow: 32 hrs;Interviews: 4 | Included patient satisfaction survey. Decentralized (DCT) showed more patient reported “promptness in response to call” than the centralized (CNT) unit. |
| Hua et al., 2012 | Mixed methods | Exploratory; Quasi Experimental; Non-randomized cohort Pre-PostDesign | Survey, interview, observation | USA | 7 | IP | 1.5 years (Pre:3m, Brk:1yr; Post:3m) | Surveys: 99 (Pre:31;Post:68);Interview: 38 (Pre:20,Post:18);Shadow: 264 (Pre: 130 hrs ;Post:134 hrs) | Nursing unit design changes, to a team-based hybrid unit design, correlated with a significant increase in time and frequency of nurse‐doctor communication per day. Strong increase in patient satisfaction. No significant change in job satisfaction, patient falls, pressure ulcers, or organizational outcomes (e.g., length of stay) |

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| Source | Type of Study | Study Design | Methods | Country | Total # of Study Sites | Setting | Duration | Data Collected | Relevant Findings to Physical Environment |
| Jenkins et al., 2016 | Quantitative | Exploratory; Cross sectional comparison | Survey | Wales | Not reported | OP & IP | Not reported | Surveys: 443 | Results showed that collocation has a significant positive correlation with inter‐professional communication. Pharmacists working in pharmacies physically linked to general healthcare facilities saw a two‐fold increase in daily physician‐ pharmacist interaction, a three‐fold increase in daily nurse‐pharmacist interaction, and monthly increases in mid‐wife, health visitor and paramedic interaction. |
| Lewin et al., 2011 | Qualitative | Exploratory; Ethnographic | Observation, Interviews | England | 2 | IP | three, three- month periods over two years | Observation: 90 hrsInterviews: 49 | There is shifting ‘ownership’ of space by different professional groups and the ways in which front and backstage activities are structured by physical space. The 'open plan' nature of space on the wards may also create problems in demarcating backstage areas clearly. |
| Li et al., 2011 | Qualitative | Exploratory; Cross sectional Study | Observation, field notes, and interviews | Australia | 3 | IP | 3 months | Interviews:11; Observation: 13 meetings | The layout of the space and technology to ensure that all participants can be involved in team meetings and to see the same thing was helpful to effective communication, and the best configuration depends on the local context and resources. |
| Liu et al., 2014 | Qualitative | Exploratory; Ethnography | Observation, field interviews, video recordings, video reflective focus groups interviews | Australia | 2 | IP | 10 months | Observation: 290 hrs Interviews:72; Video: 34 hr;Focus Groups: 5 | A shared nurse/team hub was a place nurses found social support, and other professions (e.g., MD, allied health) valued easy access to care team. The spatial configuration of the nursing unit contributed to environmental interruptions during medication activities. The health professionals' work space reflected distinctions of occupational status and disciplinary power relations. |
| Liu et al., 2012 | Qualitative | Exploratory; Ethnography | Participant observations, field interviews, video- recordings, and reflective focus groups. | Australia | 2 | IP | 10 months | Observation: 290 hrs Interviews:72; Video: 34 hr;Focus Groups: 6 | The spatial locations where nursing handovers occurred affected communication process and social relationships between nurses. Findings stressed the importance of creating spaces for nurse handover that could reduce distraction and interruptions. |

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| Source | Type of Study | Study Design | Methods | Country | Total # of Study Sites | Setting | Duration | Data Collected | Relevant Findings |
| Mejia et al., 2010 | Qualitative | Exploratory; Qualitative description | Observation | Mexico | Not reported | IP | NA | Observation: ~118 hr. | More than half of staff interactions were impromptu, and the spatial configuration was linked to how often and how these interactions occurred. |
| Mundt et al., 2016 | Qualitative | Exploratory; Qualitative description | Interviews | USA | 6 | OP | NA | Interviews: 19 | Results showed that co‐location for staff was important to supporting communication, team performance and streamlining care. The results from primary care teams are in line with the Systems Engineering Initiative for Patient Safety (SEIPS)‐based model. |
| Nanda et al., 2015 | Mixed Methods | Exploratory; Triangulation | Survey, behavior observations, focus group interviews, sound studies, spatial analysis | USA | 1 | IP | 2.5 days | Surveys: 29;Interviews: 16 | Lack of visibility and connectivity is a problem for many clinical care teams and communications including nurse‐to‐nurse, nurse‐to‐doctor, doctor‐ to‐doctor, and leadership‐to‐nursing staff. Corridors were used as an essential communication space. |
| Oandasan, et al. 2009 | Qualitative | Exploratory; Ethnography | Interview and observation | Canada | 3 | OP | 5 months | Interviews: 37 ; Observation: 139h | Physical space and time are significantly linked to quality and quantity of interprofessional collaboration and communication for primary health care. Staff felt geographic separation was barrier to staff communication, feeling a part of the team. |
| Parker et al., 2012 | Mixed Methods | Exploratory; comparative case study, Sequential explanatory study | Survey and focus group interview | USA | 2 | IP | 4 weeks | Surveys:40 | No statistically significant difference was found between DCT and CNT unit design; however, the nurses on the CNT had greater perceive mutual performance monitoring, situational awareness, and could support one another. Whereas the nurses on the DCT felt distance and went long periods without seeing another nurse. |

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| Source | Type of Study | Study Design | Methods | Country | Total # of Study Sites | Setting | Duration | Data Collected | Relevant Findings to Physical Environment |
| Pati et al., 2015 | Quantitative | Exploratory; Quasi Experimental; Pre- Post Design | Survey, observation with PDA, Pedometers, | USA | 6 | IP | 8 months (Pre:3wk; Break:6m;Pos t:4wk) | Surveys: 254 (Pre:144; Post: 110); | Decentralized nurse station design was linked to reduced staff teamwork and collaboration despite an increased score on a standard measure of the environment's support for teamwork. Decentralization was linked to increase walking distance and needs to consider operationally-paired changes. |
| Price et al., 2009 | Qualitative | Formative descriptive evaluation using qualitative methods. | Interview | Canada | 2 | OP | not reported | Interviews: 8 | The physical environment, information technology systems and leadership support were programmatic enablers of interprofessional collaborative practice and education. Specifically, shared team rooms with visual and acoustic privacy were crucial to interprofessional education. |
| Pullon et al., 2016 | Qualitative | Exploratory; Multiple case study | Observation, field interviews, video recordings, interviews | New Zealand | 3 | OP | not reported | Observation: 38 hrInterviews: 17 | The built environment was identified as one of five key elements to support interprofessional collaboration (IPC). Shared spaces and locations that created "inevitable passing‐by" of interprofessional staff and informal interaction between them were reported as important to IPC. |
| Rajkomar et al., 2012 | Qualitative | Ethnographic, Exploratory | Observation and interview | England | 1 | IP | 4 weeks | Observation:12 hrs.Interviews: 15 | The physical environment helped to externalized information and supported distributed cognition and communication across staff. Situational awareness was essential for care and was supported by more open floor plans with increased professional co‐visibility. |
| Real et al., 2016 | Qualitative | Exploratory; Systematic Qualitative Analysis | Focus group interview, quantitative measurement of walking distance | USA | 2 | IP | Not reported | Focus groups: 9 | Decentralized nurse station design was linked to reduced nurse‐to‐nurse interactions and interdependencies, and harmed nursing communities of practice; however, it was linked to increased nurse‐to‐allied health teamwork and interdependencies. Additionally, many processes were still centralized on a decentralized nursing unit, causing conflict between system factors and physical design. |

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| Swanson et al., 2013 | Quantitative | Exploratory; Observational crossover cohort study design, longitudinal | Survey | USA | 2 | IP (NICU) | 8 months | Surveys: 248 | In open ward, parents and med. staff were satisfied with teamwork. After changing from an open ward (OW) to private room (PR) NICU, RNs initially reported a statistically significant decreased teamwork and a decrease in safety; however, that decrease lessened with time (1month vs. 8month). Advanced Practice Nurse’s (AP) scores consistently increased in the PR condition. RNs became less satisfied with PR overtime. Parents were consistently higher satisfaction scores in both the PR and OW conditions.  |
| Trzpuc et al., 2010 | Qualitative | Exploratory, interview | Visibility and path length analysis, semi-structured interviews | USA | 3 | IP | Not reported | Interviews: 3 | Found difficulty reaching consensus in nurses' preference for nursing unit type. Identified misunderstandings between designer‐ and clinician‐interpretation of the environment. |
| Weaver et al., 2017 | Quantitative | Exploratory; Cohort study (prospective) pre- post study | Survey | USA | 2 | ED | 6 months | Surveys: 92 (matched pre/post:46) | Increasing the shared nature of workspace between medical and nursing staff, increased measures of perceived teamwork and communication. |
| Zborowsky et al., 2010 | Mixed Methods | Exploratory; Comparative Case Study, Triangulation | Observation, sound level, survey, focus group interview | USA | 6 | IP | Not reported | Surveys: 57;Focus Groups: 2;Observation: 38 hr | On decentralized units, RNs spent less time consulting with other staff. On centralized units, social interactions and time on administrative duties, phones and computers was higher. Sound levels did not differ between central and decentralized conditions. |
| Zhang et al., 2015 | Qualitative | Exploratory phenomenological study | Interview | USA | 2 | IP | 1 month | Interviews: 20 | Challenges of the hybrid inpatient unit design were increased perceived isolation, compromised nurse communication and teamwork and scattered assignments reduced benefit of hybrid model. Benefits of the hybrid design were reduced distraction, better time management, quieter, better proximity to patients. |

*Note.* OP = outpatient; EMR = electronic medical record; IP = inpatient; PERK = Providing Effective Resources and Knowledge; ED = emergency departments;

DCT = Decentralized; CNT = centralized; SEIPS = Systems Engineering for Patient Safety; IPC = interprofessional collaboration; NICU = neonatal intensive care unit;

OW = open ward; PR = private room; AP = Advanced Practice; RN= Registered Nurse; PDA= Personal Digital Assistants; MD = Medical Doctor