

Summary of studies reporting on outcomes and experiences associated with cohorting of patients by clinical care team

Source	Study design	Data gathering & duration/timing	Specialty & patient population	Study setting (teaching vs. non-teaching)	Number of subjects	Outcomes	Results
Roy et al., JHM, 2008	Retrospective cohort study*	Hospital administrative databases Study duration: 1 year	General medicine, general wards	Teaching and non-teaching	Total patients: 5,194 - Intervention: 992 - Control: 4202	<p>Patient outcomes:</p> <ul style="list-style-type: none"> <li>• Mortality</li> <li>• ICU transfers</li> <li>• Readmissions</li> <li>• Cost of care</li> <li>• LOS</li> </ul> <p>Satisfaction</p> <ul style="list-style-type: none"> <li>• Patient satisfaction scores</li> </ul>	<p>Patient outcomes:</p> <ul style="list-style-type: none"> <li>• Total cost of care was marginally lower on the study service (adjusted costs 3.9% lower; 95% CI: -7.5% to -0.3%)</li> <li>• LOS was not significantly different (adjusted LOS 5.0% higher; 95% CI: -0.4% to +10%) on the study service</li> <li>• No difference was seen in inpatient mortality, ICU transfers, or readmissions</li> </ul> <p>Satisfaction:</p> <ul style="list-style-type: none"> <li>• No difference was seen in patient satisfaction scores</li> </ul>
O'Leary et al., JGIM, 2009	Pre-post cohort analysis	Survey of nurses and physicians Surveyed 2x: once pre and once post localization	General medicine, general wards	Teaching and non-teaching	<p>Nurses:</p> <ul style="list-style-type: none"> <li>-Pre: 311/342 (91%)</li> <li>-Post: 291/294 (99%)</li> </ul> <p>Doctors:</p> <ul style="list-style-type: none"> <li>-Pre: 301/342 (88%)</li> <li>-Post: 285/294 (97%)</li> </ul>	<p>Communication:</p> <ul style="list-style-type: none"> <li>• Ability to identify one another</li> <li>• Reported frequency of communication</li> <li>• Agreement on plan of care</li> </ul>	<p>Communication:</p> <ul style="list-style-type: none"> <li>• Greater ability to identify one another: nurses 93% vs. 71%; P&lt;0.001 and physicians 58% vs. 36%; P&lt;0.001</li> <li>• More frequently reported communication: nurses 68% vs. 50%; P&lt;0.001 and physicians 74% vs. 61%; P&lt;0.001, respectively</li> <li>• Nurse-physician agreement was significantly improved for two aspects of the plan of care: planned tests and anticipated length of stay</li> </ul>

Gordon et al., Arch Pediatr Adolesc Med, 2011	Pre-post cohort analysis	Survey of residents and nurses Review of page logs Survey at 3 time points: pre-intervention, early post, and late post-intervention	General pediatrics, general wards	Teaching	60/81 eligible residents responded 154/179 eligible nurses responded	Communication <ul style="list-style-type: none"> <li>• Ability to identify one another</li> <li>• Mode of communication</li> <li>• Timeliness of response</li> <li>• Number of pages</li> </ul>	Communication: <ul style="list-style-type: none"> <li>• Physicians were more likely to be able to identify the nurse for their patients with the most complex conditions (62.3% vs. 82.8% vs. 82.5%, P=0.05)</li> <li>• More likely to report contacting (27.3% vs. 64.9% vs. 56.9%, P=0.01) and being contacted by (7.7% vs. 48.2% vs. 55.2%, P=0.002) that nurse in person</li> <li>• More likely to believe their patient care concerns were met (44.2% vs. 82.1% vs. 81.8%, P=0.009)</li> <li>• Mean number of pages per day to residents decreased by 42.1% (19 vs. 10 vs. 11, P&lt;0.001).</li> </ul>
Singh et al., JHM, 2012	Cohort study with concurrent and historical controls	Medical record and discharge coding data Page logs, billing data, pedometers Study duration: 6-month total intervention	General medicine, general wards	Non- teaching	1,826 hospitalizations: -783 historical controls -478 concurrent controls -565 intervention	Patient outcomes <ul style="list-style-type: none"> <li>• 30-day readmission rate</li> <li>• LOS</li> <li>• Charges</li> </ul> Efficiency <ul style="list-style-type: none"> <li>• # of pages</li> <li>• RVUs generated</li> <li>• Steps walked by PA</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>• LOS was about 11% higher in the localized group as compared to historical controls (P=0.038), and about 9% higher as compared to the concurrent control group (P=0.138). The difference in LOS was not statistically significant on an overall 3-way comparison</li> <li>• Risk of readmission within 30 days and charges incurred were no different.</li> </ul> Efficiency: <ul style="list-style-type: none"> <li>• Localized teams received 51% (CI: 48–54) fewer pages during the workday.</li> <li>• Localized teams had 0.89 [95% confidence interval (CI): 0.37–1.41] more patient encounters and generated 2.20 more RVUs per day (CI: 1.10–3.29) compared to historical controls; and 1.02 (CI: 0.46–1.58) more patient encounters and generated 1.36 more RVUs per day (CI: 0.17–2.55) compared to concurrent controls.</li> <li>• PAs possibly walked fewer steps while localized (not statistically significant after multivariate adjustment)</li> </ul>

Fanucchi et al., JHM, 2013	Retrospective cohort study	Paging logs	General medicine, general wards	Teaching	5 medicine teams 10 interns 6,652 pages	Efficiency <ul style="list-style-type: none"> <li>Number of pages</li> </ul>	Efficiency <ul style="list-style-type: none"> <li>The number of pages received per intern per hour, adjusted for team census and number of admissions, was 2.2 (95% CI: 2.0–2.4) in the full geographically localized model, 2.8 (95% CI: 2.6–3.0) in the partially localized model, and 3.9 (95% CI: 3.6–4.2) in the standard model. All of these differences were statistically significant (P&lt;0.001)</li> </ul>
Singh et al., JGIM, 2014	Qualitative study	Semi-structured focus groups with nurses, PAs, and hospitalists	General medicine, general wards	Non-teaching	5 total focus groups 29 nurses 6 hospitalists 3 PAs	Themes that emerged from focus groups	Pros: <ul style="list-style-type: none"> <li>Participants perceived an overall positive impact of localization on the quality of patient care they provide and their workflow. The positive impact was mediated through proximity to patients and between members of the healthcare team, as well as through increased communication, decreased wasted time and increased teamwork</li> </ul> Cons: <ul style="list-style-type: none"> <li>The participants also identified increased interruptions, variability in patient flow, mismatches in specialization and perverse incentives as mediating factors leading to unintended consequences</li> </ul>
Kara et al., JHM, 2015	Retrospective cohort study**	Cost and quality database (University Health Consortium) HCAHPS scores Surveys distributed to providers Study duration: 17 months	Medical and surgical units	Teaching and non-teaching	Did not report number of patients 11 total units studied 96/110 providers answered survey	Patient outcomes <ul style="list-style-type: none"> <li>LOS index (observed to expected ratio)</li> <li>Cost</li> <li>Readmissions</li> </ul> Satisfaction <ul style="list-style-type: none"> <li>HCAHPS scores</li> <li>Provider satisfaction from qualitative surveys</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>The implementation of the model was associated with decreases in LOS index (P&lt;0.0001) and costs adjusted for CMI (P=0.0006)</li> <li>There were no improvements seen in readmission rates</li> </ul> Satisfaction: <ul style="list-style-type: none"> <li>No difference was seen in patient satisfaction scores as measured by HCAHPS</li> <li>Most providers (95.8%, n=92) agreed that the model had improved the quality and safety of the care delivered</li> </ul>

Olson et al., Journal for Healthcare Quality, 2015	Pre-post cohort analysis	Survey of patients, physicians and nurses Study duration: 9 months before and 4 months after localization	General medicine, general wards	Teaching	Total patients: 153 • Pre: 89 • Post: 64 Physicians: 26 Nurses: 10	<p>Patient outcomes:</p> <ul style="list-style-type: none"> <li>• 30-day readmission rates</li> <li>• Number of rapid responses</li> <li>• LOS</li> </ul> <p>Communication:</p> <ul style="list-style-type: none"> <li>• Patient knowledge of diagnosis</li> <li>• Addressing patient emotions</li> <li>• Time spent with patients</li> <li>• Collaboration between physicians and nurses</li> </ul> <p>Efficiency:</p> <ul style="list-style-type: none"> <li>• Volume of pages to physicians</li> </ul> <p>Satisfaction:</p> <ul style="list-style-type: none"> <li>• Provider: job satisfaction</li> </ul>	<p>Patient outcomes:</p> <ul style="list-style-type: none"> <li>• 30-day readmission rates: 32.1% before localization versus 34.1% after localization (P&gt;0.05)</li> <li>• Number of rapid responses: no change</li> <li>• LOS unchanged at 6.8 days</li> </ul> <p>Communication:</p> <ul style="list-style-type: none"> <li>• Knowledge of diagnosis: 57% pre-localization versus 80% post-localization (P&lt;0.0001)</li> <li>• 39% of patients felt physicians frequently discussed their emotions (anxieties/fears related to hospitalization) with them pre-localization versus 85% after localization (P&lt;0.0001)</li> <li>• 51% of patients stated that doctors spent 4 min or more daily with them discussing care versus 91% after localization (P&lt;0.0001)</li> <li>• Collaboration between nurses and physicians: Pre-localization 4% of physicians felt they experienced good collaboration with nursing compared to 58% after localization (P&lt;0.0001). 10% of nurses felt they experienced good collaboration with physicians prior to localization compared to 40% after localization (P=0.01)</li> </ul> <p>Efficiency:</p> <ul style="list-style-type: none"> <li>• Volume of pages to physicians: no change</li> </ul> <p>Satisfaction:</p> <ul style="list-style-type: none"> <li>• Feeling they “worked as part of a large family”:<ul style="list-style-type: none"> <li>○ Physicians: 35% pre-localization vs. 84% after localization (P&lt;0.0001)</li> <li>○ Nurses: No change</li> </ul> </li> </ul>
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Mueller et al., JHM 2016	Pre-post cohort analysis	Survey of nurses and physicians (nurse-intern pairs) EMR review Study duration: Patients and/or their providers included for 3 months before localization, or 3 months a year after localization	General medicine, general wards	Teaching	414 nurse-intern pairs for surveys 392 patients for EMR review	Patient outcomes <ul style="list-style-type: none"> <li>Preventable adverse events</li> </ul> Communication: <ul style="list-style-type: none"> <li>Concordance of patient care plan</li> <li>Knowledge of one another's name</li> <li>Daily care plan discussions</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>No significant difference in the adjusted odds of preventable AEs (adjusted odds ratio: 1.37, 95% CI: 0.69, 2.69)</li> </ul> Communication: <ul style="list-style-type: none"> <li>No significant differences in total mean concordance scores (0.65 vs. 0.67, P=0.26)</li> <li>Improvement in agreement on expected discharge date (0.56 vs. 0.68, P=0.003)</li> <li>Knowledge of the other provider's name (0.56 vs. 0.86, P&lt;0.001)</li> <li>Daily care plan discussions (0.73 vs. 0.88, P&lt;0.001)</li> </ul>
Huang et al., JHM, 2017	Pre-post cohort analysis	Time motion analysis Study duration: Spanned 3 months pre-redesign and 3 months a year after the redesign	General medicine, general wards	Teaching	Recorded 16 rounds pre-intervention, 25 rounds post-intervention. This included 166 patients pre-intervention and 304 post	Communication <ul style="list-style-type: none"> <li>Time each team member present on rounds</li> <li>Proportion of bedside rounding time</li> </ul> Efficiency <ul style="list-style-type: none"> <li>Round duration</li> <li>Non-patient time during rounds</li> </ul>	Communication: <ul style="list-style-type: none"> <li>Mean proportion of time the nurse was present on rounds per round session increased significantly (P&lt;0.001), from 24.1% to 67.8%</li> <li>Total bedside rounding time increased significantly (P&lt;0.001), from 39.9% before the intervention to 55.8% afterward</li> </ul> Efficiency: <ul style="list-style-type: none"> <li>Total rounding time decreased significantly, from mean of 182 minutes at baseline to a mean of 146 minutes after the intervention (despite higher post-intervention census)</li> <li>Rounding time not related to patient discussion or evaluation decreased from 22.7 minutes per session to 13.3 minutes (P=0.003).</li> </ul>
Bryson et al., Hosp Practice, 2017	Pre-post cohort analysis	Survey of hospitalists, residents, nurses, and case managers EMR/chart data Study duration: Spanned 3 months pre to 12 months post intervention	General medicine, general wards	Teaching and non-teaching	97/155 (62%) responded to both pre and post survey (residents and hospitalists) 10 case managers and 67 nurses responded to the pre survey and 7 and 39 to the post survey (did not say out of how many)	Patient outcomes <ul style="list-style-type: none"> <li>LOS</li> <li>30-day readmission</li> </ul> Communication <ul style="list-style-type: none"> <li>Perceptions of communication with patients and other members of team</li> </ul> Efficiency: DBN rate Satisfaction	Patient outcomes: <ul style="list-style-type: none"> <li>Mean length of stay (4.54 vs. 4.62 days) and 30-day readmission rates (16.0% vs. 16.6%) did not change significantly</li> </ul> Communication: <ul style="list-style-type: none"> <li>Increase in perceived time spent with patient or caregivers to discuss plan of care for the day (P&lt;0.001) or to communicate with nurses (P=0.0009).</li> <li>There was also an increased sense of teamwork with nurses (P&lt;0.001) and case managers (P&lt;0.001).</li> </ul> Efficiency:

						<ul style="list-style-type: none"> <li>Physicians (based on survey)</li> <li>Patient (based on HCAHPS score)</li> </ul>	<ul style="list-style-type: none"> <li>The discharge before noon rate improved slightly from 47.5% to 54.1%.</li> </ul> <p>Satisfaction:</p> <ul style="list-style-type: none"> <li>Patient satisfaction (79.9 vs. 77.3% — as defined by HCAHPS score of rating doctors performance as excellent) did not change significantly</li> <li>87% felt it had a positive impact on the overall quality of care</li> </ul>
Kara et al., Am Journal of Med Qual, 2018	Qualitative study	Survey sent to the physician, nurse practitioner, and physician assistant members of the Society of Hospital Medicine	N/A	N/A	369 surveys analyzed/8,863 invitations sent	Themes from surveys	<p>Pros:</p> <ul style="list-style-type: none"> <li>Comments reflected improvements in (1) inter- and intra-professional collaboration and communication, (2) efficiency, (3) patient-centeredness, (4) nursing satisfaction, and (5) the facilitation, by cohorting, of other interventions. All appeared to be mediated by a combination of the increased proximity and presence of the hospitalist on the unit.</li> </ul> <p>Cons:</p> <ul style="list-style-type: none"> <li>Dissatisfaction related to increased face-to-face interruptions, narrowed clinical focus, and isolation from colleagues leading to an erosion in group camaraderie</li> <li>Patient care concerns were driven by the increased fragmentation of care, the possibility of mismatch between patient needs and bed placement, and the concern that nursing critical thinking skills were adversely affected by the continuous availability of the hospitalist</li> </ul>
Siddiqui et al., Journal of Patient Experience, 2018	Retrospective cohort study	HCAHPS and Press Ganey scores	General medicine, general wards	Teaching	<p>Total patients: 3,012</p> <ul style="list-style-type: none"> <li>1,694 localized</li> <li>1,318 non-localized</li> </ul> <p>Study duration: 10 years</p>	<p>Satisfaction:</p> <ul style="list-style-type: none"> <li>% top-box scores on both Press Ganey and HCAHPS surveys</li> </ul>	<p>Satisfaction:</p> <ul style="list-style-type: none"> <li>Geographically localized patients did not report satisfaction more often with the time physicians spent with them (48.6% vs. 47.5%; P=0.54)</li> <li>Geographically localized patients did not feel that the staff worked better together (65.1% vs. 65.6%; P=0.86)</li> <li>Experience with discharge preparedness and overall hospital rating was also not different between groups</li> </ul>
Kara et al., JHM, 2019	Prospective cohort study	<p>Time motion analysis:</p> <ul style="list-style-type: none"> <li>Geotracking</li> <li>Manual observation</li> </ul>	General medicine, general wards	Teaching and non-teaching	Geotracking: 17 hospitalists (7 in cohorted group, 1 in non-cohorted, and 9 observed in both)	<p>Communication</p> <ul style="list-style-type: none"> <li>Duration of patient visits</li> </ul>	<p>Communication:</p> <ul style="list-style-type: none"> <li>The odds that a GCh (cohorted) hospitalist would visit a patient more than once per day were 1.8 times higher</li> </ul>

					Manual observation: 8 hospitalists (4 in cohorted and 4 in non-cohorted) Total of 10,522 direct care episodes observed	<ul style="list-style-type: none"> <li>Odds of visiting patient room &gt;1x/day</li> </ul> Efficiency <ul style="list-style-type: none"> <li>Proportion of day on various tasks (computer, face-to-face communication, travelling, at nurses station)</li> <li>Interruptions</li> </ul>	<p>(95% CI: 1.37, 2.34; P&lt;0.0001) than for a non-GCh hospitalist</p> <ul style="list-style-type: none"> <li>GCh was associated with longer durations of patient visits while increasing patient loads were associated with shorter visits</li> </ul> Efficiency: <ul style="list-style-type: none"> <li>GCh hospitalists were observed spending 56% of the day in computer interactions vs. nonGCh hospitalists (39%; P&lt;0.005)</li> <li>The percentage of time spent multitasking was 18% for GCh and 14% for non-GCh hospitalists (P&gt;0.05)</li> <li>Interruptions were pervasive, but the highest interruption rate of once every eight minutes in the afternoon was noted in the GCh group</li> </ul>
Williams et al., JGIM, 2019	Pre-post cohort analysis	“Composite index” consisting of rapid response rates for the time periods of interest—no further detail provided. Study duration: Looked at July-December for 2 years pre intervention, and 1 year post intervention	General medicine, general wards	Teaching	Total patients: 4,514 <ul style="list-style-type: none"> <li>Pre: 2,689</li> <li>Post: 1,825</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>Rapid response events</li> </ul>	Patient Outcomes: <ul style="list-style-type: none"> <li>There was a significant reduction in rapid response events (2.16% vs. 0.66%, P&lt;0.0001). The odds ratio of experiencing a rapid response event after geographic rounding was 0.30 (95% CI: 0.16 to 0.56).</li> </ul>
Coates et al., Hospital Practice, 2021	Pre-post cohort analysis	EMR/Chart and billing data Study duration: 25 months pre-, 6 months during, and 5 months post-intervention	General medicine, general wards	Teaching and non-teaching	Number of admissions: <ul style="list-style-type: none"> <li>Pre: 15,902</li> <li>During: 4,022</li> <li>Post: 3,379</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>30-day readmission</li> <li>LOS</li> </ul> Efficiency: <ul style="list-style-type: none"> <li>Discharge efficiency</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>30-day readmission: 12.2% pre-intervention to 11.7% post-intervention (P=0.42)</li> <li>LOS: decrease in adjusted length of stay of 0.98 days (95% CI: 0.50, 1.47) associated with the intervention</li> </ul> Efficiency: <ul style="list-style-type: none"> <li>Discharge efficiency: increase in discharge efficiency from 0.168 to 0.181 discharges/encounter (95% CI: 0.024, 0.004, P=0.009)</li> </ul>
Carlson et al., Hospital Practice, 2022	Pre-post cohort analysis	EMR/Chart data Secure messaging data Survey of providers assessing measures of burnout Qualitative interviews Study duration: 6 months pre- and 6 months post-intervention	General medicine, general wards	Non-teaching	Number of notes <ul style="list-style-type: none"> <li>Pre: 11,341</li> <li>Post: 12,718</li> </ul> Number of messages: <ul style="list-style-type: none"> <li>Pre: 45,954</li> <li>Post: 48,377</li> </ul> Mini-Z survey <ul style="list-style-type: none"> <li>Pre: 37 hospitalists</li> </ul>	Efficiency: <ul style="list-style-type: none"> <li>Timing of progress note completion</li> <li>Volume of messages</li> </ul> Satisfaction: <ul style="list-style-type: none"> <li>Mini-Z survey (assessment of provider burnout)</li> </ul>	Efficiency: <ul style="list-style-type: none"> <li>Timing of progress note completion <ul style="list-style-type: none"> <li>Mean progress note completion time 2:30 pm pre- and 2:01 pm post-intervention (P&lt;0.001).</li> <li>25.1% of progress notes were completed after-hours pre-intervention vs. 20% post-intervention (P&lt;0.001).</li> </ul> </li> </ul>

					<ul style="list-style-type: none"> <li>Post: 43 hospitalists</li> <li>Interviews: 6 hospitalist physicians, 1 APP</li> </ul>	Themes that emerged from semi-structured interviews	<ul style="list-style-type: none"> <li>Volume of messages: volume of messages per patient per day decreased from 1.95 pre-intervention to 1.8 post-intervention (P&lt;0.001)</li> </ul> <p>Satisfaction:</p> <ul style="list-style-type: none"> <li>Mini-Z survey: 77.8% of hospitalists reported no symptoms of burnout pre-intervention vs. 93% post-intervention (P=0.1)</li> </ul> <p>Themes that emerged from semi-structured interviews</p> <ul style="list-style-type: none"> <li>Provider perceived higher quality care</li> <li>More efficient workflow. Mixed views on distribution of workload</li> <li>Improved communication and stronger interprofessional relationships</li> <li>Enhanced job satisfaction</li> </ul>
Klein et al., Journal of General Internal Medicine, 2022	Pre-post cohort analysis	EMR/Chart data Patient satisfaction scores (HCAHPS) Survey of residents (rotation evaluations) Study duration: 10 months pre- and 10 months post-intervention	General medicine, general wards	Teaching	Total patients: 1,720 (95 patients with discharges in both time periods) <ul style="list-style-type: none"> <li>Pre: 911</li> <li>Post: 905</li> </ul> Rotation evaluations completed by 174 residents	Patient outcomes: <ul style="list-style-type: none"> <li>6-month mortality (primary)</li> <li>LOS, 7- and 30-day readmission (secondary)</li> </ul> Satisfaction: <ul style="list-style-type: none"> <li>Patients: HCAHPS scores</li> <li>Providers: Resident rotation evaluation</li> </ul>	Patient outcomes: <ul style="list-style-type: none"> <li>6-month mortality: No change (3.1% pre-intervention vs. 3.9% after; OR 1.13; 95% CI: 0.99, 1.30; P=0.083)</li> <li>LOS: No change (2.84 days pre-intervention vs. 3.22 days after; slope change 0.046; 95% CI: -0.07, 0.16; P=0.43)</li> <li>7-day readmission: No change (4.1% pre-intervention vs. 3.67% after; OR 1.02; 95% CI: 0.88, 1.18; P=0.79)</li> <li>30-day readmission: No change (18.6% pre-intervention vs. 12.99% after; OR 0.95; 95% CI: 0.87, 1.04; P=0.28)</li> </ul> Satisfaction: <ul style="list-style-type: none"> <li>Patient top box HCAHPS scores: No change</li> <li>Resident satisfaction with rotation: Increased (+0.2870; 95% CI: 0.0376, 0.5364; P=0.03)</li> </ul>

\*, This study was designed to compare overall care on non-teaching vs. teaching service—the non-teaching service was also localized while the teaching service was not. \*\*, This study was assessing the effectiveness of a larger accountable care team model, of which localization was one part