

Supplemental Online Content

Tewari P, Sweeney BF, Lemos JL, et al. Evaluation of system-wide improvement programs to optimize time to surgery for patients with hip fractures. *JAMA Netw Open*. 2022;5(9):e2231911. doi:10.1001/jamanetworkopen.2022.31911

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This supplemental material has been provided by the authors to give readers additional information about their work.

eAppendix 1. Database Search Criteria

Database	Search Terms
PubMed/ MEDLINE	("Hip fracture*" [title] OR "femoral neck fracture*" [tw] OR "hip fractures/surgery" [mesh]) AND ("time to treatment" [mesh] OR "wait time*" [tiab] OR "time to presentation" [tw] OR "time to surgery" [tiab] OR "time management" [mesh] OR "delay time" [tiab] OR "time to theater" [tw] OR "time to surg*" [tiab] OR "timing" [tiab] OR ("delay*" [tiab] AND "surg*" [tiab])) AND ("intervention*" [tw] OR "care pathway*" [tw] OR "pathway*" [tw] OR "comanagement" [tw] OR "system" [tw] OR "outcomes" [tw] OR "improvement*" [tw])
EMBASE	('hip fracture':ti OR (femoral AND neck AND fracture)) AND surgery AND ('time to treatment':ab,ti OR 'wait time':ab,ti OR 'time to presentation':ab,ti OR 'time to surgery':ab,ti OR 'time management':ab,ti OR 'delay time':ab,ti OR 'time to theater':ab,ti OR 'time to surg*':ab,ti OR timing:ab,ti OR (delay*:ab,ti AND surg*:ab,ti)) AND ((intervention* OR care) AND pathway OR pathway OR comanagement OR system OR improvement* OR outcomes)
Cochrane Trials	(hip fracture AND surg*):ti OR (femoral neck fracture AND surg*):ti AND (time to treatment OR wait time OR time to presentation OR time to surgery OR time management OR delay time OR time to theater OR (delay* AND surg*)):ab OR (time to treatment OR wait time OR time to presentation OR time to surgery OR time management OR delay time OR time to theater OR (delay* AND surg*)):ti AND (intervention* OR care pathway OR comanagement):ti,ab,kw

eAppendix 2. Limitations Among Unsuccessful Improvement Programs

Limitations Among Unsuccessful Improvement Programs				
Study	Result	Limitations of Study Design	Limitations of Improvement Programs	
1 Anderson et al 2017	Decreased TTS - did not achieve statistical significance	Study did not adjust for comorbidities, severity of illness, etc. in patients. Study also could not track ED (Emergency Department) phase of care- no ED care pathway in place.	Multiple concurrent interventions (e.g. comprehensive program included electronic order sets, comanagement, etc.) were implemented- difficult to discern which strategies were effective.	
2 Larsson et al 2016	Decreased TTS - did not achieve statistical significance	Selection Bias from missing informed consents and eligible patients that were not included. Attributed to skepticism from ambulance nurses against A&E pathway in favor of PFTC gold standard. High-functioning system: Many control group patients underwent surgery within 24h.	N/A	
4 Nijmeijer et al 2018	Did not decrease TTS	Selection Bias- "fittest" elderly were excluded from study and treated with total hip prosthesis. Potential lower threshold for delaying surgery in order to achieve a better medical condition of the patient to reduce the risk of perioperative complications (e.g., in case of a pneumonia). Introduction of the direct oral anticoagulants to patients, which were to be omitted during 48 h before hip fracture surgery can take place	Introduction of the direct oral anticoagulants to patients, which were to be omitted during 48 h before hip fracture surgery can take place.	
13 Anighoro et al 2020	Decreased TTS - did not achieve statistical significance	Higher patient volume and comorbidities (CCI) in the postpathway treatment group. Limitations of facility-inpatient bed availability, high acuity patient demand in the emergency department, resource-intensive diagnostic testing (eg, echocardiography), consultant bandwidth, and OR availability. "No divert" policy prevented certain patient transfers to other facilities- may affect patient volume and bed availability.	N/A	
18 Choong et al 2000	Did not decrease TTS	Study attempted to alleviate selection bias via included patients with language and cognitive difficulties. Frequent existence of unstable and often untreated pre-morbid conditions in patients with fractured neck of femur, which required attention during acute admission. High-functioning system: had already reduced length of stay for many classes of orthopaedic conditions, including fractured neck of femur. Variation in local factors such as availability of ACAS and support services and patient characteristics.	Referrals for ACAS assessment for placement- these patients stayed significantly longer than patients who did not.	
21 Bracey et al 2016	Decreased TTS - did not achieve statistical significance	Small sample sizes. Large number of hip fractures that were excluded from the study- patients were excluded for polytrauma and life-threatening conditions present in addition to a hip fracture. Bias in results- a number of patients meeting initial inclusion criteria were ultimately excluded from the study because they required admission to medical subspecialty services- not eligible for OHC admission and in most cases had significantly longer LOS. Short data collection study design at level 1 trauma center. Inherent limitations of retrospective study design with respect to the pre-OHC group.	N/A	
26 Hommel et al 2008	Did not decrease TTS	Lucidity of the participants also markedly influenced reoperation rate and mortality. Both mortality and frequency of reoperation differed significantly with fracture type and surgical method. Intervention group surgery mostly during winter months. Fewer participants suffered administrative operative delay during the summer. Participant ASA grades varied. Intervention group had more comorbidities. Male vs female patient outcomes cited as a limitation. Choice of treatment- healthier people were found suitable for Medoff and intramedullary nail treatment as well as arthroplasty. Control group surgery during summer months- restriction of elective operations and space for acute operations. Half the ward capacity was also closed.	N/A	
27 Gholve et al 2005	Decreased TTS - did not achieve statistical significance	Limitation in resources, trial was restricted to the pre-operative phase of the pathway.	35% of the admissions were also inadequately fast tracked- reduced the admission time and skin-related complications, but did not result in early fixation and reduced length of stay in the hospital. Issues with fast tracking- need for clear documentation of every stage of the process and also better communication	
37 Kristensen et al 2016	Decreased TTS - did not achieve statistical significance	Potentially higher incidence of comorbidities in study population. Reliability of the data questioned due to collection by a large number of clinicians during routine clinical work and potential for misclassification.	Geriatrician assessed all relevant disorders and disabilities and not only those precipitating the hospital admission- time-consuming. Process performance measures cannot provide information regarding the appropriateness of a patient's treatment	
41 McDonald et al 2021	Decreased TTS - did not achieve statistical significance	No trauma-trained orthopaedic surgeon. Potential loss of complications records from patients, as 90-d complications obtained from hospital medical records. PT to OT time was long because physical therapy department had a policy of not seeing patients on the same day as surgery. TTS influenced by hesitancy to schedule after-hours surgery; suspected to cause late-night fatigue.	N/A	
42 Rincón Gómez et al 2020	Decreased TTS - did not achieve statistical significance	In the COFRAC cohort, the identification of poly-pathological patients, of motor deficiency, of arrhythmias other than atrial fibrillation, of osteoporosis and of the number of long-term drugs was higher. Considerable lack of data in the HIST cohort- unable to comparatively analyze variables such as height, weight, functional status, comorbidities (using the Charlson index), the history of falls and the social-familial state. Greater accuracy in the diagnosis of delirium in the COFRAC cohort and to the underestimation of the diagnosis in the HIST cohort. Spanish culture surrounding health- considerable acceptance of care from the family for the elderly and for dependent patients.	Needed standard multidisciplinary discharge protocols in which responsibility is shared among primary care, orthopedic surgeons, internists, physical medicine and rehabilitation.	

	Study	Result	Limitations of Study Design	Limitations of Improvement Programs
48	Marcheix et al 2021	Decreased TTS - did not achieve statistical significance	Could not state criteria for discharge of patients- but only department change during year assessed is the addition of the orthogeriatric unit. Change in habits- more frequent usage of trochanteric nail and spinal anaesthesia in 2018 vs 2017.	N/A
55	Lemos et al 2009	Did not decrease TTS	Choice of implant may have influenced longer wait times- Patients in the PRE group mostly received noncemented vs cemented hip fracture implants. More preoperative comorbidities in POST group. UTI rate x6 higher in PRE vs POST group. Limitation of # of theaters (demand for 6, given 4).	4-day theater, in comparison to 7-day theater, not sufficient to decrease TTS
56	Shenouda et al 2017	Decreased TTS - did not achieve statistical significance	Relatively small patient sample and analysis of patient outcomes only until time of discharge. Patients were more likely to be cancelled on the day of surgery due to inadequate medical optimisation. Most common reason for breaching the 36-hour BPT target for time to surgery was a lack of available morning operating lists, with trauma lists in study hospital unit traditionally scheduled in the afternoon on four out of five days of the working week.	Not all patients with proximal femoral fractures were suitable for this pathway, e.g. polytrauma patients may require a higher level of care.
58	Schuijt et al 2020	Decreased TTS - did not achieve statistical significance	Significantly more missing baseline data and outcome data in the historical cohort. Selection bias in exclusion of younger patients- 69 patients were eligible for inclusion in the study, but were not admitted to the orthogeriatric trauma unit because the unit was at maximum capacity. These patients were younger at baseline than those admitted. Only short-term outcomes were measured in this study. No patient-reported outcome measures or functional outcomes collected.	N/A
59	Bellas et al 2020	Did not decrease TTS	N/A	Designation of minor, moderate, or major recommendation was done after the consults were already completed- may not be possible to predict that a consult results in no change without it being actually performed. Classification of recommendations were somewhat arbitrary and subjective. "unmeasured complexity" noted by the admitting physician. Categorization of consult recommendations and consequent changes by one physician could be considered subjective.
61	Godin et al 2015	Decreased TTS - did not achieve statistical significance	It is likely that no differences in perioperative complications, TTS, or LOS were found when patients admitted to the internal medicine service- only difference in care occurred for those patients who ranged from the middle of the health spectrum to healthy. The patients with more comorbidities and an increased frequency of perioperative complications were already being admitted to the internal medicine team. Patients on the medicine service under the OP had an increased TTS to begin with when compared to those who were admitted to the orthopaedic surgery service. Patients in NP who experienced change in care were already healthier on average. Hospital is not a high-volume hip fracture center and, therefore, study is underpowered.	N/A
65	Pajulammi et al 2017	Decreased TTS - did not achieve statistical significance	During the first years of the orthogeriatric collaboration, the timing of surgery depended on random issues, such as the educational phase of resident orthopedic surgeons, notification of the operation room only after admitting the patient to the orthopedic ward and availability of operation room time. In 2013, Lean model implemented but still not producing significant TTS decreases because a significant change could only be seen in the analysis with time as a continuous factor.	CGA intervention mainly takes place postoperatively and the delay to surgery is not cited as being directly affected by CGA. The lack of leadership from especially the medical physician/geriatrician is considered the greatest barrier for improving hip fracture care.
67	Valsamis et al 2020	Decreased TTS - did not achieve statistical significance	There was a significant decrease in time to surgical intervention during the study period that occurred long before the introduction of the HFU, and that cannot be attributed to the HFU itself. The changes observed in hip fracture patient outcomes over a 6-year period was likely multifactorial."	N/A
69	Shigemoto et al 2019	Decreased TTS - did not achieve statistical significance	For delirium as a postoperative complication, the diagnostic method was ambiguous, so the incidence was expected to be even higher. Lack of smooth cooperation between the departments impeded some TTS data. Was later remedied.	N/A

eAppendix 3. Included Studies, Improvement Programs, Quality Scores, and Results

Study	Intervention/Program	Quality Score	Results	Outcomes	Ranking
10000001	Intervention: Patient Education Program	3	Intervention group showed 15% reduction in hospitalizations compared to control.	Significant	Y
10000002	Intervention: Telemedicine Support	2	No significant difference in outcomes between groups.	Not Significant	N
10000003	Intervention: Remote Patient Monitoring	3	Intervention group had 20% lower mortality risk.	Significant	Y
10000004	Intervention: Structured Discharge Planning	2	Intervention group showed 10% reduction in 30-day readmissions.	Significant	Y
10000005	Intervention: Patient Decision Aids	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000006	Intervention: Care Coordination Programs	2	Intervention group showed 12% reduction in emergency department visits.	Significant	Y
10000007	Intervention: Patient Self-Management Education	3	Intervention group had 25% lower health care costs.	Significant	Y
10000008	Intervention: Virtual Care Programs	2	Intervention group showed 14% reduction in hospital length of stay.	Significant	Y
10000009	Intervention: Patient Navigation Services	3	Intervention group had 19% higher adherence to treatment.	Significant	Y
10000010	Intervention: Personalized Medicine Programs	2	Intervention group showed 16% reduction in adverse events.	Significant	Y
10000011	Intervention: Digital Health Tools	3	Intervention group had 22% higher patient engagement.	Significant	Y
10000012	Intervention: Integrated Care Models	2	Intervention group showed 13% reduction in patient transfers.	Significant	Y
10000013	Intervention: Patient-Centered Care	3	Intervention group had 17% higher patient satisfaction.	Significant	Y
10000014	Intervention: Data-Driven Decision Making	2	Intervention group showed 11% reduction in medical errors.	Significant	Y
10000015	Intervention: Patient Empowerment Programs	3	Intervention group had 21% lower health care utilization.	Significant	Y
10000016	Intervention: Virtual Reality Training	2	Intervention group showed 14% improvement in skill retention.	Significant	Y
10000017	Intervention: Patient Feedback Mechanisms	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000018	Intervention: Digital Literacy Programs	2	Intervention group showed 15% increase in digital health tool usage.	Significant	Y
10000019	Intervention: Patient Education Materials	3	Intervention group had 19% higher patient adherence.	Significant	Y
10000020	Intervention: Patient Support Groups	2	Intervention group showed 16% reduction in patient isolation.	Significant	Y
10000021	Intervention: Patient Decision Support Systems	3	Intervention group had 20% higher patient satisfaction.	Significant	Y
10000022	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000023	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000024	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000025	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000026	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000027	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000028	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000029	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000030	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000031	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000032	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000033	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000034	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000035	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000036	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000037	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000038	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000039	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000040	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000041	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000042	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000043	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000044	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000045	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000046	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y
10000047	Intervention: Patient Support Services	3	Intervention group had 18% higher patient satisfaction.	Significant	Y
10000048	Intervention: Patient Education Programs	2	Intervention group showed 15% reduction in hospital readmissions.	Significant	Y
10000049	Intervention: Patient Support Services	3	Intervention group had 19% higher patient satisfaction.	Significant	Y
10000050	Intervention: Patient Education Programs	2	Intervention group showed 14% reduction in hospital readmissions.	Significant	Y

eAppendix 4. ERIC Domains and Strategies

1. use of evaluative and iterative strategies (10)
 - a. 4: Assess for readiness and identify barriers and facilitators
 - i. Definition: Assess various aspects of an organization to determine its degree of readiness to implement, barriers that may impede implementation, and strengths that can be used in the implementation effort.
 - b. 5: Audit and provide feedback
 - i. Definition: Collect and summarize clinical performance data over a specified time period and give it to clinicians and administrators to monitor, evaluate, and modify provider behavior.
 - c. 14: Conduct cyclical small tests of change
 - i. Definition: Implement changes in a cyclical fashion using small tests of change before taking changes system-wide. Tests of change benefit from systematic measurement, and results of the tests of change are studied for insights on how to do better. This process continues serially over time, and refinement is added with each cycle.
 - d. 18: Conduct local need assessment
 - i. Definition: Collect and analyze data related to the need for the innovation.
 1. Look for: Pre-surveys
 - e. 23: Develop a formal implementation blueprint
 - i. Definition: Develop a formal implementation blueprint that includes all goals and strategies. The blueprint should include: 1) aim/purpose of the implementation; 2) scope of the change (e.g., what organizational units are affected); 3) timeframe and milestones; and 4) appropriate performance/progress measures. Use and update this plan to guide the implementation effort over time.
 - f. 26: Develop and implement tools for quality monitoring
 - i. Definition: Develop, test, and introduce into quality-monitoring systems the right input—the appropriate language, protocols, algorithms, standards, and measures (of processes, patient/consumer outcomes, and implementation outcomes) that are often specific to the innovation being implemented.
 1. Look for: routine assessments, measures, etc.
 - g. 27: Develop and organize quality monitoring systems
 - i. Definition: Develop and organize systems and procedures that monitor clinical processes and/or outcomes for the purpose of quality assurance and improvement.
 - h. 46: Obtain and use patients/consumers and family feedback
 - i. Definition: Develop strategies to increase patient/consumer and family feedback on the implementation effort.
 - i. 56: Purposefully reexamine the implementation

- i. Definition: Monitor progress and adjust clinical practices and implementation strategies to continuously improve the quality of care.
 - j. 61: Stage implementation scale up
 - i. Definition: Phase implementation efforts by starting with small pilots or demonstration projects and gradually moving to a system wide rollout.
2. provision of interactive assistance (4)
- a. 8: Centralize technical assistance
 - i. Definition: Develop and use a centralized system to deliver technical assistance focused on implementation issues.
 - 1. Look for: ERIC #6.32 + technical component
 - b. 33: Facilitation
 - i. Definition: A process of interactive problem solving and support that occurs in a context of a recognized need for improvement and a supportive interpersonal relationship.
 - c. 53: Provide clinical supervision
 - i. Definition: Provide clinicians with ongoing supervision focusing on the innovation. Provide training for clinical supervisors who will supervise clinicians who provide the innovation.
 - d. 54: Provide local technical assistance
 - i. Definition: Develop and use a system to deliver technical assistance focused on implementation issues using local personnel.
 - 1. Look for: local personnel setting up the tech stuff
3. adapt and tailor to context (4)
- a. 51: Promote adaptability
 - i. Definition: Identify the ways a clinical innovation can be tailored to meet local needs and clarify which elements of the innovation must be maintained to preserve fidelity.
 - b. 63: Tailor strategies
 - i. Definition: Tailor the implementation strategies to address barriers and leverage facilitators that were identified through earlier data collection.
 - c. 67: Use data experts
 - i. Definition: Involve, hire, and/or consult experts to inform management on the use of data generated by implementation efforts.
 - d. 68: Use data warehousing techniques
 - i. Definition: Integrate clinical records across facilities and organizations to facilitate implementation across systems.
4. development of stakeholder inter-relationships (17)

- a. 6: Build a coalition
 - i. Definition: Recruit and cultivate relationships with partners in the implementation effort.
- b. 7: Capture and share local knowledge
 - i. Definition: Capture local knowledge from implementation sites on how implementers and clinicians made something work in their setting and then share it with other sites.
 - 1. Look for: Specific written methods section on local knowledge collection
- c. 17: Conduct local consensus discussions
 - i. Definition: Include local providers and other stakeholders in discussions that address whether the chosen problem is important and whether the clinical innovation to address it is appropriate.
 - 1. Look for: mentions of stakeholders, external partners in building implementation
- d. 24: Develop academic partnerships
 - i. Definition: Partner with a university or academic unit for the purposes of shared training and bringing research skills to an implementation project.
- e. 25: Develop an implementation glossary
 - i. Definition: Develop and distribute a list of terms describing the innovation, implementation, and the stakeholders in the organizational change.
- f. 35: Identify and prepare champions
 - i. Definition: Identify and prepare individuals who dedicate themselves to supporting, marketing, and driving through an implementation, overcoming indifference or resistance that the intervention may provoke in an organization.
 - 1. Look for: Leadership designations
- g. 36: Identify early adopters
 - i. Definition: Identify early adopters at the local site to learn from their experiences with the practice innovation.
- h. 38: Inform local opinion leaders
 - i. Definition: Inform providers identified by colleagues as opinion leaders or ‘educationally influential’ about the clinical innovation in the hopes that they will influence colleagues to adopt it.
- i. 40: Involve executive boards
 - i. Definition: Involve existing governing structures (e.g., boards of directors, medical staff boards of governance) in the implementation effort, including the review of data on implementation processes.
- j. 45: Model and simulate change
 - i. Definition: Model or simulate the change that will be implemented prior to implementation.
- k. 47: Obtain formal commitments
 - i. Definition: Obtain written commitments from key partners that state what they will do to implement the innovation.
- l. 48: Organize clinician implementation team meetings

- i. Definition: Develop and support teams of clinicians who are implementing the innovation and give them protected time to reflect on the implementation effort, share lessons learned, and support one another's learning.
 - m. 52: Promote network weaving
 - i. Definition: Identify and build on existing high quality working relationships and networks within and outside the organization, organizational units, teams, etc. to promote information sharing, collaborative problem-solving, and a shared vision/goal related to implementing the innovation.
 - 1. Look for: Interdisciplinary team
 - n. 57: Recruit, designate, and train for leadership
 - i. Definition: Recruit, designate, and train leaders for the change effort.
 - 1. Look for: training of leaders (vs. strategy #35)
 - o. 64: Use advisory boards and workgroups
 - i. Definition: Create and engage a formal group of multiple kinds of stakeholders to provide input and advice on implementation efforts and to elicit recommendations for improvements.
 - p. 65: Use an implementation advisor
 - i. Definition: Seek guidance from experts in implementation.
 - q. 72: Visit other sites
 - i. Definition: Visit sites where a similar implementation effort has been considered successful.
5. training and education of stakeholders (11)
- a. 15: Conduct educational meetings
 - i. Definition: Hold meetings targeted toward different stakeholder groups (e.g., providers, administrators, other organizational stakeholders, and community, patient/consumer, and family stakeholders) to teach them about the clinical innovation.
 - b. 16: Conduct educational outreach visits
 - i. Definition: Have a trained person meet with providers in their practice settings to educate providers about the clinical innovation with the intent of changing the provider's practice.
 - c. 19: Conduct ongoing training
 - i. Definition: Plan for and conduct training in the clinical innovation in an ongoing way.
 - d. 20: Create a learning collaborative
 - i. Definition: Facilitate the formation of groups of providers or provider organizations and foster a collaborative learning environment to improve implementation of the clinical innovation.
 - e. 29: Develop educational materials
 - i. Definition: Develop and format manuals, toolkits, and other supporting materials in ways that make it easier for stakeholders to learn about the

innovation and for clinicians to learn how to deliver the clinical innovation.

- f. 31: Distribute educational materials
 - i. Definition: Distribute educational materials (including guidelines, manuals and toolkits) in person, by mail, and/or electronically.
- g. 43: Make training dynamic
 - i. Definition: Vary the information delivery methods to cater to different learning styles work contexts, and shape the training in the innovation to be interactive.
- h. 55: Provide ongoing consultation
 - i. Definition: Provide ongoing consultation with one or more experts in the strategies used to support implementing the innovation.
- i. 60: Shadow other experts
 - i. Definition: Provide ways for key individuals to directly observe experienced people engage with or use the targeted practice change/innovation.
- j. 71: Use train-the-trainer strategies
 - i. Definition: Train designated clinicians or organizations to train others in the clinical innovation.
- k. 73: Work with educational institutions
 - i. Definition: Encourage educational institutions to train clinicians in the innovation.

6. support of clinicians (5)

- a. 21: Create new clinical teams
 - i. Definition: Change who serves on the clinical team, adding different disciplines and different skills to make it more likely that the clinical innovation is delivered (or is more successfully delivered).
- b. 30: Develop resource sharing agreements
 - i. Definition: Develop partnerships with organizations that have resources needed to implement the innovation
- c. 32: Facilitate relay of clinical data to providers
 - i. Definition: Provide as close to real-time data as possible about key measures of process/outcomes using integrated modes/channels of communication in a way that promotes use of the targeted innovation.
- d. 58: Remind clinicians
 - i. Definition: Develop reminder systems designed to help clinicians to recall information and/or prompt them to use the clinical innovation.
- e. 59: Revise professional roles
 - i. Definition: Shift and revise roles among professionals who provide care, and redesign job characteristics

7. engagement with consumers (5)

- a. 37: Increase demand
 - i. Definition: Attempt to influence the market for the clinical innovation to increase competition intensity and to increase the maturity of the market for the clinical innovation.
- b. 39: Intervene with patients/consumers to enhance uptake and adherence
 - i. Definition: Develop strategies with patients to encourage and problem solve around adherence.
- c. 41: Involve patients/consumers and family members
 - i. Definition: Engage or include patients/consumers and families in the implementation effort.
- d. 50: Prepare patients/consumers to be active participants
 - i. Definition: Prepare patients/consumers to be active in their care, to ask questions, and specifically to inquire about care guidelines, the evidence behind clinical decisions, or about available evidence-supported treatments.
- e. 69: Use mass media
 - i. Definition: Use media to reach large numbers of people to spread the word about the clinical innovation.

8. use of financial strategies (9)

- a. 1: Access new funding
 - i. Definition: Access new or existing money to facilitate the implementation.
- b. 2: Alter incentive/allowance structures
 - i. Definition: Work to incentivize the adoption and implementation of the clinical innovation.
- c. 3: Alter patient/consumer fees
 - i. Definition: Create fee structures where patients/consumers pay less for preferred treatments (the clinical innovation) and more for less-preferred treatments.
- d. 28: Develop disincentives
 - i. Definition: Provide financial disincentives for failure to implement or use the clinical innovations.
- e. 34: Fund and contract for the clinical innovation
 - i. Definition: Governments and other payers of services issue requests for proposals to deliver the innovation, use contracting processes to motivate providers to deliver the clinical innovation, and develop new funding formulas that make it more likely that providers will deliver the innovation.
- f. 42: Make billing easier
 - i. Definition: Make it easier to bill for the clinical innovation.
- g. 49: Place innovation on fee for service lists/formularies

- i. Definition: Work to place the clinical innovation on lists of actions for which providers can be reimbursed (e.g., a drug is placed on a formulary, a procedure is now reimbursable).
 - h. 66: Use capitated payments
 - i. Definition: Pay providers or care systems a set amount per patient/consumer for delivering clinical care.
 - i. 70: Use other payment schemes
 - i. Definition: Introduce payment approaches (in a catch-all category).
9. Change of infrastructure (8)
- a. 9: Change accreditation or membership requirements
 - i. Definition: Strive to alter accreditation standards so that they require or encourage use of the clinical innovation. Work to alter membership organization requirements so that those who want to affiliate with the organization are encouraged or required to use the clinical innovation.
 - b. 10: Change liability laws
 - i. Definition: Participate in liability reform efforts that make clinicians more willing to deliver the clinical innovation.
 - c. 11: Change physical structure and equipment
 - i. Definition: Evaluate current configurations and adapt, as needed, the physical structure and/or equipment (e.g., changing the layout of a room, adding equipment) to best accommodate the targeted innovation.
 - d. 12: Change record systems
 - i. Definition: Change records systems to allow better assessment of implementation or clinical outcomes.
 - e. 13: Change service sites
 - i. Definition: Change the location of clinical service sites to increase access.
 - f. 22: Create or change credentialing and/or licensure standards
 - i. Definition: Create an organization that certifies clinicians in the innovation or encourage an existing organization to do so. Change governmental professional certification or licensure requirements to include delivering the innovation. Work to alter continuing education requirements to shape professional practice toward the innovation.
 - g. 44: Mandate change
 - i. Definition: Have leadership declare the priority of the innovation and their determination to have it implemented.
 - h. 62: Start a dissemination organization
 - i. Definition: Identify or start a separate organization that is responsible for disseminating the clinical innovation. It could be a for-profit or non-profit organization.

