

Supplementary file 3. Inductive narrative analysis that identified key study phases, figure 3

The narrative analysis of the integration of QI and IS in the studies in conjunction with frequency analysis was used to identify how frequently QI or IS methods/tools/theories were used across different phases of QI and IS studies. Studies were analysed line-by-line to identify the QI or IS methods/tools/theories used (See table 1, Characteristics of studies). Key study phases were inductively identified during the narrative analysis, into which the methods/tools/theories could be categorised:

- **The System diagnostic phase**, which we defined as an assessment of the extent and/or nature of an issue being targeted to improve performance or outcomes, and identification of barriers and facilitators (B&Fs) to implementation. This included: QI methods/tools/theories used to identify B&Fs to implementation (e.g., Process Mapping, Fishbone diagram/ Cause and effect diagram, Pareto chart, Force field analysis, Impact effort matrix, and histograms), and IS tools/theories used to identify B&Fs to implementation (e.g., COM-B, TDF, CFIR).
- **The Intervention design phase** which typically involves the design, development and refinement of an intervention. This included: QI/IS methods/tools/theories used to inform the QI design.
- **The Implementation of intervention phase** which typically included intervention testing and embedded strategies to implement the intervention. This included: QI tools/findings that guided implementation strategies (e.g., Plan, Do, Study, Act (PDSA), Audit and & Feedback (A&F), and Champions), IS tools/theories that guided implementation strategies, and Feasibility and useability testing.
- **The Scale/spread or sustainability phase** which included scale up of the intervention to a larger or different team or setting with consideration of ongoing maintenance of the implementation of the intervention. This included IS tools/theories used to determine whether it was appropriate to upscale the intervention across the organization.
- As well as these four phases, **Methodology** (which included methodologies that were applied across the entire span of the study such as Lean six sigma), and **Measurement tools** such as Control charts and Run charts were included in the analysis.

Phase	Tools/methods/theories
Systems Diagnostic phase	Process Mapping Fishbone diagram (Cause and effect diagram) Pareto chart Force field analysis Impact effort matrix Histogram IS used to identify B&Fs
Intervention Design phase	IS/ QI informed QI design
Implementation of intervention phase	PDSA A&F Champions IS/ QI guided implementation strategies Intervention feasibility and useability testing
Scale/spread phase	IS used to determine if it is appropriate to upscale the intervention across the organisation
Measurement tools	Control chart Run charts
Methodology	LEAN

Example of analysis

QI and IS study phases	IS tools/theory used	QI tools/methods used
Systems Diagnostic phase		
Process Mapping		Cummings 2017
		Duran 2023
		Kallam 2018
		Mathura 2023
		Middleton 2022
		Mathura 2023
		Middleton 2022
		Middleton 2022
		Middleton 2022
Fishbone diagram (Cause and effect diagram)		Kallam 2018
Pareto chart		Middleton 2022
Force field analysis		Middleton 2022
Impact effort matrix		Middleton 2022
Histogram		Middleton 2022
IS used to identify B&Fs	Cummings 2017	
	Duran 2023	
	Kingsley 2020	
	Mathura 2023	
	Patel 2022	
	Silva 2023	
	Steinmo 2016	
	Young 2018	
Intervention Design phase		
IS/ QI informed QI design	Cummings 2017	Duran 2023
	Kingsley 2020	Farley 2023
	Vanstone 2022	Kallam 2018
		Middleton 2022
		Mathura 2023
		Patel 2022
		Silva 2023
		Steinmo 2016
		Young 2018
Implementation of intervention phase		
PDSA		Cummings 2017
		Farley 2023
		Kingsley 2020
		Mathura 2023
		Middleton 2022
		Silva 2023 (PDCA)
		Steinmo 2016
		Vanstone 2022
A&F		Young 2018
		Cummings 2017
		Middleton 2022
		Patel 2022
		Vanstone 2022
Champions		Young 2018
		Cummings 2017
		Farley 2023
		Kallam 2018
		Mathura 2023
IS/QI guided implementation strategies	Kallam 2018	Cummings 2017
	Mathura 2023	Kingsley 2020
	Middleton 2022	Middleton 2022
	Patel 2022	

Feasibility and useability testing	Silva 2023	Vanstone 2022
	Steinmo 2016	Young 2018
	Vanstone 2022	
	Young 2018	Duran 2023
Scale/spread phase		
IS used to determine if it is appropriate to upscale the intervention across the organisation	Farley 2023	
Measurement tools		
Control chart		Vanstone 2022
Run charts		Vanstone 2022
Methodology		
LEAN		Kallam 2018