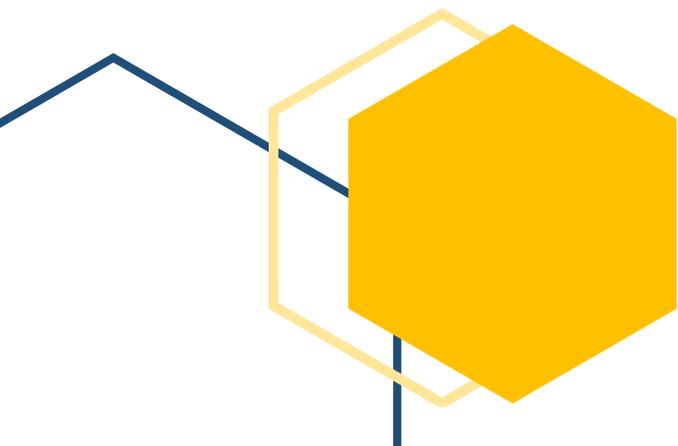




UNDERSTANDING FUNCTIONS AND FORMS OF COMPLEX/MULTILEVEL INTERVENTIONS

**CONSORTIUM FOR CANCER IMPLEMENTATION SCIENCE
IMPLEMENTATION OF COMPLEX/MULTILEVEL INTERVENTIONS TASK GROUP**

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Advancing implementation science (IS) requires explicit attention to interactions between and among multiple levels of influence and the development and implementation of multilevel/complex health interventions designed to target them. Multilevel interventions (MLIs) are defined as interventions at two or more levels of individuals, providers, clinical teams, health care systems, and/or community settings that measure outcomes at three levels. Complex interventions are generally defined as multicomponent adaptable interventions. All MLIs are complex interventions, but not all complex interventions are MLIs. Due to the inherent complexity of complex/MLI research, few examples along the cancer care continuum exist and even fewer have been implemented into practice. Moreover, most intervention studies lack sufficient detail around the multilevel context, making it difficult to understand how and why an intervention succeeds or fails across different settings and populations.

Initiated in 2020, the goal of the Consortium for Cancer Implementation Sciences (CCIS) Implementation of Complex/Multilevel Intervention action group is to advance the science and understanding of MLIs through three objectives: (1) understanding the interface of MLIs and IS, (2) exploring the interface of complex interventions and IS, and (3) producing goods and tutorials to help others seeking to work at the interface of these disciplines. A common need identified by members of the action group includes specific tools, resources, and examples to help navigate the inherent complexity of MLI research. The following resource, funded by the CCIS in 2021, applied an existing pragmatic tool to well-defined case examples of MLIs across the cancer care continuum to advance our understanding of developing and implementing complex interventions/MLIs.

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Rationale for Public Good

Limitations in our understanding of how best to implement MLIs or how interventions at multiple levels interact and affect health outcomes remain an ongoing challenge. Increasingly, researchers and practitioners interested in developing and implementing MLIs across the cancer continuum have requested tools, resources, and case examples to help improve the delivery and understanding of MLIs. This can be achieved by building off of existing tools designed to help us better understand and document components of MLIs.

The *Function & Form Matrix* provides a framework for operationalizing and measuring core functions and forms of MLIs and complex health interventions. Core functions are what the intervention seeks to change, while forms are specific strategies or activities that are needed to carry out the core functions and are often customized to the local contexts. Initially developed to describe implementation of the patient-centered medical home model, the form includes three columns: (1) motivating need/problem, (2) core functions, and (3) customized forms. This form can be applied to MLIs across the cancer continuum by providing a theory-based depiction of how an intervention achieves its effects, links needs and contextual factors to outcomes, and illustrates how variations in form tie to core functions.



Purpose of the resource:

1. Provide well-designed case studies to serve as examples for implementing complex interventions/MLIs across the cancer care continuum.
2. Apply the *Function & Form Matrix* to describe and characterize the motivating need/problem, core function, and customized forms of selected studies.
3. Provide recommendations and limitations.

Intended users: Intended users include researchers in diversity and inclusion, public health, and clinical settings and community members interested in developing and implementing complex interventions/MLIs.

How resources were developed: Two members of the action group conducted an initial literature search using terms such as “multilevel,” “complex,” “ecological,” “interventions,” “programs,” and “cancer.” The search was limited to studies conducted in the United States since 2012. We also elicited potential case studies from other action group leads within the CCIS and reviewed eligible interventions listed in the Evidence-based Cancer Control Programs website. Next, a subset of action group members applied the *Function & Form Matrix* to selected case studies and met to discuss findings and resolve discrepancies. These ongoing discussions resulted in further refinement of the *Function & Form Matrix* and recommendations for future use.

A. Case Studies across the Cancer Care Continuum

a. List of select case examples with links or PDF

1. Coronado GD, Leo MC, Ramsey K, et al. **Mailed fecal testing and patient navigation versus usual care to improve rates of colorectal cancer screening and follow-up colonoscopy in rural Medicaid enrollees: a cluster-randomized controlled trial.** *Implement Sci Commun.* 2022;3(1):42. doi:[10.1186/s43058-022-00285-3](https://doi.org/10.1186/s43058-022-00285-3).
2. Graboyes EM, Sterba KR, Li H, et al. **Development and evaluation of a navigation-based, multilevel intervention to improve the delivery of timely, guideline-adherent adjuvant therapy for patients with head and neck cancer.** *JCO Oncol Pract.* 2021;17(10):e1512-e1523. doi:[10.1200/OP.20.00943](https://doi.org/10.1200/OP.20.00943).
3. Patel MI, Khateeb S, Coker T. **A randomized trial of a multi-level intervention to improve advance care planning and symptom management among low-income and minority employees diagnosed with cancer in outpatient community settings.** *Contemp Clin Trials.* 2020;91:105971. doi:[10.1016/j.cct.2020.105971](https://doi.org/10.1016/j.cct.2020.105971).
4. Highfield L, Rajan SS, Valerio MA, Walton G, Fernandez ME, Bartholomew LK. **A non-randomized controlled stepped wedge trial to evaluate the effectiveness of a multi-level mammography intervention in improving appointment adherence in underserved women.** *Implement Sci.* 2015;10:143. doi:[10.1186/s13012-015-0334-x](https://doi.org/10.1186/s13012-015-0334-x).
5. Paskett ED, Krok-Schoen JL, Pennell ML, et al. **Results of a multilevel intervention trial to increase human papillomavirus (HPV) vaccine uptake among adolescent girls.** *Cancer Epidemiol Biomarkers Prev.* 2016;25(4):593-602. doi:[10.1158/1055-9965.EPI-15-1243](https://doi.org/10.1158/1055-9965.EPI-15-1243).



6. Finney Rutten LJ, Ruddy KJ, Chlan LL, et al. **Pragmatic cluster randomized trial to evaluate effectiveness and implementation of enhanced EHR-facilitated cancer symptom control (E2C2)**. *Trials*. 2020;21:480. doi:[10.1186/s13063-020-04335-w](https://doi.org/10.1186/s13063-020-04335-w).
7. Wallner LP, Abrahamse P, Gargaro JG, et al. **Improving the delivery of team-based survivorship care after primary breast cancer treatment through a multi-level intervention: a pilot randomized controlled trial**. *Breast Cancer Res Treat*. 2021;189(1):81-92. doi:[10.1007/s10549-021-06257-w](https://doi.org/10.1007/s10549-021-06257-w).

b. [Matrix of characteristics](#)

B. *Function and Form Matrix*

a. [Overview of the Matrix and examples applying the Matrix to case studies](#)

b. Recommendations/limitations

1. The *Function & Form Matrix* is an easy-to-use tool that is helpful in thinking about the initial development of a complex intervention/MLI.
2. The *Function & Form Matrix* may also serve as a tool to assist with adapting existing complex interventions/MLIs to a new context.
3. The *Function & Form Matrix* provides a road map to facilitate better alignment between complex intervention/MLI components and/or implementation strategies and expected outcomes.
4. An ongoing iterative approach and expert consultation is recommended to identify and apply the concepts of core functions and forms.
5. The *Function & Form Matrix* was retrospectively applied to case examples based on information provided in peer-reviewed publications that lack sufficient detail regarding why (core function) specific intervention components or implementation strategies were selected.
6. While easily accessible to a broader audience, the simplicity of the tool lends itself to discrepancies and/or insufficient reporting of details. This is likely due to differences in how core functions and forms are conceptualized and defined in the literature and the background/training of those applying the tool.

*This resource is a living document that was last updated and released in March 2023. It is anticipated that this resource will continue to evolve.