

Association of Intervention Outcomes with Practices' Capacity to Change:  
Subgroup Analysis from a Group Randomized Trial

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## **Abstract**

**Background:** The relationship between health care practices' capacity to change and the results and sustainability of interventions to improve service delivery is unclear.

**Methods:** In the setting of a practice-tailored intervention to increase preventive service delivery (PSD), we assessed practice change capacity by rating practices' motivation to change and instrumental ability to change, using a 1-4 scale for each. After combining these ratings into a single score, random effects models tested its association with change in PSD rates from baseline after intervention completion and 12 months later.

**Results:** Our measures of practice change capacity varied widely at baseline (range 2-8; mean  $4.8 \pm 1.6$ ). Practices with greater change capacity delivered preventive services to eligible patients at higher rates by the completion of the intervention (2.7% per unit increase in the combined effort score,  $p < 0.001$ ). This relationship persisted for 12 months after the intervention ended (3.1%,  $p < 0.001$ ).

**Conclusions:** Greater capacity for change is associated with a higher probability that a practice will attain and sustain desired outcomes. Future work to refine measures of this practice characteristic may be useful in planning and implementing interventions that result in sustained, evidence-based improvements in care delivery.

**Key words:** preventive services, health care delivery, implementation

## ***Findings:***

Systematic reviews and meta-analyses demonstrate that many interventions yield inconsistent results in clinical trials settings.[1,2] One potential explanation for this is that standardized interventions overlook factors within the context of “real world” health care settings that influence the implementation of new procedures.[3-8] A better understanding of the factors affecting health care practices’ capacity to adopt, implement, and sustain application of evidence-based strategies may therefore prove valuable in accelerating the translation of research into routine use.

Over the past two decades, work conducted in a broad range of settings provides several ways to conceptualize influences on the translational process.[7,9-13] One descriptive framework focusing on primary care practices’ ability to adopt and implement new approaches to care delivery[14] may be particularly valuable, given that these practices represent a venue through which a majority of Americans receive ambulatory care annually.[15-18] This framework, for example, highlights the potential role of several practice characteristics: 1) the individual and aggregate motivation of practice members; 2) the resources that they identify within and outside the practice that are both accessible and important in supporting change efforts (including previous experience in using new tools or adopting new procedures); 3) the external forces or factors that shape or influence change options; and 4) practice members’ perception of options and opportunities for change.

Two components – motivations and resources for change – are central components of other conceptual frameworks on organizational capacity for change.[9,12,13] While some have

suggested that practice motivation or inertia may be particularly relevant in the implementation of clinical guidelines,[19] motivation appears to be necessary but not sufficient for change to occur:[9] Confidence to act and an ability to implement change represent resource-related factors that must also be present.[9,12] It is also useful to note that interventions providing instrumental support in the process of implementation can be effective in fostering change once motivation exists or is developed.[20]

Despite considerable effort to characterize organizational change capacity at the conceptual level, only a handful of studies demonstrate empirical links between operational correlates of conceptual models and implementation outcomes. In the majority of cases, however, the outcomes reported reflect intention to act rather than actual behaviors. To determine whether elements of practice capacity for change were associated with the implementation and the sustainability of an intervention to improve health care delivery, we used data from the Study to Enhance Prevention by Understanding Practices (STEP-UP), a community practice-based, group randomized clinical trial aimed at improving the delivery of a broad spectrum of preventive services in ambulatory primary care settings. The design, methods, and findings from this trial have been described in detail previously[21,22]. In brief, 79 primary care practices in northeast Ohio were randomly assigned to a control or intervention group. Intervention practices were assessed by a research nurse facilitator over 1-3 days to gain an understanding of practice roles and routine procedures. The intervention, incorporating information from this assessment, involved creation of a practice-individualized plan for change using a menu of tools (e.g., chart stickers, flow sheets, reminder cards) and approaches (e.g., personnel roles, delivery of preventive services during illness visits) to

enhance preventive service delivery (PSD). The study outcome, practice-level rates of PSD (screening, immunizations, and behavioral counseling services recommended by the U.S. Preventive Services Task Force for age/sex-eligible individuals),[23,24] was assessed by research nurses using medical record review every six months (baseline, month 6, month 12 [end of the intervention], and follow up visits at months 18 and 24). Thirty-nine practices were randomly assigned to the intervention; the 37 practices participating in follow up for the full 24 months represent the sample for this study.

Nearly all previous studies assessing organizational capacity use a quantitative approach that relies upon participant surveys.[9,25-30] While reflective of the experience or perspectives of those working in the practice, this approach is often limited by low response rates and may miss practice features that are not directly assessed by the items administered. To capture practice characteristics representing the conceptual domains of “motivations” and “resources”, we used a more qualitative strategy, described and applied in previous work,[20] based on the direct observations of members of the research team.

Prior to conducting outcome analyses, each participating practice’s capacity to change in response to the intervention was retrospectively rated by the research team, which consisted of two nurse practice change facilitators, three research nurses who visited practices to conduct medical record reviews, the epidemiologist data analyst and the physician/epidemiologist principal investigator. Ratings were informed by an assessment approach that used facilitators’ and research nurses’ ethnographic field notes and practice environment checklists based on practice observation and discussion with practice

members.[20,31] For each practice, team members individually generated two ratings. The first assessed the amount of effort needed to motivate practice staff to undertake the intervention (“Motivation to Change”). The second rating indirectly assessed a key practice resource - members’ *ability* to undertake change, by estimating the amount of instrumental assistance a practice needed to implement tools and approaches designed to increase PSD (“Ability to Change”). Both ratings were expressed using a four-point scale (1= low motivation / ability to change; 4=high motivation / ability to change). For example, practice members at one site where brief visits and high patient volume was common had very little interest in focusing attention on the delivery of preventive care and were scored as having low motivation (rating =“1”); individuals at another practice site who were highly adept at implementing rapid-cycle quality improvement efforts were scored as having a high ability to undertake change (rating = “4”). Using ratings generated by each research team member and supplementing them with review of fieldnotes on the practice, the research team reached consensus on a single rating for both scores. Because each score represented complementary dimensions of a larger construct - practices’ change capacity - both were combined into a single score for the primary analysis. A post-hoc analysis assessed the presence of an interaction between the two components.

This paper tests the hypotheses that greater change capacity would be associated with greater change in PSD rates from baseline to the end of the active intervention period and that this association would be sustained during follow up, when no intervention was being offered.

To provide a preliminary test of the relationship between absolute change in PSD and the change capacity score, we compared mean PSD values for practices in the highest and lowest tertiles of the change capacity score using Student's t-test. We then assessed this association more thoroughly using data from all study outcome assessment points and all practices to develop models that permitted random intercepts and slopes. Separate models were developed to assess the association between the combined practice change capacity score (or the interaction term) with change in PSD from baseline to month 12 and from baseline to month 24. A two-tailed p value <0.05 served as the threshold for statistical significance. SPSS version 13 and HLM version 6.03 were used to perform the analyses. The University Hospitals of Cleveland Institutional Review Board approved this study, which was conducted in accord with the Declaration of Helsinki principles.

For the group as a whole, change in PSD from baseline to completion of the intervention period (month 12) varied significantly with absolute change ranging from -1% to 21% (mean  $7.6\% \pm 5.5$ ); at month 24, absolute change in PSD rates ranged from -9% to 26% (mean  $6.9\% \pm 7.0$ ). Regarding practices' capacity for change, the full range of scores was used, with average combined effort scores falling in the mid-range (mean  $4.8 \pm 1.6$ ).

We observed comparable rates of PSD improvement in the first 12 months for both high and low change capacity practices (Figure) with little difference in rates adjusted for baseline PSD. After month 12, however, significantly higher PSD rates were noted in the group of ten practices with highest change capacity and this was sustained through month 24, compared with the ten practices having lowest change capacity (mean difference  $6.2\% \pm 2.0$ ;  $p=0.009$ ).

Using multiple assessments of outcomes at each intervention practice, random effects models demonstrated a 2.7% increment in PSD rates at month 12 (completion of the active intervention) for each unit increase in the practice change capacity score ( $p < 0.001$ ). This finding was similar at month 24 (3.1%;  $p < 0.001$ ). To explore differences in PSD rates related to the components of the combined score, a supplemental analysis demonstrated a strong association with instrumental change capacity (3.2%,  $p = 0.002$ ); a weaker association with motivation to change approached significance (2.1%,  $p = 0.09$ ). Finally, the model testing an interaction between the two components of the combined score demonstrated that a one-point increase was associated with a 1.1% and 1.3% increase in PSD rates from baseline at months 12 and 24, respectively (both  $p$  values  $< 0.001$ ).

These results yield two insights with potential value for the implementation of interventions to improve care. First, using qualitative estimates generated by our research team, we observe significant variation among practices in the level of effort required to motivate practices to undertake change and to assist in implementing tools and approaches to enhance preventive service delivery. We also demonstrate that variation in our estimates of practices' capacity to change correlates with differences in outcomes both at the end of an intervention and for at least 12 months thereafter. Taken together, these findings suggest that these simple measures of change capacity have utility in predicting intervention adoption, implementation, and maintenance and that variation in change capacity may potentially explain inconsistent results when efficacious practice-based interventions are applied in real world settings.[5]

It is not surprising that variation exists in practices' capacity to change. Previous work, for example, highlights the rich differences that characterize the health system for primary care and the many factors that contribute to its evolution in individual practice settings.[10,31-34] Staff with particular skills, interests, and personal motivations, for example, enter and leave practices regularly, while new challenges within the larger health care system and in society continually emerge and dissipate.[33] Acknowledging these differences across practices may be useful for translating efficacious interventions into "real world" practice settings in a variety of ways. In some cases, researchers seeking to enhance their success in improving care delivery have begun to perform initial practice assessments and to use insights from this process to guide the development of "tailored" interventions.[20,31,34-36] An assessment of practice capacity to change may also be useful in promoting greater efficiency or equity in the deployment of an intervention, depending on the goals of the research team. Practice assessments, for example, may allow for the targeting of limited resources to practices with the greatest capacity to change. If resources are less limited, it may be possible to reduce practice-level disparities in performance by targeting efforts toward those with the lowest capacity.

Although we do not propose a causal link between practice change capacity and intervention outcomes, our findings nonetheless suggest the potential value of interventions to enhance both motivational and instrumental change capacity. This is further supported by evidence of an association between preventive service delivery and an interaction between these two factors that is sustained over time. Recent work in commercial business settings now informs our understanding of ways in which motivation to change might be enhanced and

new work patterns might be more readily adopted and implemented.[37-40] One strategy, for example, emphasizes organizational self-reflection to first identify and later leverage existing strengths (e.g., resources, personal motivations, and relationships) to build motivation within the group to undertake a project with shared meaning. In contrast to traditional quality improvement efforts, participants begin with a positive focus of “what might be” rather than one that seeks to eliminate problems or to reduce gaps. Although its effectiveness in health care settings is currently under investigation, a recent report describes efforts to apply the self-reflective or “appreciative” approach to improve health care delivery in primary care.[41] Caution in focusing entirely on the assessment (and modification) of practice change capacity for the sake of greater intervention effectiveness is advisable, however. Previous comparative case studies of practices in STEP-UP shows the possibility for surprises and missed opportunities – some practices undertake little change despite high capacity, while others make large changes despite low capacity.[20]

Our results should be interpreted within the context of several limitations. Unmeasured practice-level factors may have confounded the associations we observed. Also, the sample of family medicine practices used may not have been representative of this diverse primary care specialty or of other primary care specialists (e.g., general internists, pediatricians) located elsewhere. Finally, we acknowledge that the qualitative estimates of practice change capacity are relatively coarse and may fail to include important dimensions of this construct. Given variation in practice change capacity and its relationship to intervention outcomes, however, our findings provide rationale for further refining the organizing framework that

guides our understanding of this practice feature and for developing measures that might be more useful in assessing it.

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**Competing Interests:** The authors declare that they have no competing interests.

**Note:** The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

**Authors' contributions:** DL, MR and KS conceived of the study and participated in its design and coordination. All authors participated in the drafting of the manuscript and read and approved it in its final form.

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## Figure legend

Service delivery rates during and after an intervention to improve preventive care at a subset of practices estimated to have the highest and lowest capacity for change. Each box and bracket represent the mean and standard deviation, respectively, for PSD rates at assessments conducted every six months with mean difference in PSD rate adjusted for baseline presented at bottom. The ten practices with the highest change capacity are indicated by the dashed line; the ten practices with lowest change capacity are indicated by the solid line.

Note: PSD=preventive service delivery; \* $p < 0.01$

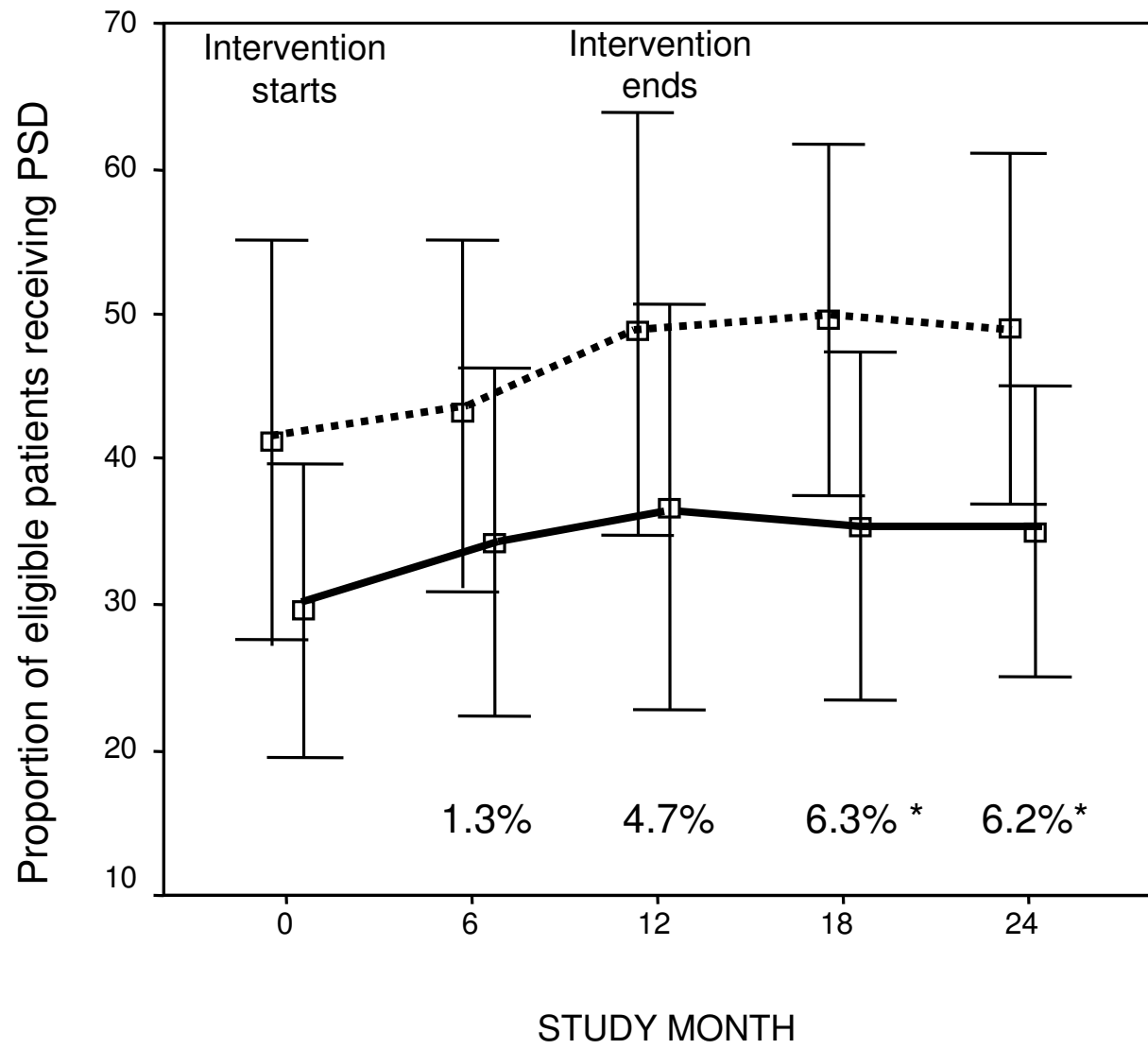


Figure 1

**Additional files provided with this submission:**

Additional file 1: change capacity and psd 11-7-07 changes in bold font.doc,  
134K

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