Two case studies of statistical approaches that simplify the VHA learning healthcare system

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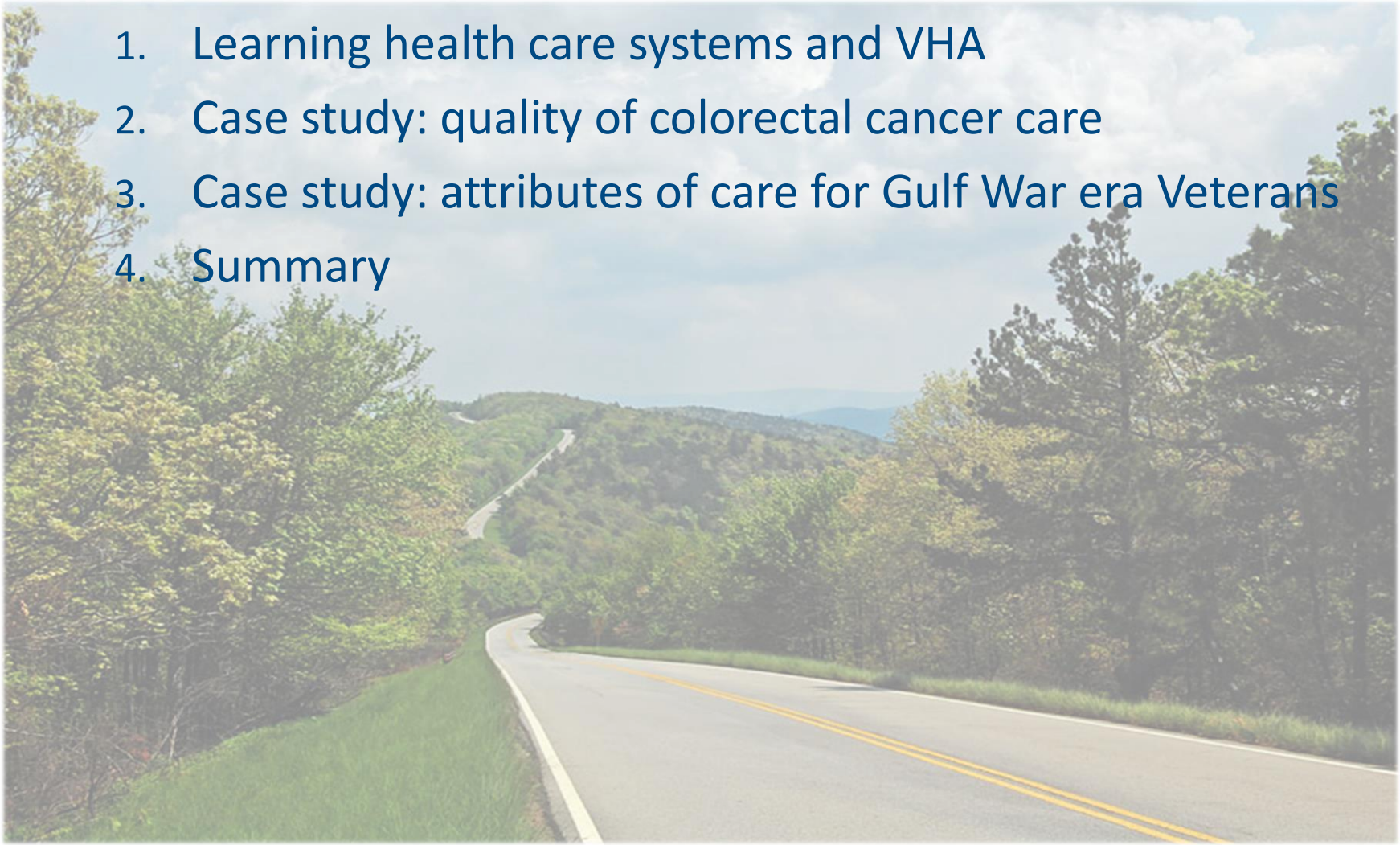
Overview

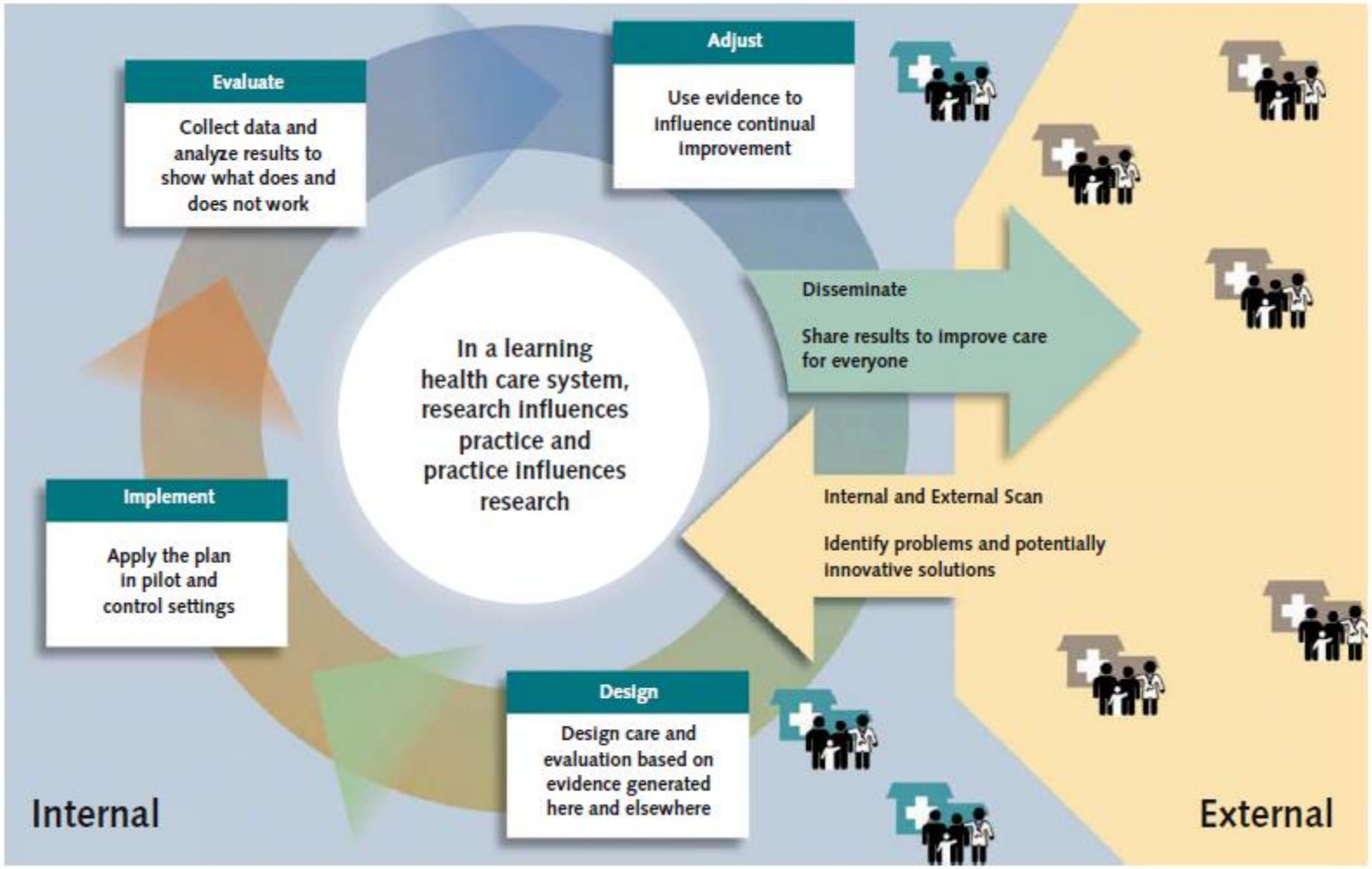
1. Learning health care systems and VHA
2. Case study: quality of colorectal cancer care
3. Case study: attributes of care for Gulf War era Veterans
4. Summary



Telimena Scenic Highway: image courtesy of www.panoramio.com

What is a learning healthcare system?

- Goal: “the best care, at lower cost” achieved by data-driven decision-making & evidence-based policy[1]
- Motivation: two imperatives identified by IOM[1]
  - *To manage the health care system’s ever-increasing complexity, and*
  - *To curb ever-escalating costs*
- Cyclical approach to continuous quality improvement
  - Plan – Do – Check/Study – Act
  - Formal evaluations of programs and policies
  - Multidisciplinary teams
  - Rapid dissemination & feedback
- Program implementation may carry design challenges[2]
- Retrospective analyses & monitoring efforts

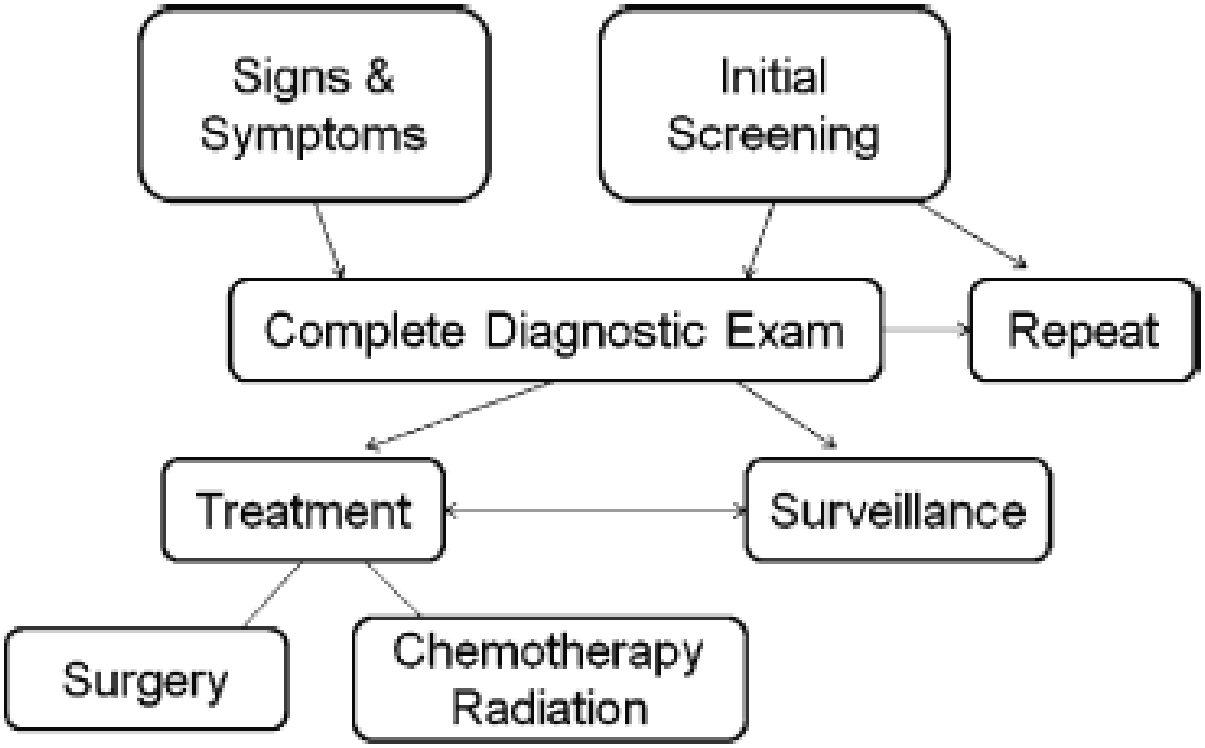


Greene SM, Reid RJ, Larson EB. *Ann Intern Med* 2012;157:207-210.

VA health care system

- Veterans Health Administration characteristics (FY2014)[3]
  - 9.1 million enrollees
  - 92.4 million outpatient visits
  - 707.4 inpatient admissions
- 168 Medical Centers and 1047 outpatient sites
- Over 60% of physicians have training components in VHA
- Veterans Info Systems and Technology Architecture (VistA)[4]
  - Electronic data processing since 1985
  - Computerized Patient Record System (GUI) since 1997 (decentralized)
  - Structured data -> Corporate Data Warehouse construction began 2006
- Performance reports for dozens of metrics & levels of service
- Real-time risk modeling for hospitalization & death

Case #1: Colorectal cancer care process



Jackson GL, Powell AA, Ordin DL, et al. *J Gen Intern Med* 2010;25(S1):38-43.

Three VA CRC QI projects

Project	Description	Outcome measures	Data collection
C4 **CRC Care Collaborative[5-8] (2005-2008)**	Screening and diagnosis (21 VAMCs) Goal: improve process of diagnosis and reduce time from positive screening to diagnostic evaluation	3 measures of process completion and timeliness	Automated CPRS record processing; Excel tracking tool
	Treatment improvement (28 VAMCs) Goal: improve guideline concordance and timeliness of CRC treatment and followup	25 quality indicators based on NCCN Guidelines for Colon and Rectal Cancers; 9 measures of timeliness of care	Standardized EMR abstraction tool to support C4 treatment collaborative; ~230 data elements; real-time reporting
EPRP **External Peer Review Program[9] (2009-2010)**	Retrospective EMR abstraction of 2492 patients with CRC diagnosed 10/2003-3/2006 Goal: assess quality of nonmetastatic CRC care in VA	6 indicators based on NCCN Guidelines; 3 indicators of timeliness of care	Administrative data extracts; vital status data extracts; medical record abstractions
C-CARES **Cancer Care Assessment and Responsive Evaluation Studies[10-13] (2009)**	Survey of VA patients diagnosed with CRC in 2008 Goal: assess symptoms, symptom management, and experiences with health care system	Domains: decision-making, health status, symptoms, barriers to care, care coordination, NCI PROMIS measures	VACCR extract; patient survey

C4 data collection

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staff. Central to the collaborative was the use of data to target improvement activities and monitor changes. These data were collected using the CCQMS.[4,5]

Also central to collaboratives is the use of data to target improvement activities and monitor the impact of changes.[26] However, few data systems in the US allow for the efficient measurement of health care quality across the continuum of screening, diagnosis, treatment and surveillance.[27,28] The C4 collaboratives utilized three different data collection systems to measure quality. These included: (1) baseline chart extraction to establish pre-collaborative rates of time from a positive FOBT result to receiving a diagnostic colonoscopy; (2) a Microsoft Excel-based self-measurement tool for ongoing facility measurement of time from FOBT result to colonoscopy; (3) a centralized computer medical record abstraction system to determine the level of guideline concordance and timeliness of CRC care.

C4 analysis methods and reported statistics

Project	Outcome measures	Analysis methods	Reported statistics	Impact
C4 **CRC Care Collaborative (2005-2008)**	3 measures of process completion and timeliness	Mean, SD Percentage (%) χ^2 test t-test (days) logistic regression ANOVA GEEs	Frequency Percentage (%) Mean, SD ORs & CIs p-value	Performance monitor; Improvement Guide; national calls & listserv; regional collaboratives; expansion of clinical space; increased non-VA referrals
	25 quality indicators based on NCCN Guidelines for Colon and Rectal Cancers; 9 measures of timeliness of care	Percentage (%) Median (days) Mean, SD	Percentage (%) Frequency Median (days) Mean, SD	Clinical note & reminder templates; measurement systems; patient education & support materials; survivorship care planning

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Specific products that came from the CRC diagnosis and treatment improvement collaborative include: (1) models and tools for improving cancer diagnosis and treatment (e.g., note and reminder templates; comprehensive CRC Diagnosis Improvement Guide); (2) measurement systems; (3) models for developing surveys to identify best practices and barriers;[31] (4) protocols for bringing together partnerships to develop collaboratives; (5) an infrastructure for sharing insight (e.g., QI listservs and resource websites).

Clinical note & reminder templates; measurement systems; patient education & support materials; survivorship care planning

EPRP analysis methods and reported stats

Project	Outcome measures	Analysis methods	Reported statistics	Impact
EPRP **External Peer Review Program** **(2009-2010)**	6 indicators based on NCCN Guidelines; 3 indicators of timeliness of care	Percentage (%) Mean, SD Median, IQR Log-rank tests Wilcoxon tests Cox PH models χ^2 tests Logistic regressions Bonferroni adjustment	Percentage (%) Frequency Mean, SD Median, IQR, min-max Hazard ratios & CIs ORs & CIs p-values	Additional analyses and new studies to understand gaps identified in lung & prostate cancer screening processes

C-CARES analysis methods and reported stats

Project	Outcome measures	Analysis methods	Reported statistics	Impact
C-CARES **Cancer Care Assessment and Responsive Evaluation Studies (2009)**	Patient survey of symptoms, symptom management, and experiences with health care system	Percentage (%) Mean, SD Median, IQR Linear regressions MCMC imputations Logistic regressions	Percentage (%) Frequency Mean, SD Median, IQR, min-max Model coefficients ORs & CIs p-values	Demonstrates ability to collect PROs from cancer patients across healthcare system

Case #2: Care of Gulf War era Veterans

- 700,000 members of US Armed Forces deployed to SW Asia in support of 1990-1991 Gulf War
- Compared with those serving elsewhere, deployed Gulf War era Veterans demonstrate:
  - Increased prevalence of medically unexplained symptomatology
  - Equivalent or lower disease-related mortality
  - Mixed patterns of hospitalization and overall utilization
- Most research on diagnoses and utilization was performed in first decade after Gulf War, and needs to be updated
- Highly politicized and fragmented research environment
- VA post-deployment integrated care initiative (PDICI) and other activities to improve care for Gulf War and post-9/11 Veterans

VA HSR&D Request for Applications

HX-14-011: Targeted Solicitation for Service-Directed Research on HSR on the Care of Gulf War Veterans

VA is interested in evaluating patient satisfaction and whether the models of care currently in use should be implemented more widely or modified to be more responsive to patient needs. VA would like to evaluate specific clinical treatments and determine if health care for Gulf War Veterans varies among VA Medical Centers or from one region to another.

Many Veterans receiving care from VA also receive care outside the VA health system. Relatively little is known about the care that Gulf War Veterans may have received or are receiving outside the VA. Although getting reliable data on outside care is challenging, studies are encouraged that can provide a more comprehensive look at the care sought and received by Gulf War Veterans, including from VA and without. Such studies may provide insights on unmet needs for Veterans that the VA health care system could address.

more than 20,000 in-patient admissions. Although an increase in multisymptom illnesses has been documented for Gulf War Veterans, relatively little is known what kind of care Gulf War Veterans have been receiving from the VA and from outside the VA for multisymptom illnesses and for other diagnosed and unusual health conditions they have. Of particular interest is how care for Gulf War Veterans -- including intensity of care, sites of care (e.g., primary care or specialty care), referral patterns, and services provided -- may vary by facility, region, or time period. Such variation may provide insight into: how barriers to care vary by time and location; whether care is shaped by inconsistent knowledge across VA about the health system of issues facing Gulf War Veterans; and how medical complaints and treatment patterns evolve over time and through the course of different treatments. Insights from observational studies of care can help

Project Overview

- Based in 90,000-Veteran stratified random sample
  - Administrative (VHA) health data available for more than 50k
- Quantitative and qualitative analyses
  - Quantitative: uses data from administrative sources to answer questions about demographics and (for VHA users) clinical/utilization characteristics
  - Quantitative -> Qualitative: telephone survey and focus groups to learn about factors influencing choice of healthcare providers, perceived healthcare needs, and important outcomes of care
- Interdisciplinary project team represents multiple areas of expertise and strong partnership between CSP & HSRD
- Advisory and Implementation Committee of senior clinicians and implementation scientists

Domains of interest

patient satisfaction

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Domains of interest

ADMINISTRATIVE DATA

- care sought and received … from VA
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- determine if health care … varies among VA Medical Centers or from one region to another
- how care … may vary by facility, region, or time period
- unmet needs

PATIENT PERSPECTIVES

- care sought and received … including from VA and without
- determine if health care … varies among VA Medical Centers or from one region to another
- how care … may vary by facility, region, or time period
- unmet needs
- patient satisfaction

Questions for administrative data

- How much care are Gulf War era Veterans receiving?
- What types of providers are being used? (physician, nurse, PA, NP, social worker, clinical pharmacist, psychologist)
- What types of visits are being used? (one-on-one clinic visit, telephone visit, group visit, RN visit, secure messaging use)
- Are age-appropriate screenings occurring?
- Which extended or non-traditional services are used? (PT/RT, acupuncture, chiropractic, chaplain)
- What are the estimated costs? (inpatient, outpatient & rx, total)
- How do these quantities vary by patient-level and structural factors?

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- How do these qu factors?

Number of visits per year

# of provider types used

% contribution of each provider type

% contribution of each visit type

Age-appropriate screening completion (Y/N)

Use of non-traditional services (Y/N)

Annual costs

EFFECTIVE DATA VISUALIZATION IS KEY

Learning directly from patient experiences

- Deeper & contextual information regarding
  - Access to care
  - Preferred care delivery models
  - Variations in care delivery by VA and non-VA providers
  - Satisfaction with VA and non-VA care
  - Goals of care
- Two-phase sequential quantitatively driven mixed method design
  - Begin with telephone survey of usage/costs of care types, experiences with care sources, and prioritization of common goals of care
  - Conclude with focus groups to learn more about experiences with traditional and non-traditional forms of care through VA and non-VA providers
- Quantitative analysis: simple summaries and regressions
- Qualitative analysis: directed approach using *a priori* coding scheme developed by research team

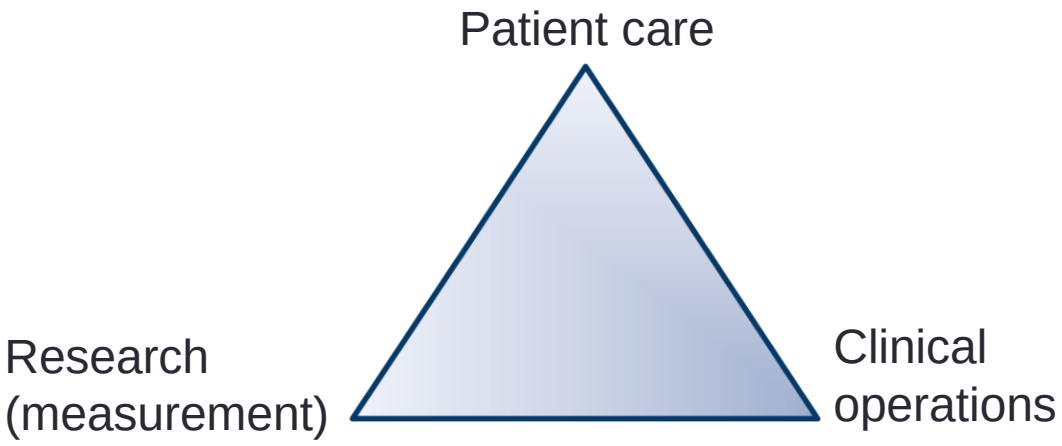
Content areas might include …

- VA users and dual-users:
  - Why did you enroll in VA healthcare?
  - Which of your healthcare needs are served by VA?
  - Do you use non-traditional forms of care, and if so, where?
  - What is your satisfaction with VA care?
- Dual users
  - To what extent do you use non-VA care?
  - What affects your decisions about providers of different types of care?
  - How do you maintain informational and care management continuity?
  - What is your satisfaction with VA and non-VA care?
- Non-users:
  - What did you experience in trying to enroll for VA care?
  - If you have never tried to enroll for VA care, why?
  - What types of healthcare do you seek?
  - What advantages and disadvantages do you perceive of using VA care?

Critical components

- Partnerships
  - Patients: the beginning and end
  - Clinical operations: the machinery
- Dissemination and implementation
  - Webinars
  - Internal reports
  - Continual monitoring & feedback
  - Peer-reviewed literature

Testable process improvements




REVISE.
RESUBMIT.
REVISE.
RESUBMIT.
NEW EDITOR.
NEW REVIEWER.
REVISE.
RESUBMIT.
13 MONTHS.
SILENCE.
YOU BETTER BE PLEASED
TO INFORM ME.

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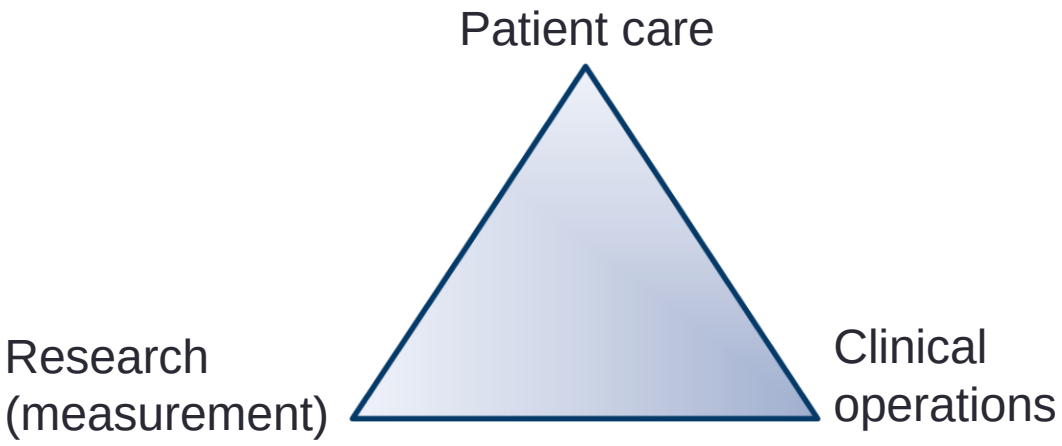

Which vehicle is right for your journey?

Image courtesy of www.thesportscarguys.com

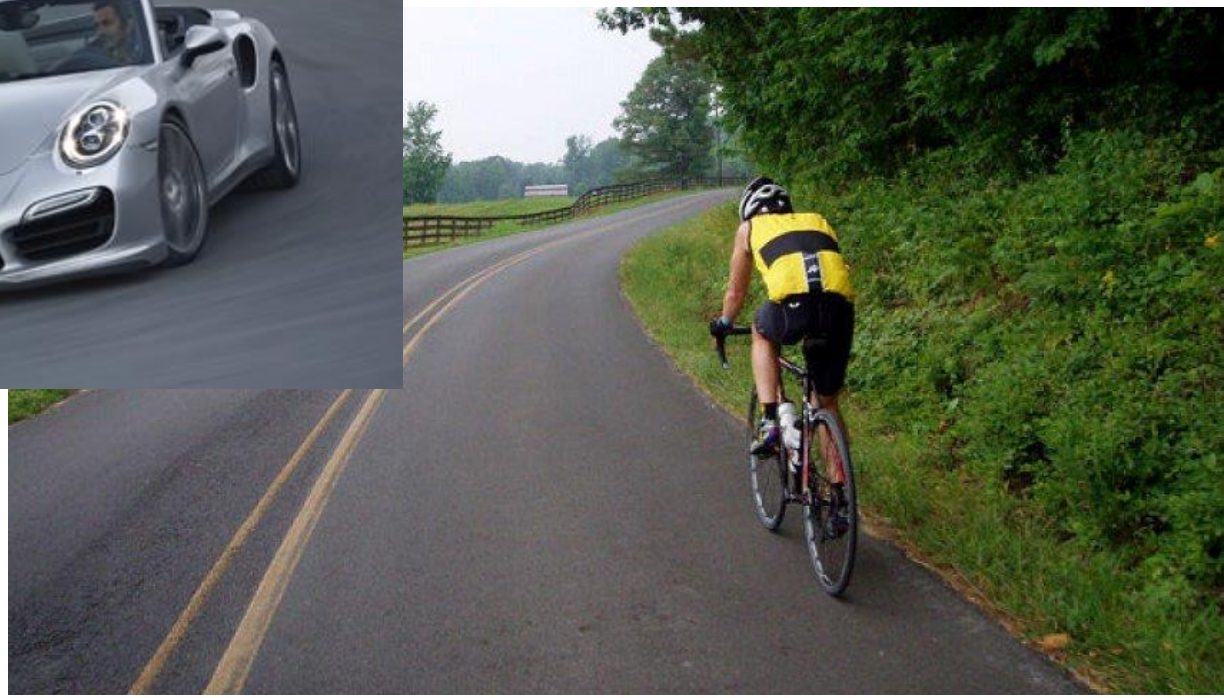

Image courtesy of www.outsideonline.com

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- Dawn T Provenzale, MD
- Kellie J Sims, PhD
- Leah L Zullig, PhD

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