



# Educating Clinicians about Precision Public Health What is Effective?



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OAK RIDGE  
INSTITUTE  
FOR SCIENCE  
AND EDUCATION



# Learning objectives

- Discuss needs and gaps in genomics education for clinicians
- Discuss evidence-based approaches to designing and developing adult education
- Identify strategies to engage learners effectively

A woman with grey hair is shown in profile, looking out a window. The background is slightly blurred, showing another person and the window frame. A teal circle is visible in the top left corner of the image.

# WE ARE

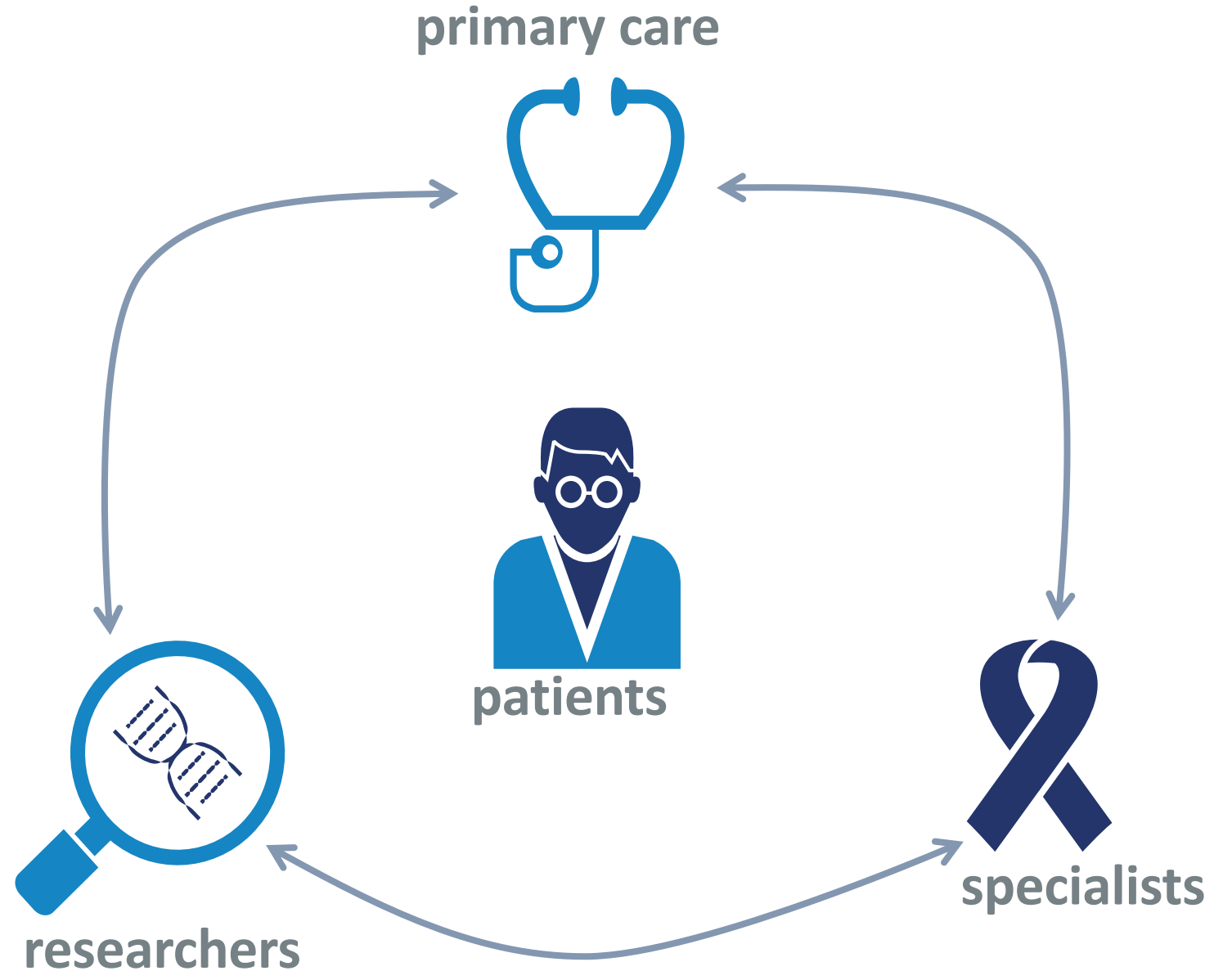
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dedicated to  
improving human  
health and providing  
personalized  
therapies to help  
treat, cure and  
prevent disease



# JAX CLINICAL EDUCATION

Empower healthcare professionals to integrate genomics into clinical practice through community collaboration



What education role(s) do you have?



# Outline

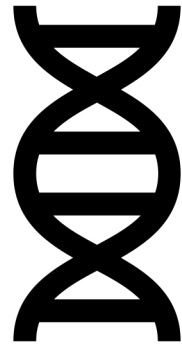
- Defining the problem
- Evidence based education
- Effectiveness & lessons learned
- The solution

# Defining the Problem



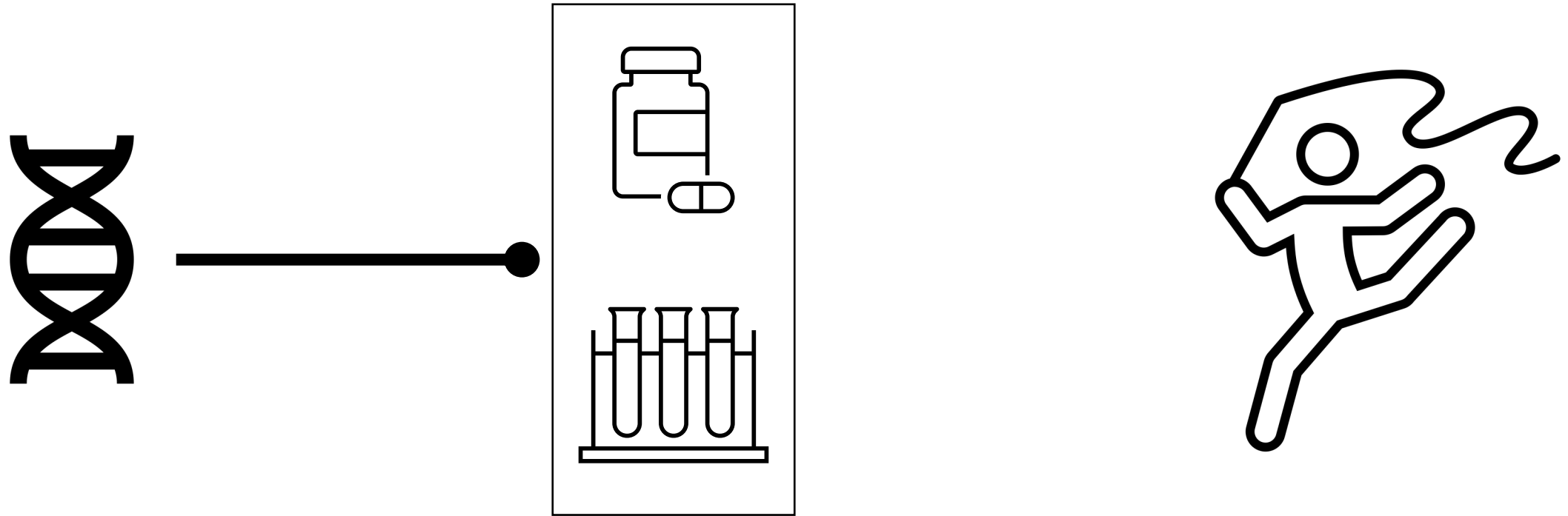
GOAL: Use genetics information to improve population health

Tier 1 conditions  
Clinical guidelines  
FDA labels

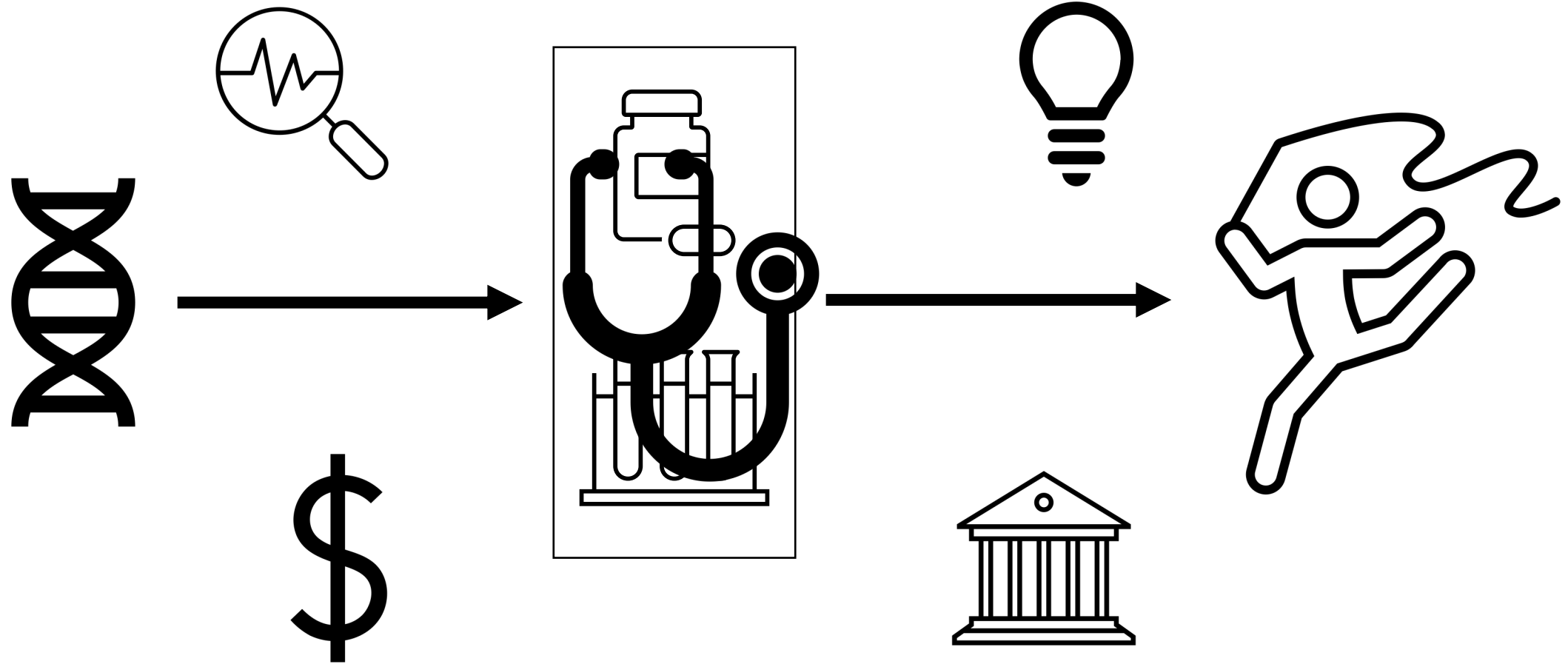




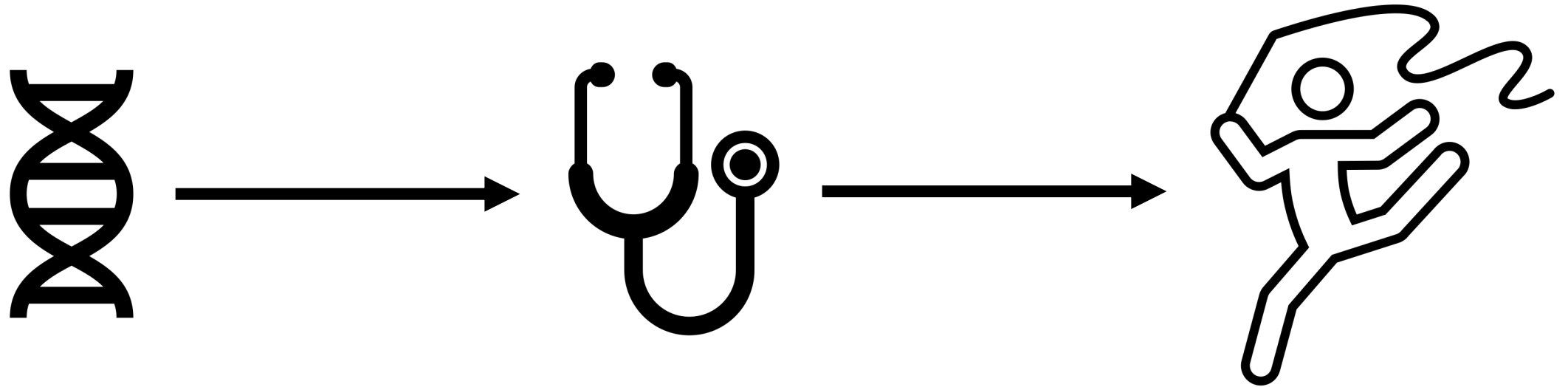
PROBLEM: Guidelines are not being implemented equably across the population



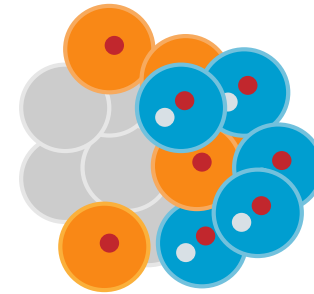
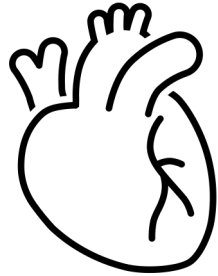
Clinicians are a key component of guideline implementation



Non-genetics clinicians need to help translate genetics into patient care



# Clinicians lack confidence in understanding interpreting genetic information



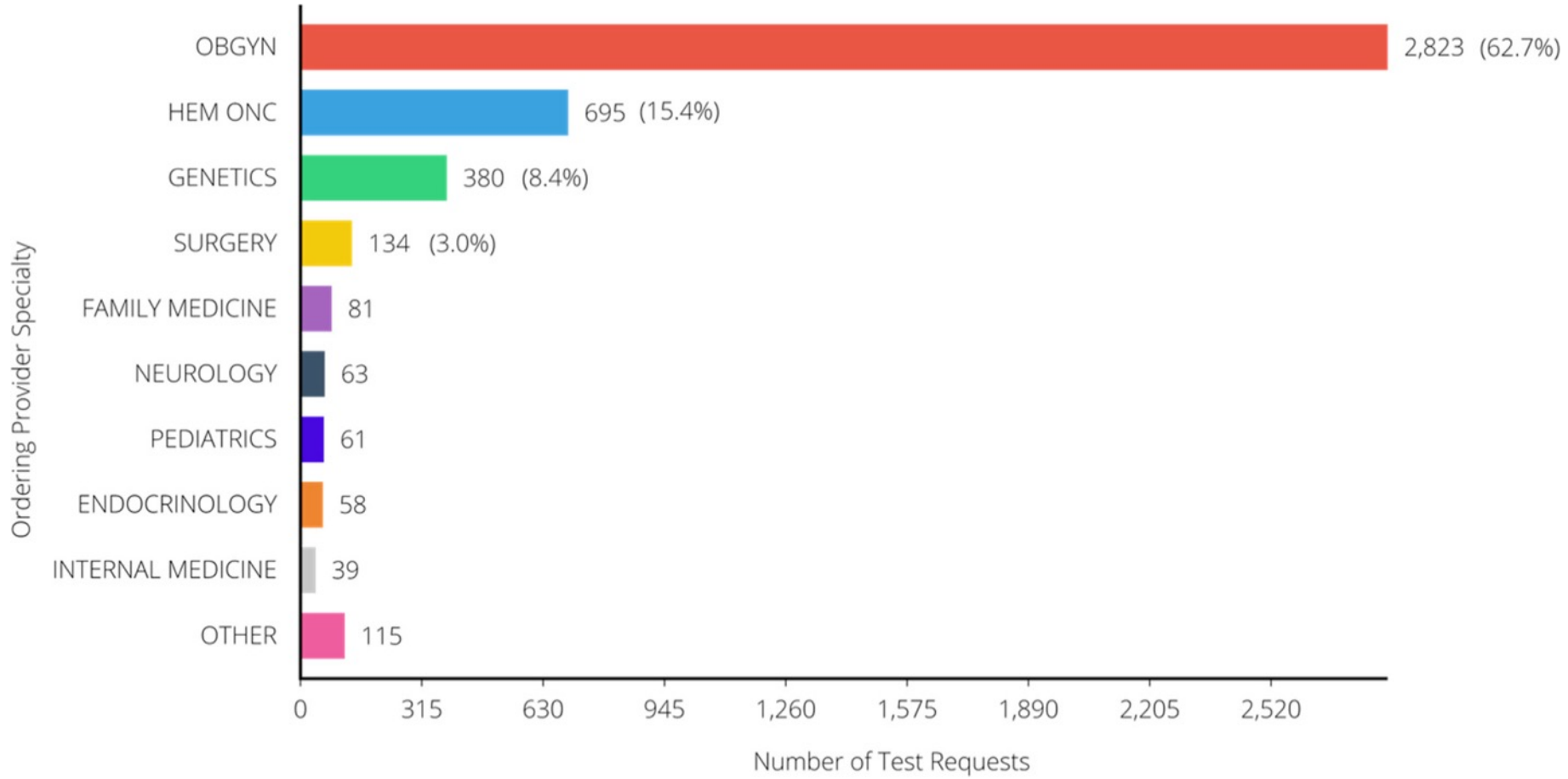
Baiguz 2022; Dotters-Katz 2019; Lemke 2020;  
Farmer 2019; Helm 2016

# Which clinical specialty orders the most genetic tests?

- Genetics
- Oncology
- Neurology
- Primary care
- Ob/gyn



# Reproductive and cancer-related testing are most ordered

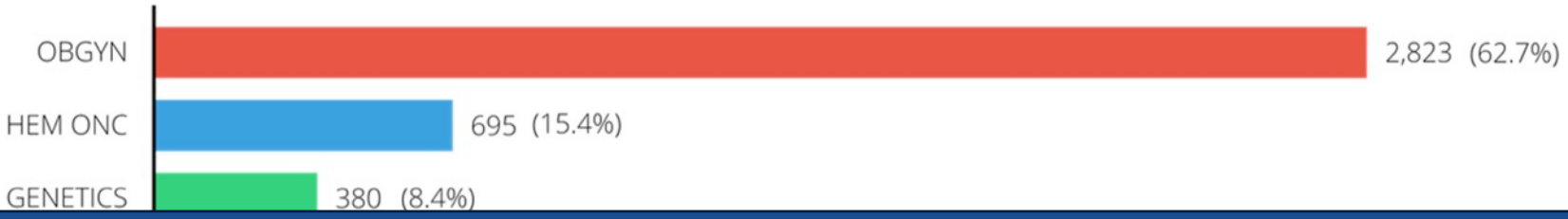


Bajguz et al 2022  
PMID 34939253

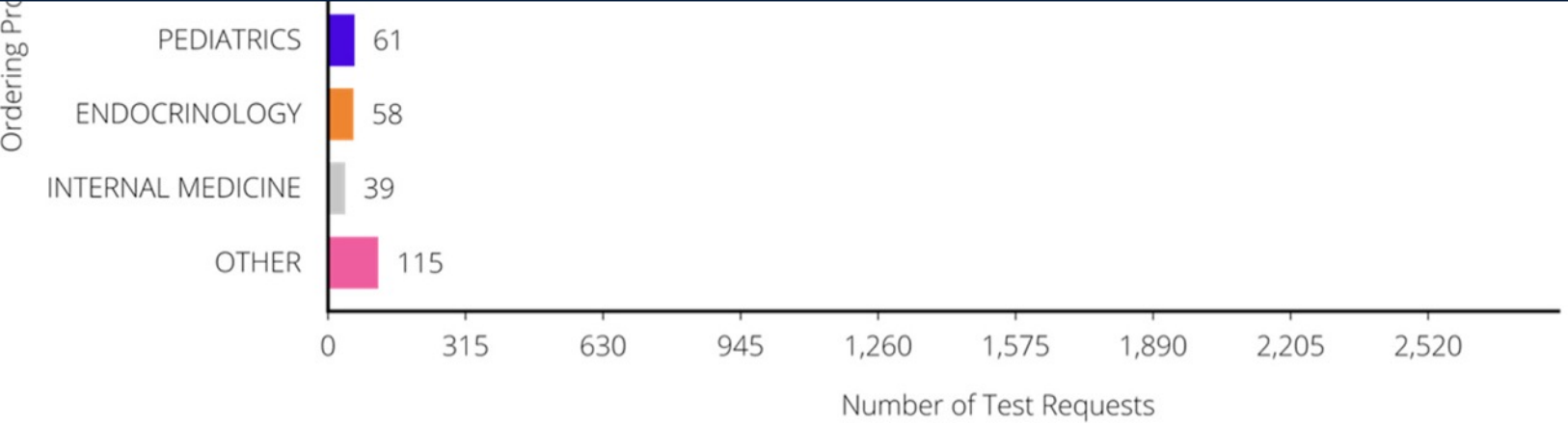




# Reproductive and cancer-related testing are most ordered



>90% of genetic tests ordered by non-genetics clinicians

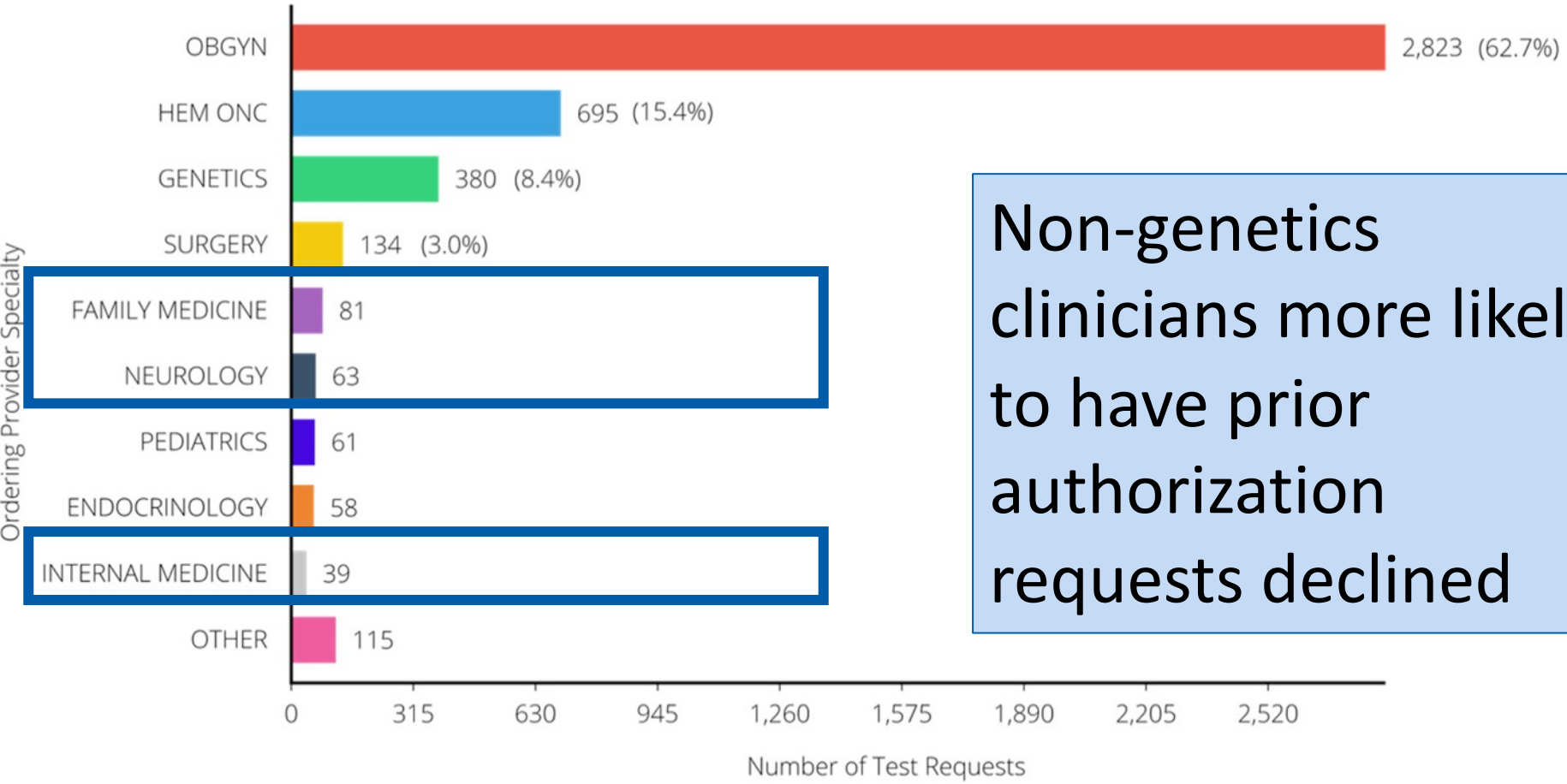


Bajguz et al 2022  
PMID 34939253





# Reproductive and cancer-related testing are most ordered



Non-genetics clinicians more likely to have prior authorization requests declined

Bajguz et al 2022  
PMID 34939253



# Misinterpretation of genetic test results can lead to undesirable outcomes

- Unnecessary surgery
- Avoidable late diagnosis
- Lost opportunity for early screening
- Excess testing



Moving from current to best practice is multi-disciplinary



POLICY



COMMUNICATION



EDUCATION

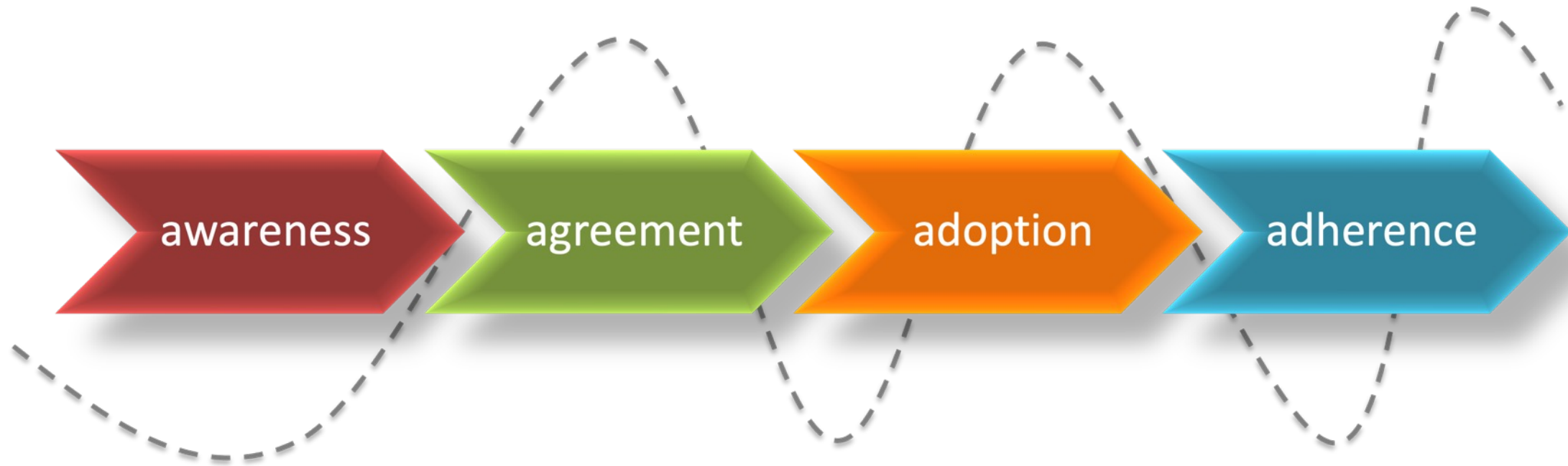


LOGISTICS/  
INFRASTRUCTURE

# Evidence-based Education



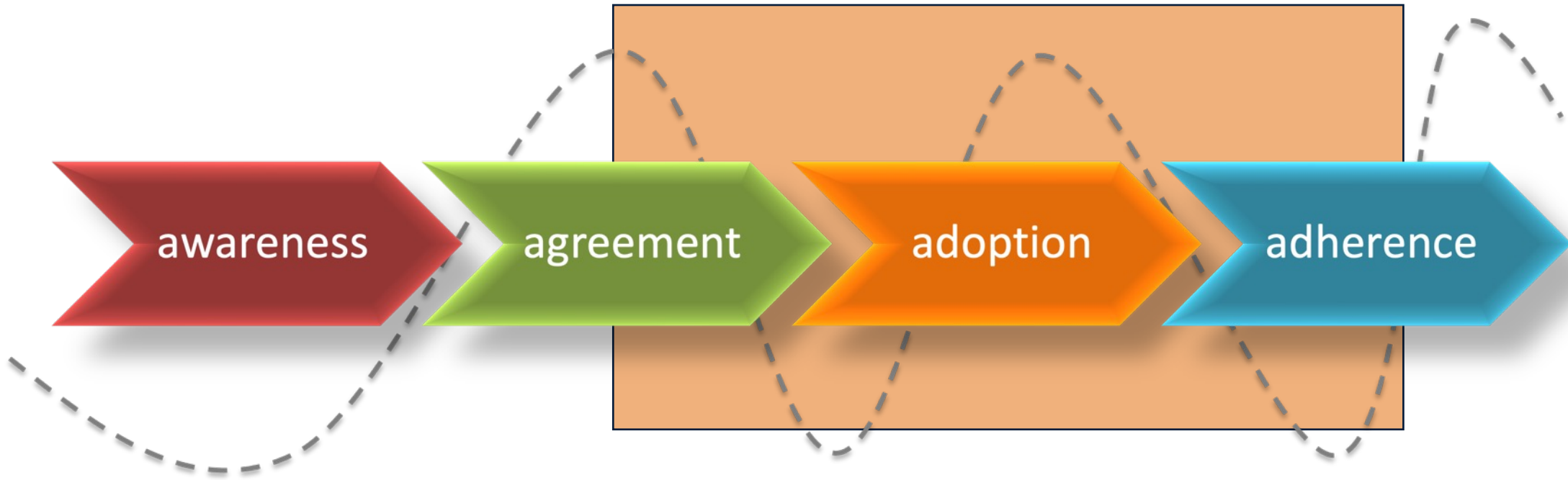
■ Translation of new knowledge into patient care is a process



Pathman 1996 PMID: 8792778



Education is best suited for agreement to adherence



Not all education is equal in its effectiveness



Evidence-based  
approach increases  
effectiveness



Analysis



Design



Development



Implementation



Evaluation

# Analysis = Needs Assessment

What does the target audience need to be doing differently?  
Why aren't they doing it?

What sources of data can we use to understand clinicians' needs?

# Direct and indirect sources of data reveal needs





# Clinician needs and constraints are similar over time

- Variable interest in and attitudes about genetics
- Focus on evidence-based applications
- Genetics related tasks vary by setting
- Lack time for everything
- Competing priorities
- Interest in online education, but may need dedicated time

# Design & Development

What are the tasks that the audience needs to perform?  
What knowledge and skills do they need to accomplish those tasks?

# What topics should you prioritize for clinicians?

- Biological pathways of disease
- Clinical applications of genetic testing
- Evidence supporting genetic testing
- Testing methodology
- Assessing family history

# Keep education relevant and focused

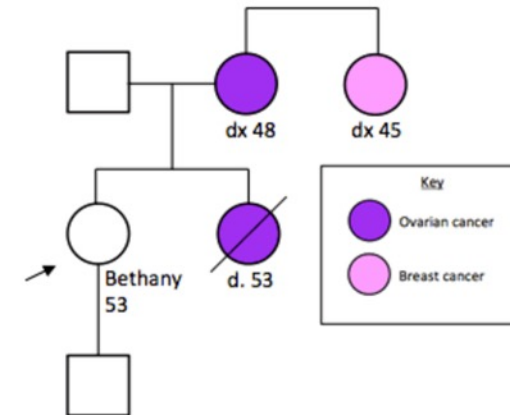
**NCCN** National Comprehensive Cancer Network® **NCCN Guidelines Version 1.2024 Hereditary Cancer Testing Criteria**

**TESTING CRITERIA FOR HIGH-PENETRANCE BREAST CANCER SUSCEPTIBILITY GENES**  
(Specifically *BRCA1*, *BRCA2*, *CDH1*, *PALB2*, *PTEN*, *STK11*, and *TP53*. See [GENE-A](#)<sup>a,f,g,h,i</sup>)

**Testing is clinically indicated in the following scenarios:**

- See General Testing Criteria on [CRIT-1](#).
- Personal history of breast cancer with specific features:
  - ▶ ≤50 y
  - ▶ Any age:
    - ◊ Treatment indications
      - To aid in systemic treatment decisions using PARP inhibitors for breast cancer in the metastatic setting<sup>j,k</sup> ([NCCN Guidelines for Breast Cancer](#))
      - To aid in adjuvant treatment decisions with olaparib for high-risk,<sup>l</sup> HER2-negative breast cancer<sup>l</sup>
    - ◊ Pathology/histology
      - Triple-negative breast cancer
      - Multiple primary breast cancers (synchronous or metachronous)<sup>m</sup>
      - Lobular breast cancer with personal or family history of diffuse gastric cancer [NCCN Guidelines for Gastric Cancer](#)
    - ◊ Male breast cancer
    - ◊ Ancestry: Ashkenazi Jewish ancestry
  - ▶ Any age (continued):
    - ◊ Family history<sup>n</sup>
      - ≥1 close blood relative<sup>o</sup> with ANY:
        - breast cancer at age ≤50
        - male breast cancer
        - ovarian cancer
        - pancreatic cancer
        - prostate cancer with metastatic,<sup>p</sup> or high- or very-high-risk group (Initial Risk Stratification and Staging Workup in [NCCN Guidelines for Prostate Cancer](#))
      - ≥3 diagnoses of breast and/or prostate cancer (any grade) on the same side of the family including the patient with breast cancer

Is Bethany a candidate for genetic testing?



# NEED to know is not the same as NICE to know

## Actionable

Accurate, but not complete



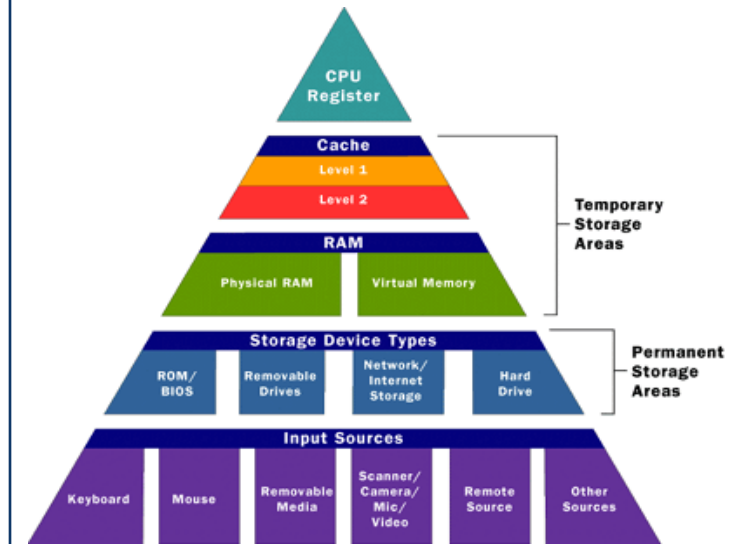
Save (CTRL-S)



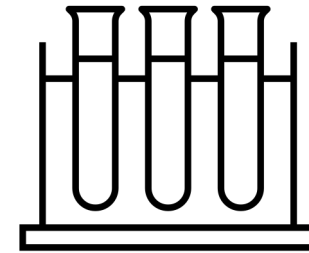
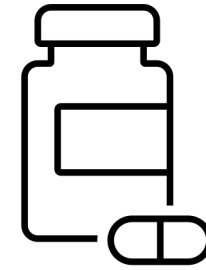
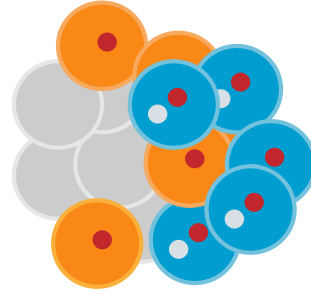
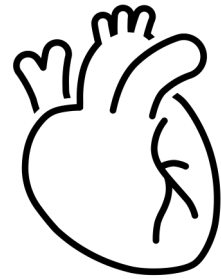
Vs.

## Expert

Accurate, complete



# Focus on evidence-based applications



# Delivery (also Design & Development)

What is the most effective way for the target audience to learn the skill?

# What is the best approach to educate clinicians on how to interpret genetic tests?

- Conferences
- Webinars
- Online courses
- Handouts
- Small group discussions



# **One Size Does Not Fit All**

**Handouts**

**Workshop**

**Didactic**

**Audience response**

**Peer learning**

**Case-based learning**

**Self-directed CME**










**Chart audit and feedback**

**EHR reminders/alerts**




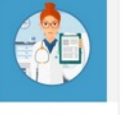







# Case-based online courses focus on fundamental skills

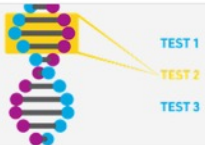

## Hereditary Cancer

 <p><b>Collecting Family History with Sufficient Detail (CME)</b> Practice asking the right questions to elicit enough information to assess family history disease risk.  FREE</p>	 <p><b>Identifying Red Flags and Patterns that Increase Cancer Risk (CME)</b> Practice identifying genetic risk factors for cancer.  FREE</p>	 <p><b>Categorizing Cancer Risk (CME)</b> Analyze family histories and classify the patients' risk into average, increased (or moderate), or high risk for cancer.  FREE</p>
 <p><b>Using Family History to Inform Management (CME)</b> Practice determining appropriate management for a patient based on family history risk stratification.  FREE</p>	 <p><b>Cancer Genetic Testing Process (CME)</b> Familiarize yourself with the steps involved in ordering genetic testing for hereditary cancer risk.  FREE</p>	 <p><b>Cancer Pretest Decisions and Counseling (CME)</b> Practice deciding when and if genetic testing is appropriate, given a patient's clinical and personal context.  FREE</p>
 <p><b>Interpreting Cancer Genetic Testing Results (CME)</b> Practice interpreting cancer genetic testing results and reports within a patient-specific context.  FREE</p>	 <p><b>Genetic Testing for Breast Cancer Risk (CME)</b> Practice evaluating how well a particular genetic test assesses breast cancer risk and the potential impact of testing on patient outcomes.  FREE</p>	 <p><b>Identifying and Managing Lynch Syndrome (CME)</b> Practice recognizing Lynch syndrome (LS) red flags, communicating about the LS testing process, and incorporating increased screening.  FREE</p>

## Precision Medicine

 <p><b>Exploring Cancer Biomarker Testing (CME)</b> Learn about benefits, limitations, and challenges of using biomarker testing to inform treatment decisions for cancer patients.  FREE</p>	 <p><b>Identifying Red Flags and Patterns for Hereditary Cardiovascular Disease (CME)</b> Practice identifying genetic risk factors for cardiac disease.  FREE</p>	 <p><b>Genomic Testing for the Healthy Individual (CME)</b> Practice identifying patient motivations for genomic testing and assessing if a genomic test is a good fit.  FREE</p>	 <p><b>Exome Testing for Diagnosis (CME)</b> Practice identifying patients who may benefit from exome testing and communicating with patients, families, and genetic experts about testing.  FREE</p>
 <p><b>Exploring Pharmacogenomic Testing (CME)</b> Learn how to determine whether pharmacogenomic testing is appropriate for the patient and practice applying test results to patient management.  FREE</p>	 <p><b>Genetic Testing in Pediatric Neurology (CME)</b> Practice identifying when further value might be added by a molecular diagnosis and choosing the best genetic tests for the clinical context.  FREE</p>	 <p><b>Interpreting Results from Somatic Cancer Panels (CME)</b> Practice interpreting results from large panel somatic testing within a patient-specific context.  FREE</p>	 <p><b>Carrier Screening (CME)</b> Learn about the benefits and limitations of carrier screening in prenatal care.  FREE</p>
 <p><b>Prenatal Cell-Free DNA Screening (CME)</b> Learn about the benefits and limitations of cell-free DNA screening in prenatal care for the purpose of facilitating patient decision-making.  FREE</p>			

## Precision Oncology

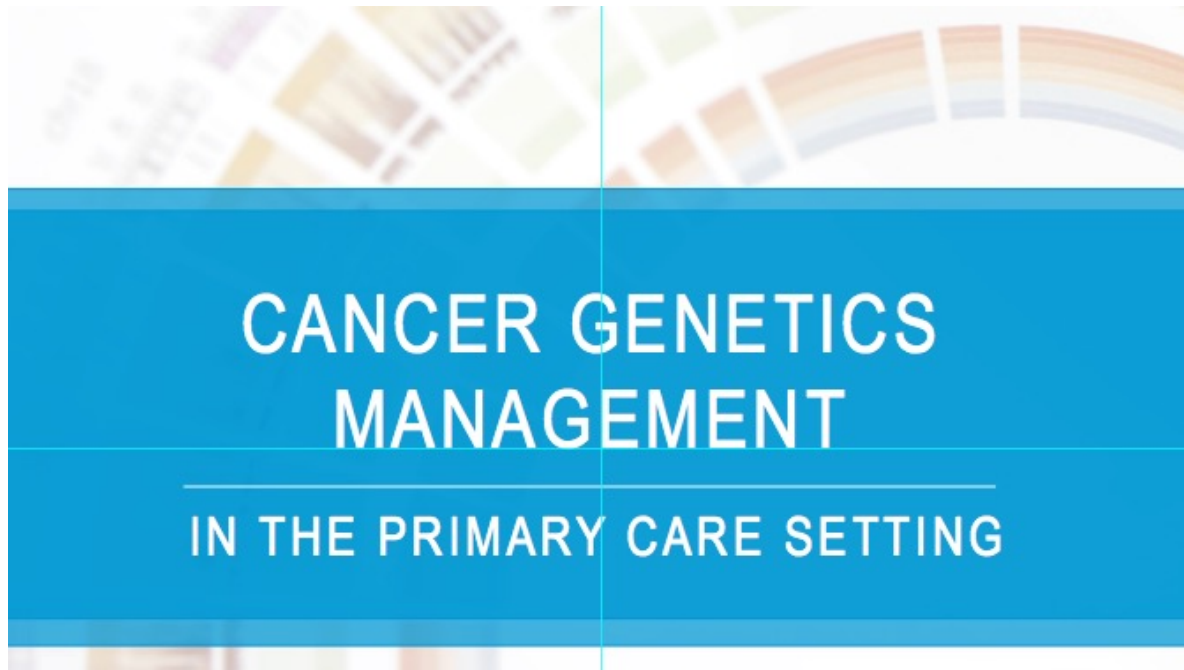
 <p><b>Choosing the Best Genomic Tumor Test (CME)</b> Identify the benefits and limitations of genomic tumor test options.  FREE</p>
 <p><b>Indications for Germline Testing After Genomic Tumor Testing (CME)</b> Interpret test results to identify patients with hereditary risks.  FREE</p>



education.clinical.jax.org



Interactive workshops allow for protected time and feedback







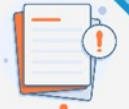
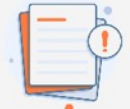

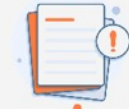




# Focused resources support clinical decision making


## S2108CD Education Resources

Educational resources to help you implement information from biomarker testing into patient care



 <p><b>Select the right biomarker test</b></p> <p>Resources to help identify which type of biomarker test is most appropriate for a patient and to answer specific clinical questions.</p>	 <p><b>Interpret biomarker test results</b></p> <p>Resources that address benefits and limitations of different biomarker tests and help the clinician understand the information provided on result reports.</p>	 <p><b>Make treatment decisions using biomarker test results</b></p> <p>Resources to help a clinician understand the evidence and prioritize available treatment and management options based on genomic variants and other biomarkers identified through biomarker testing.</p>	 <p><b>Communicate with patients about biomarker tests</b></p> <p>Resources to support the clinician discussing the utility, benefits, and limitations of different types of biomarker tests and shared decision making around treatment options based on results from testing.</p>
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 <p><b>Assessing Genomic Biomarkers for Targeted Therapy Options</b></p> <p>Provides a framework for assessing the evidence supporting targeted treatment options.</p> <p>FREE</p>	 <p><b>Demystifying a Genomic Tumor Test Report to Inform Patient Care</b></p> <p>Identifies and defines key components of a genomic tumor test report using a generalized approach and design.</p> <p>FREE</p>	 <p><b>Nomenclature in Genomic Test Reports</b></p> <p>Explains common nomenclature laboratories used to identify variants.</p> <p>FREE</p>	 <p><b>Cancer Susceptibility Genes</b></p> <p>Lists genes that are associated with hereditary cancer and should be considered for referral when identified on a tumor test report.</p> <p>FREE</p>
 <p><b>PD-L1 Testing: Ordering &amp; Interpreting</b></p> <p>Discusses which patients may benefit from PD-L1 testing and how to select and interpret tests for patients with different cancer types.</p> <p>FREE</p>	 <p><b>Hereditary Cancer Testing Results Interpretation</b></p> <p>Outlines how to interpret results from cancer genetic testing in different patient situations.</p> <p>FREE</p>	 <p><b>Important Considerations for Germline Genetic Testing in Cancer Patients</b></p> <p>Identifies genetic red flags to inform personal and family history risk assessment and genomic tumor test results that are suggestive of a germline variant.</p> <p>FREE</p>	 <p><b>Indications for Germline Testing After Genomic Tumor Testing (CME)</b></p> <p>Interpret test results to identify patients with hereditary risks.</p> <p>FREE</p>



**Multidisciplinary Expert Insights: Navigating DNA Damage Repair Deficiency in Cancer Patient Management**

A multidisciplinary panel of clinical experts discusses a case that involves DNA repair deficiency and PARP inhibitors, including BRCA1/2 and other biomarkers, and how to make informed decisions regarding the best path forward for the patient.

FREE



More on MCGI  
PMID: 37163717



# Effectiveness & Lessons Learned



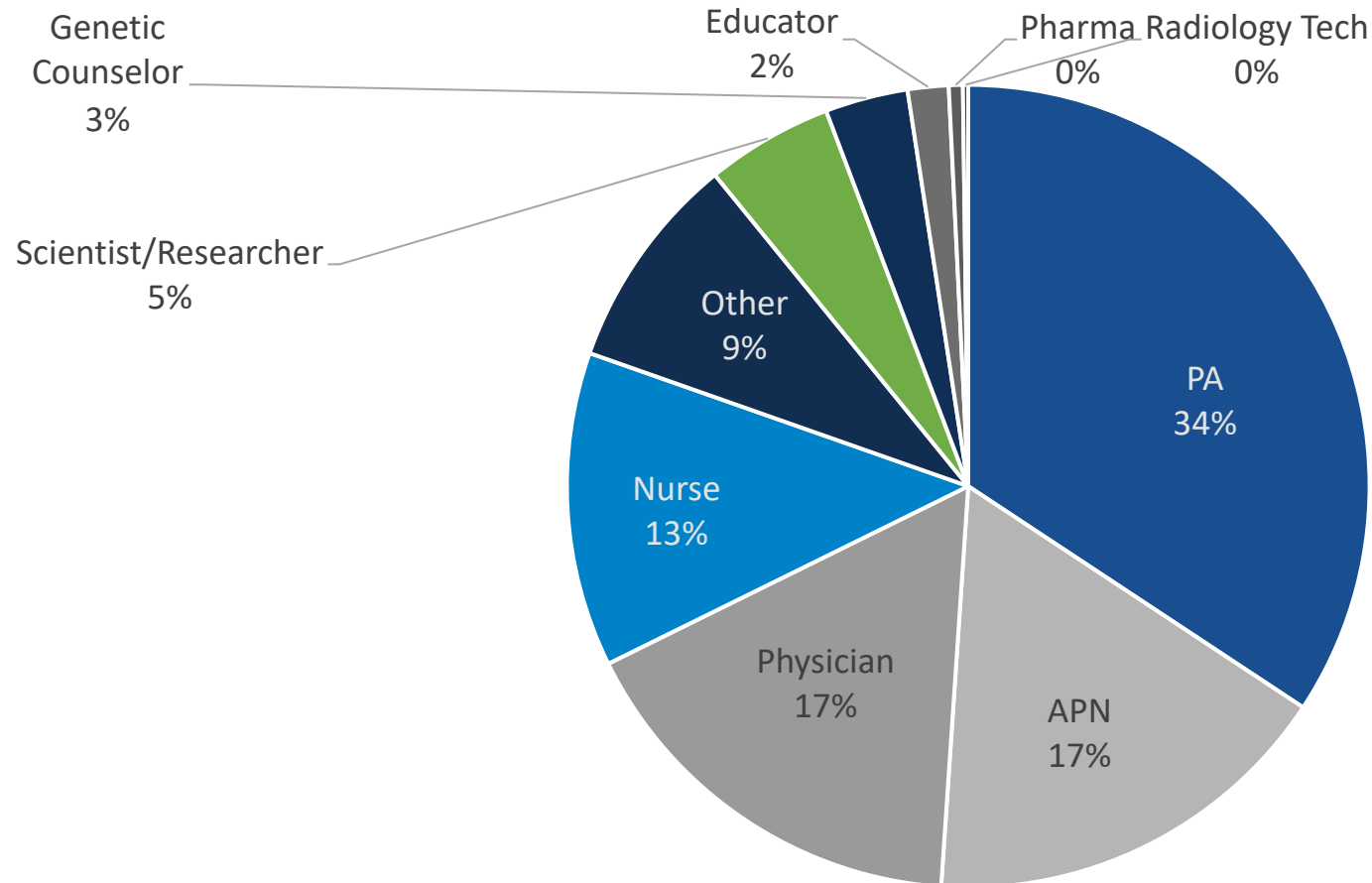
# Genetics education effectiveness depends on many variables

- Target audience
- Desired outcome
- Educational approach
- Content area
- Accessibility
- Learner incentives
- Delivery
- Cost
- Dissemination



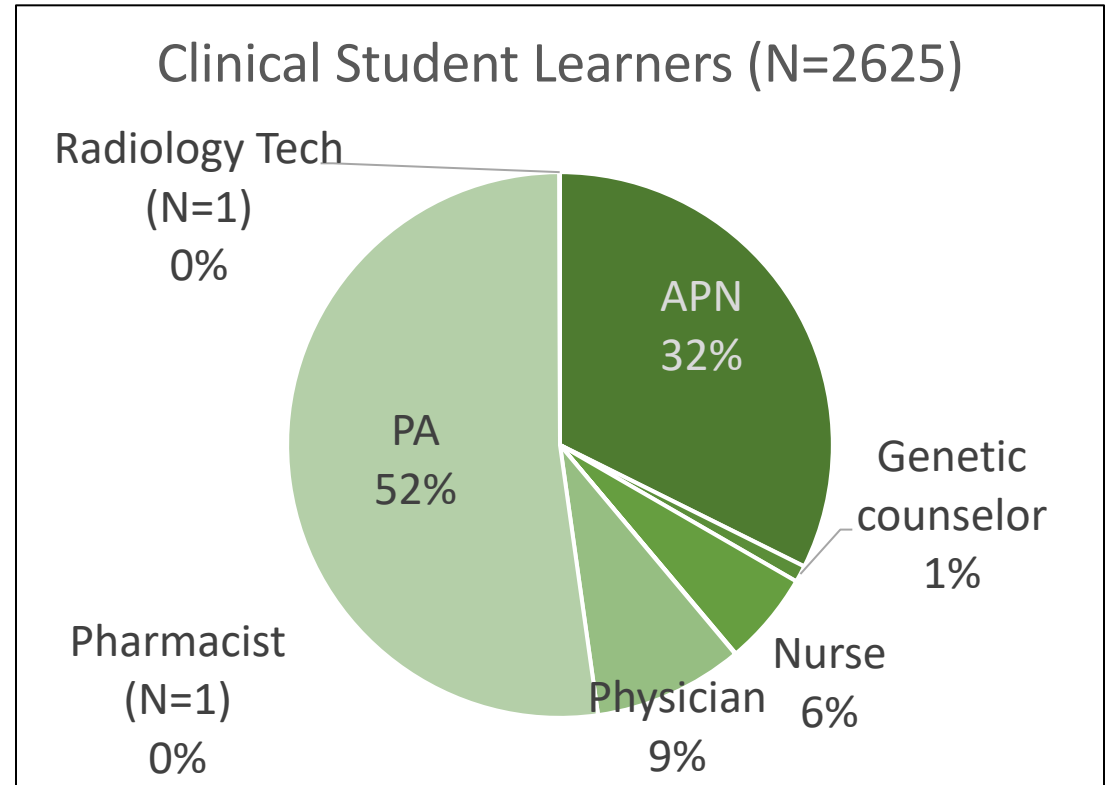
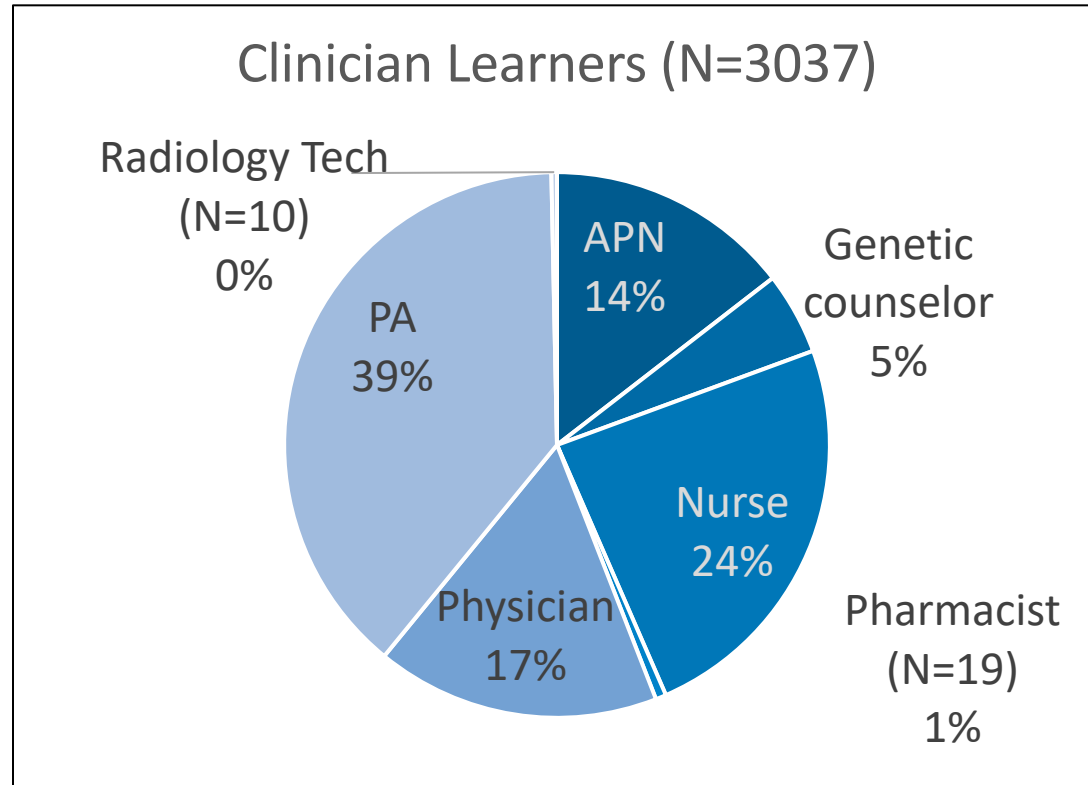
RISE2 Genomics  
Nisselle 2021  
PMID 33824503

# Our online courses are reaching a clinical audience



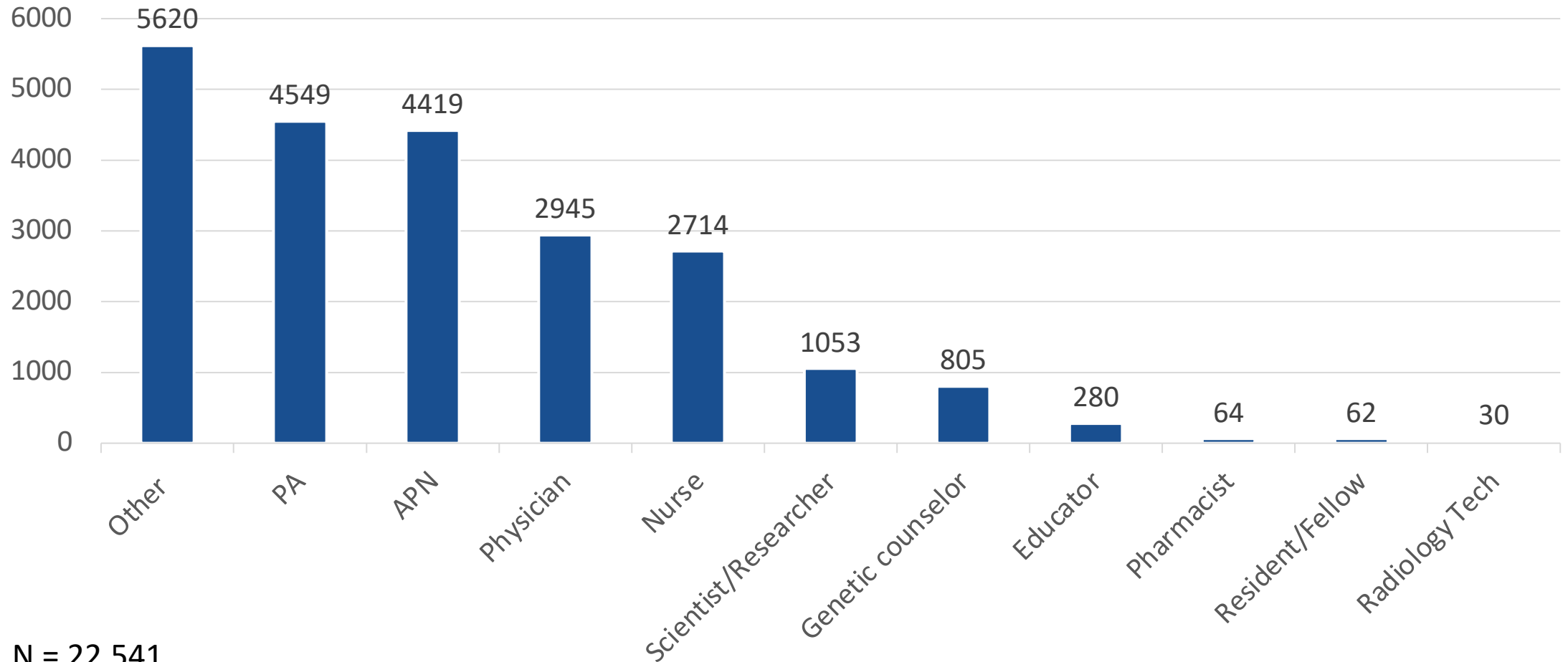
N = 11,033  
27% (N = 2526) missing professional data  
Data 2107 – March 2022

# Interest in genetics by practicing clinicians and clinical trainees



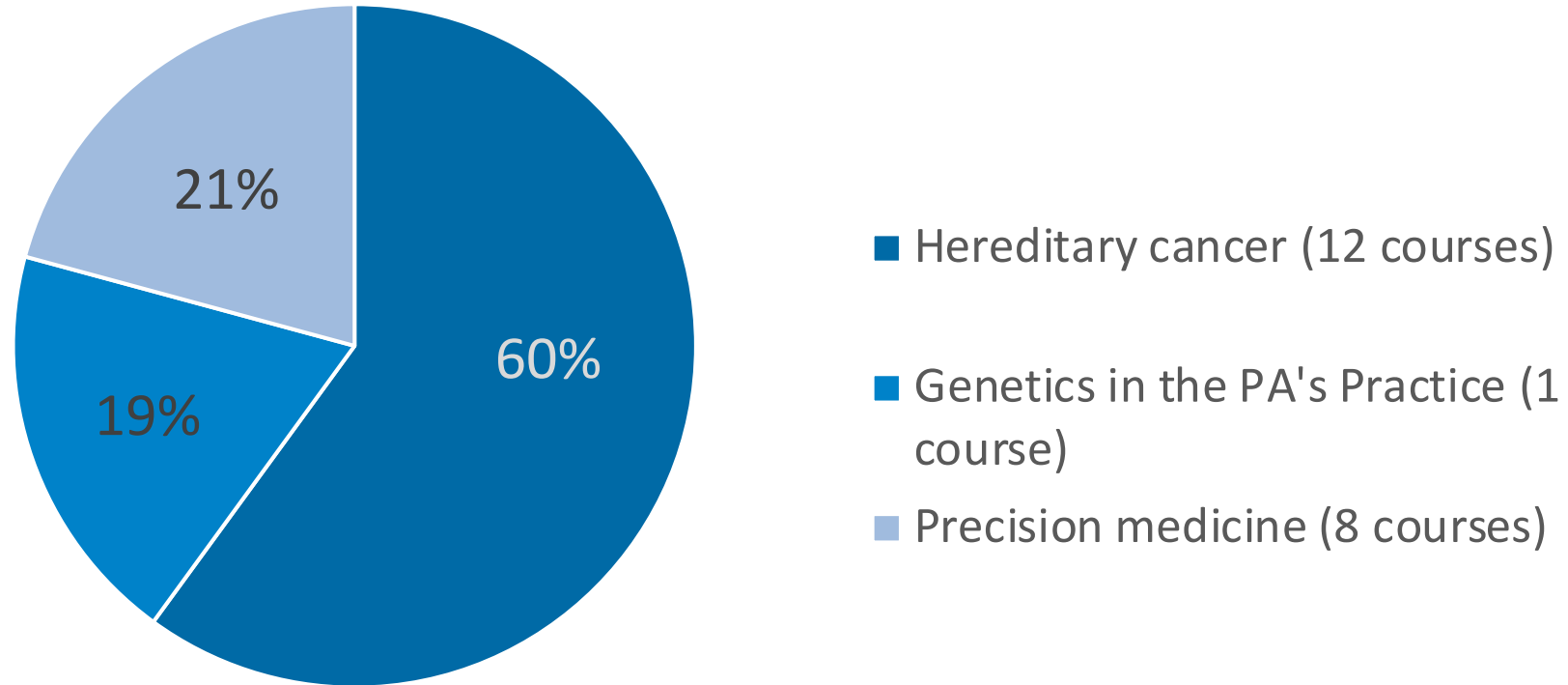


# PAs and APNs made up 40% of total enrollments



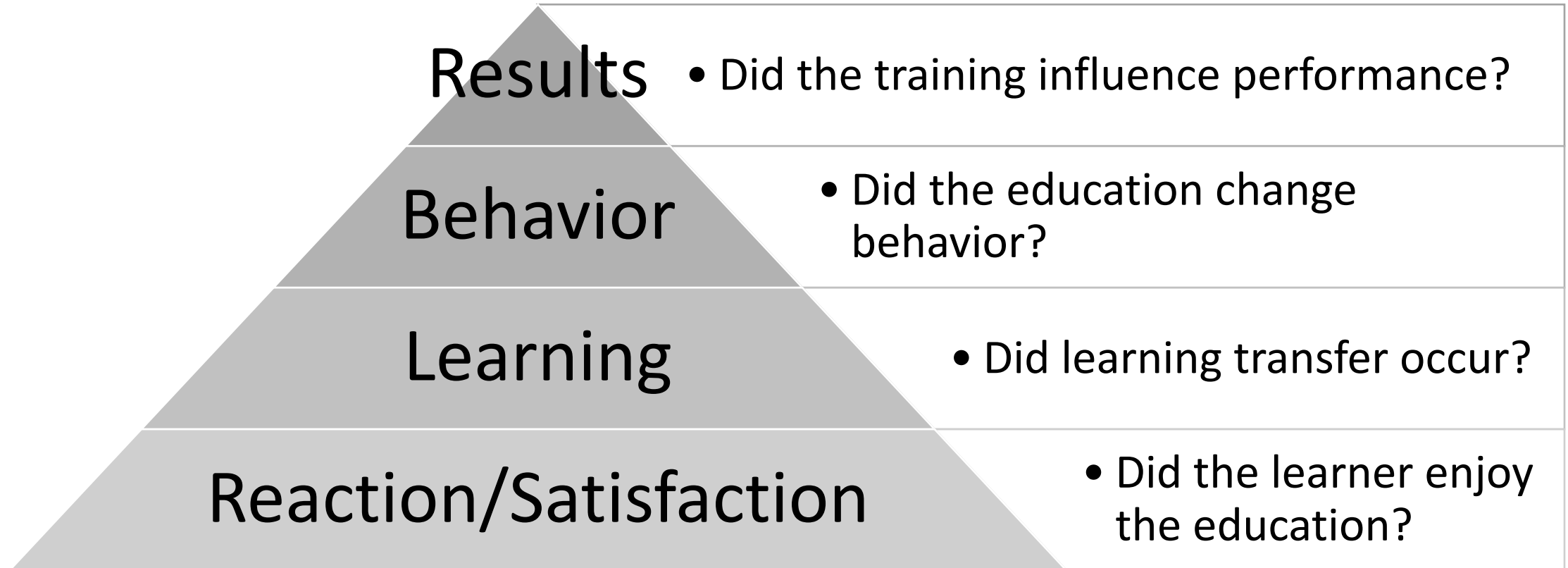
N = 22,541

# Hereditary cancer courses have highest enrollment

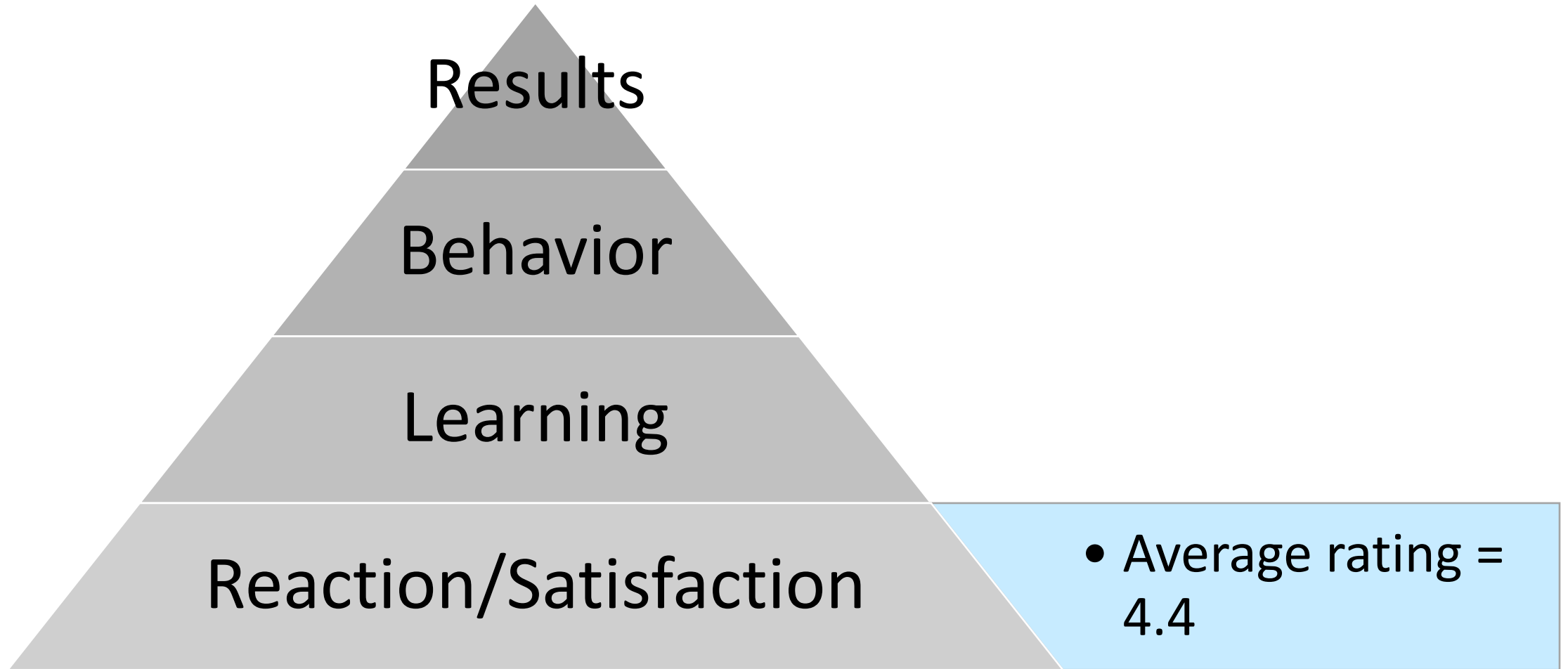


N = 24,391

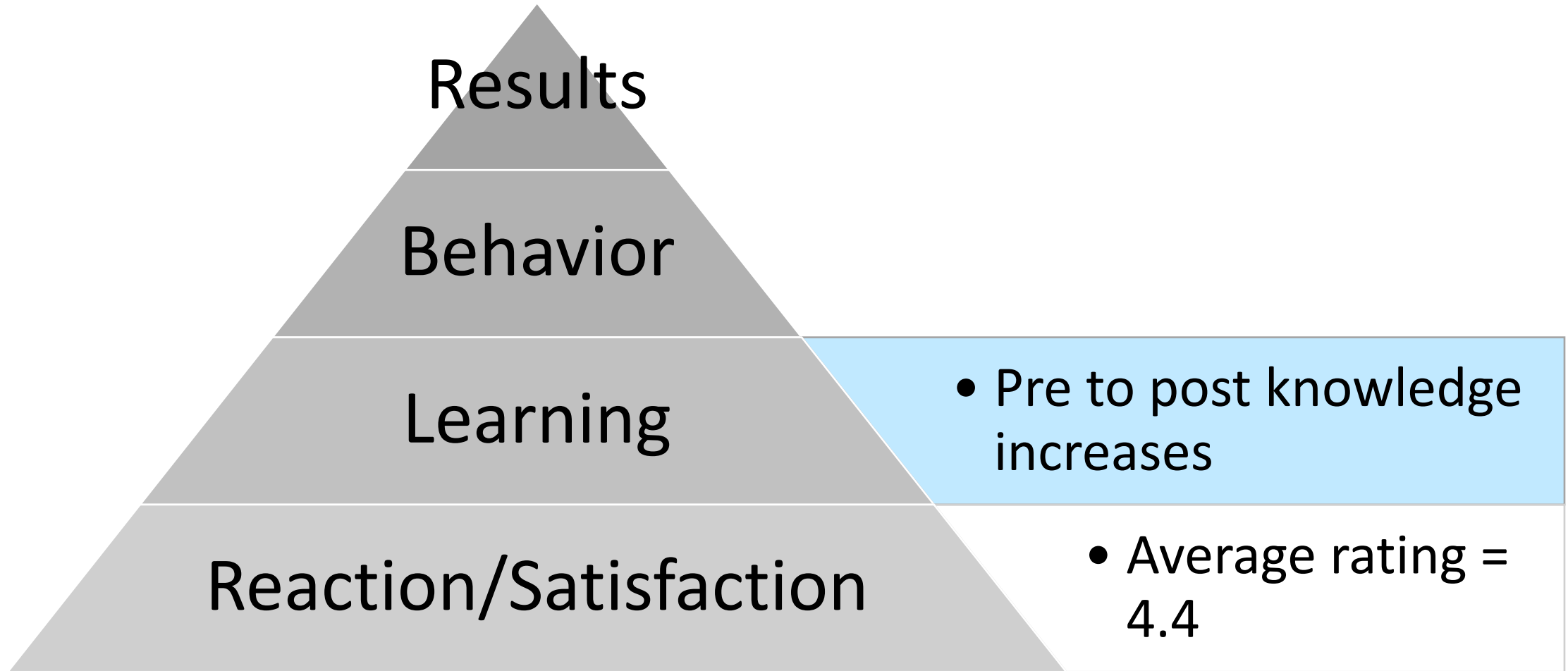
# Assessing impact of education is challenging



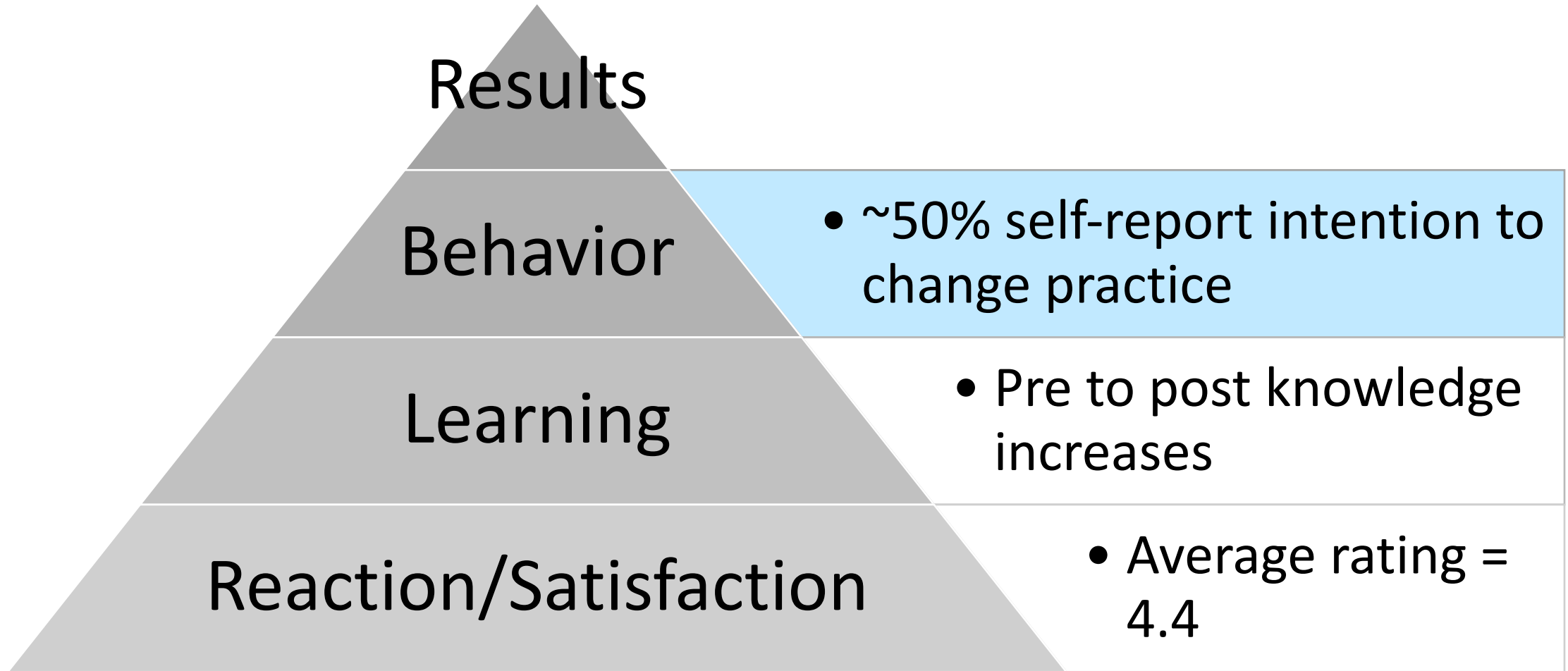
Evidence based approach shows effectiveness to a point



Evidence based approach shows effectiveness to a point



Evidence based approach shows effectiveness to a point



# Our ability to assess effectiveness is limited



No external incentives beyond CE credit



Limited access to target audience



Learners likely have higher knowledge to start



Short, focused modules



Lack of commitment or relationship

# The Solution





# Bridging the gap from current practice to best practice is multi-disciplinary



POLICY



COMMUNICATION

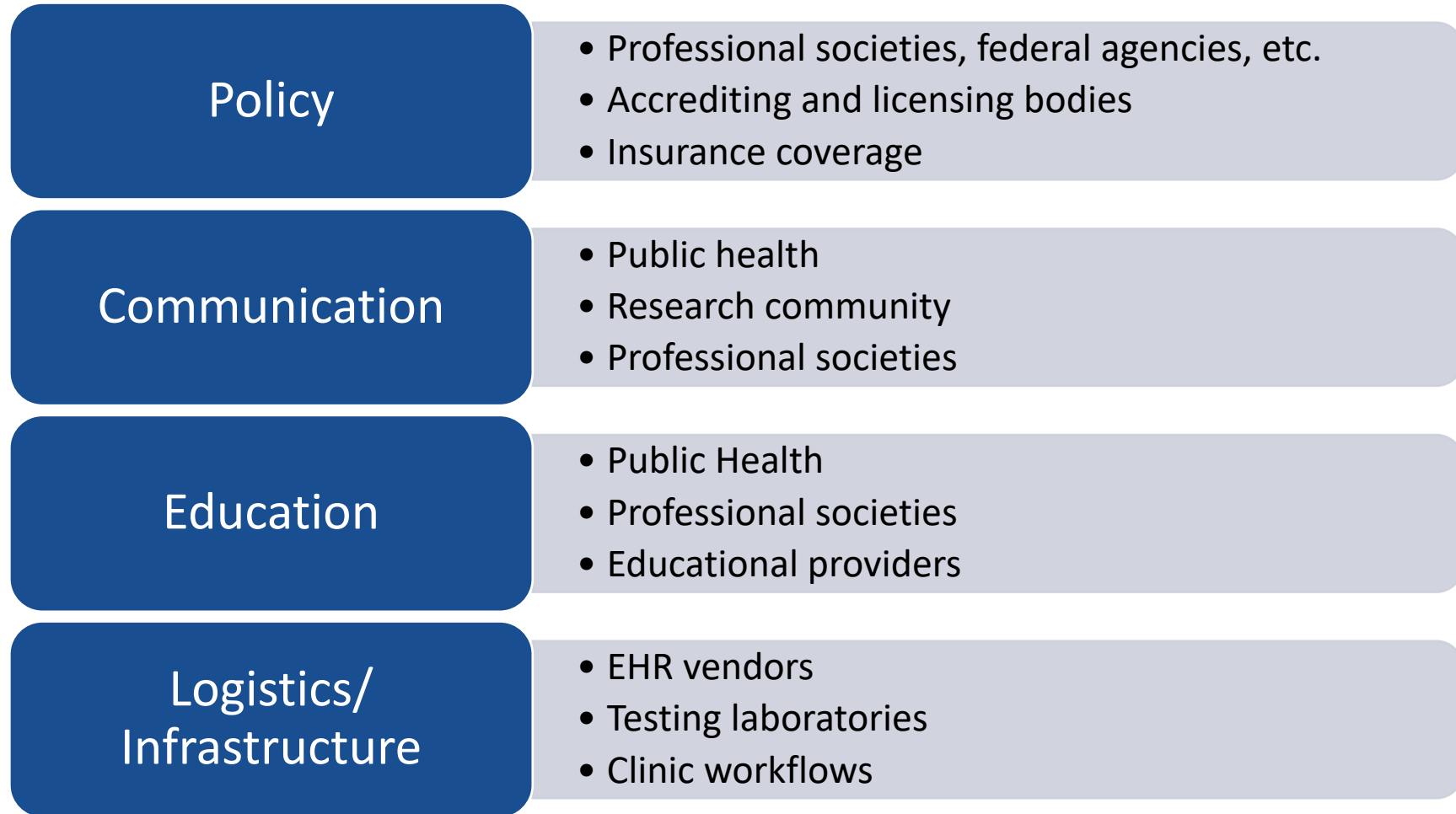


EDUCATION

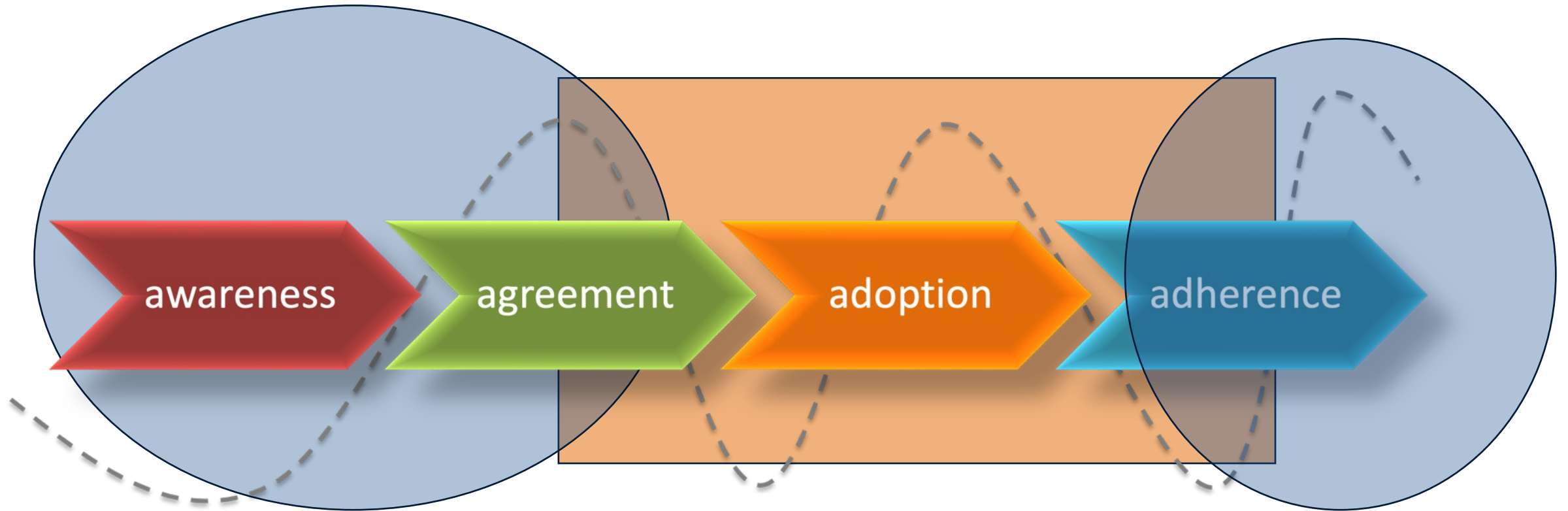


LOGISTICS/  
INFRASTRUCTURE

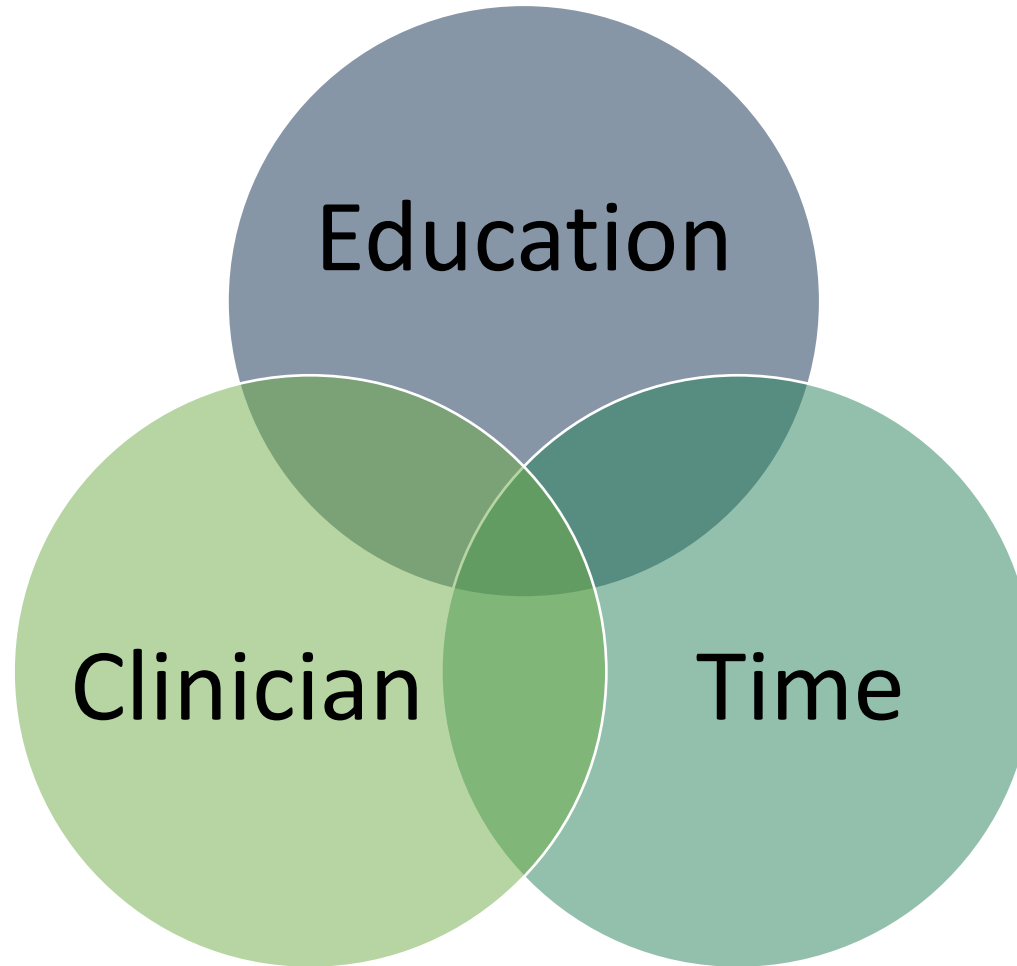
# No entity is responsible for the whole pathway



Collaboration is needed to feed the education pipeline and facilitate consistent application



# Moving towards precision education



# Questions?

Kate Reed

[Kate.reed@jax.org](mailto:Kate.reed@jax.org)

## Find our resources

Course catalog: [education.clinical.jax.org](http://education.clinical.jax.org)



Information and resources: [www.jax.org/ccep](http://www.jax.org/ccep)

