Evaluating Standardized Preventive Care to Reduce Dental Disparities in Children

NIDCR UH2DE025504

PIs: Beth Mertz & Joel White

UCSF School of Dentistry

Willamette Dental Group

UTHealth
The University of Texas Health Science Center at Houston
School of Dentistry

CAN DO
Center to Address Disparities in Oral Health

Skourtes Institute

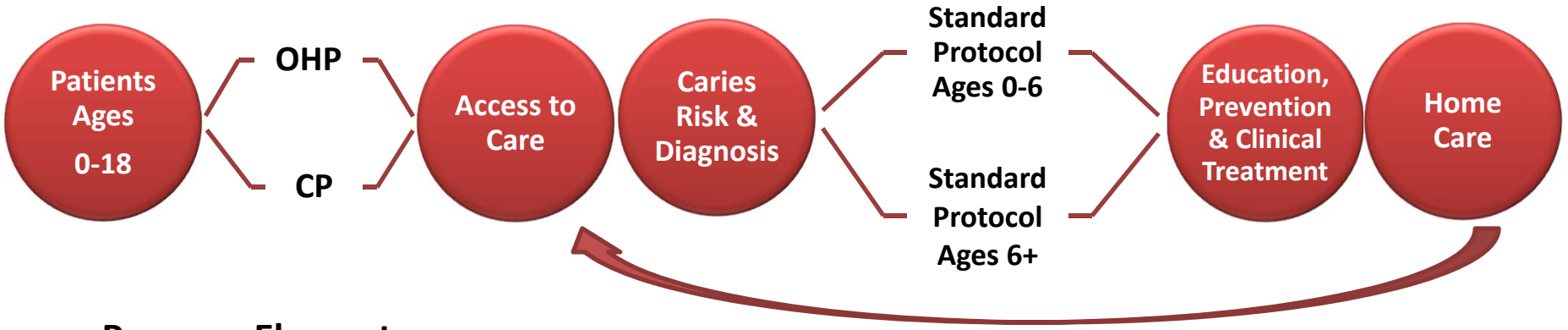
HARVARD UNIVERSITY

OHSU School of Dentistry

Outline

- Program Evaluation Design
- Preliminary Data
- Questions
- Feedback
  - Methodology
  - Other approaches to consider in the evaluation
  - Publication options for methdology

Willamette Dental Group (WDG) Caries Prevention Program



Program Elements:

- Setting: large risk-bearing dental group practice (full capitation), 53 offices, 3 states, 1,200 employees, 400,000 patient visits
- Access within 10 business days 85% of the time and within 24 hours for emergency care
- Evidence-based, standardized, caries prevention and treatment protocols based on assessed risk status
- Personalized individual dental care plan
- Therapeutic alliance with patients
- Care coordination for high risk children

Socioeconomic Disparity

- Medicaid / Oregon Health Plan (OHP)
- Commercially Insured (CP)

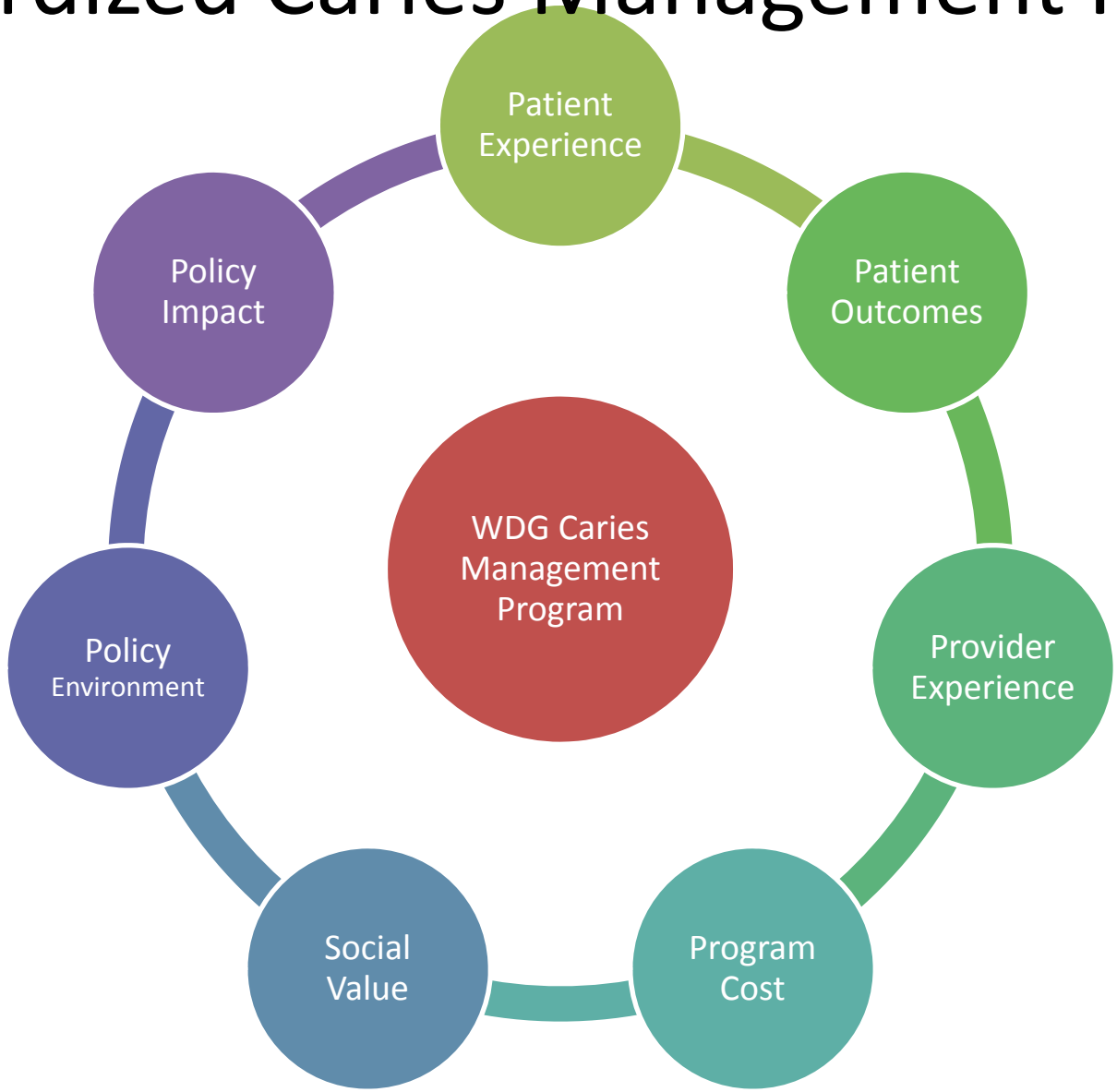
Hypothesis

The study's **primary hypothesis** is that the WDG caries prevention program will improve oral health and reduce disparities in untreated decay (ds & DS) and caries increment (Δdmfs & ΔDMFS) longitudinally between the Medicaid (OHP) and commercially-insured (CP) pediatric populations from baseline through 2019.

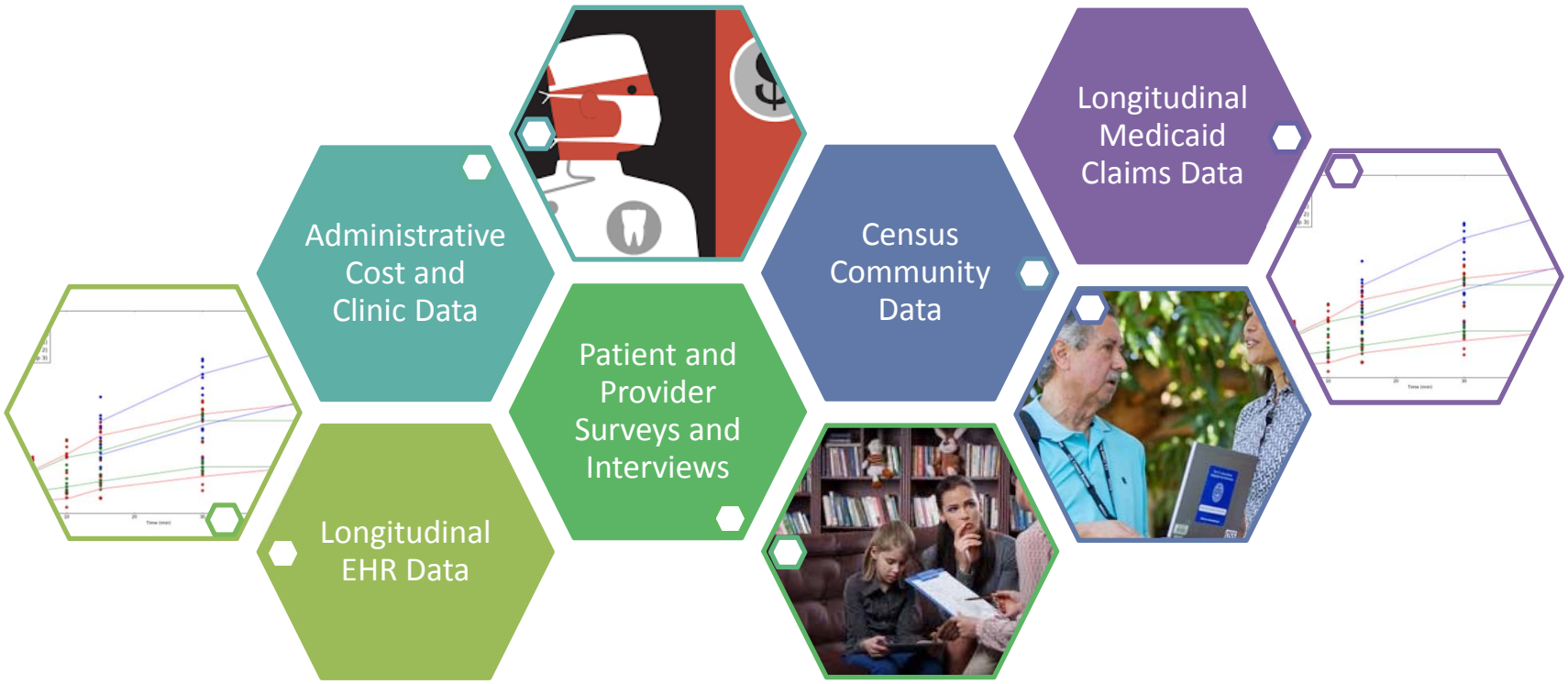
Program Evaluation Questions

1. Patient: Does the caries management program reduce disparities burden over time between Oregon Health Plan (Medicaid) and Commercial Plan children?
2. Organization: Does the caries management program provide value to patients, payers, and society?
3. Policy: How does this policy environment impact the practice and sustainability of the caries management program?

Multi-Level Program Evaluation Standardized Caries Management Program



Evaluation Data Sources



Key metrics for program evaluation

Patient-level data for OHP and CP patients (axiUm)

Demographics
Age, Sex, Race/ethnicity
Health literacy
RUCA rural/urban continuum
Distance to dental office
Insurance eligibility (proxy for socioeconomic status)
Clinical Information
Access to care timing
Visit type (D0145, D0150, D0120)
Health history
Dental diagnoses
Caries risk (low, med, high, extreme)
Phase of care (1,2,3,4)
Caries indices (e.g., dmfs/DMFS)
Prevention recommended/ dispensed/applied
Treatment (planned and completed)
Recall visits (planned and completed)
Procedures (planned and completed)
Prescriptions (Rx)
Provider & Clinic IDs

Administrative data for OHP and CP patients and organization costs (WDG)

CDT & DDS codes
Provider/patient ratio per clinic
Payer mix
Specialty referrals (pediatric)
Adherence to protocol – provider
Adherence to protocol – patient
Churn / Retention
Patient engagement & oral health quality of life (i.e., POQL, CHU9D)
Care coordination
Clinic contextual factors (e.g., rural, FTE of providers, patient load)
Patient satisfaction (i.e., CAHPS)
Costs of Care
Program pro forma
Cost of caries-related prevention
Cost of caries-related treatment
Utilization (e.g., CDT codes)
Fee schedule (e.g., National Dental Advisory Service or Fair Health)
Reimbursement for care (e.g., Truven)

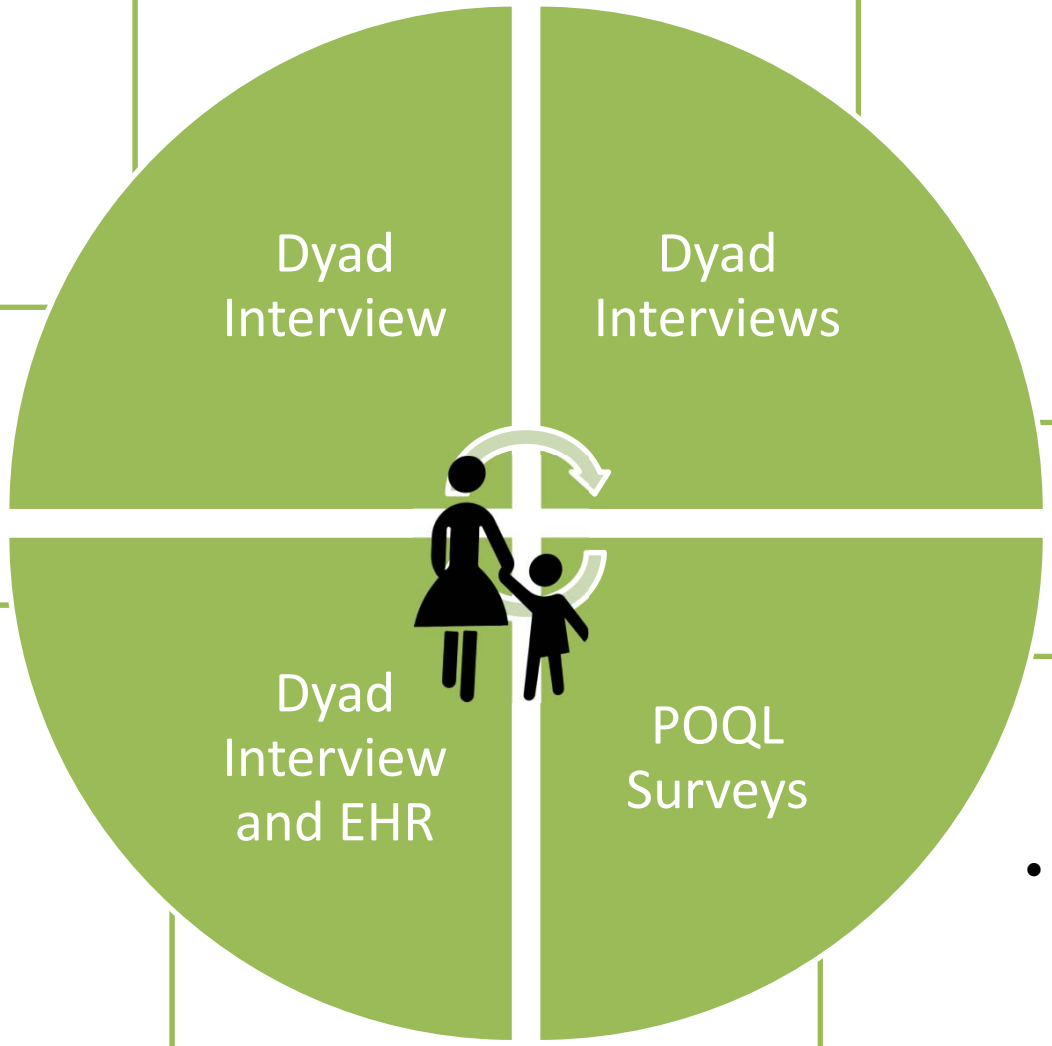
Medicaid population data (OHP)

Coordinated Care Organization (CCO) incentive metrics (e.g., sealants)
County contextual factors (e.g., rural, poverty, race/ethnicity, languages, Dental Health Professional Shortage Area status)
WDG / non-WDG status
Early Periodic Screening Diagnosis and Treatment (EPSDT), Dental Quality Alliance (DQA), and Managed Risk Medical Insurance Board (MRMIB) select metrics
Any dental service (i.e., utilization)
Preventive dental services
Diagnostic dental services
Dental treatment services
Caries-related services
Sealant on a permanent molar
Elevated risk for caries
Treatment for or prevention of caries
Comprehensive oral exam
Care continuity

Patient Experience Over Time

- Experience of clinical care
- Experience of system of care

- Home care use and experience
- Perceptions about change in risk or lack of change over time
- Frustrations with process



- Access to and ongoing use of care
- Preference for treatment options (e.g., SDF vs. Chlrx)

- Oral health quality of life

Examine **acceptability and use of home care prevention** for each comparison group based on pilot research findings from dyad interviews

Caries Risk	OHP			CP			Total
	3-5	6-12	13-18	3-5	6-12	13-18	
High	8	11	9	7	10	10	**55**
Moderate	4	9	7	1	7	7	**35**
Low	5	5	5	5	5	6	**31**
Total	**17**	**25**	**21**	**13**	**22**	**23**	**121**

Collected at 12 clinics across Oregon, including rural and urban, large and small, among 3 age groups, 2 insurance types and 3 risk levels

Key Qualitative Findings

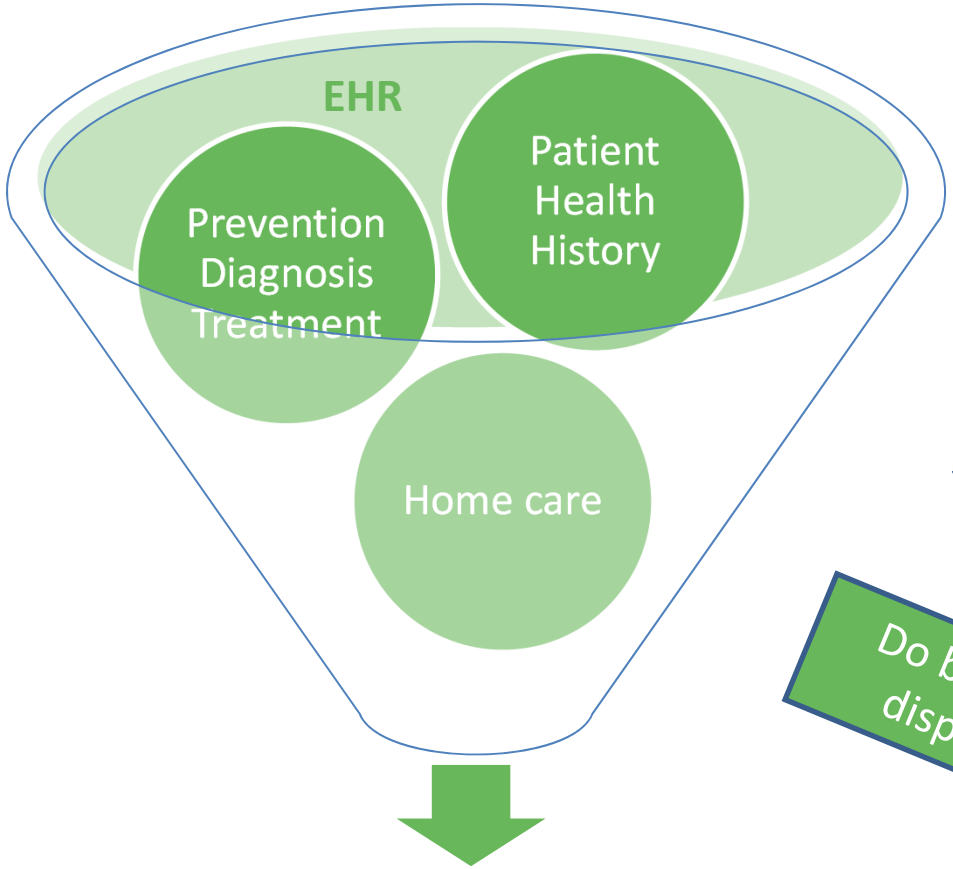
Patient education and experiences

- Like report card format and clear recommendations
- Product knowledge and recall of recommendations was good for both parents and children (age dependent)
  - Adherence for toothpaste excellent, mouthwash mixed, and xylitol was seen as optional
- Report being instructed to increase quality of existing non-prescription practices (brush longer, floss properly, etc.)
- Customer service (friendliness) and scheduling ease was highly regarded

Implications for data analysis / interpretation

- Family use of products noted
- Potential confounding issues: orthodontia and wisdom teeth

Child Patient Health Outcomes



Does child oral health status improve over time?

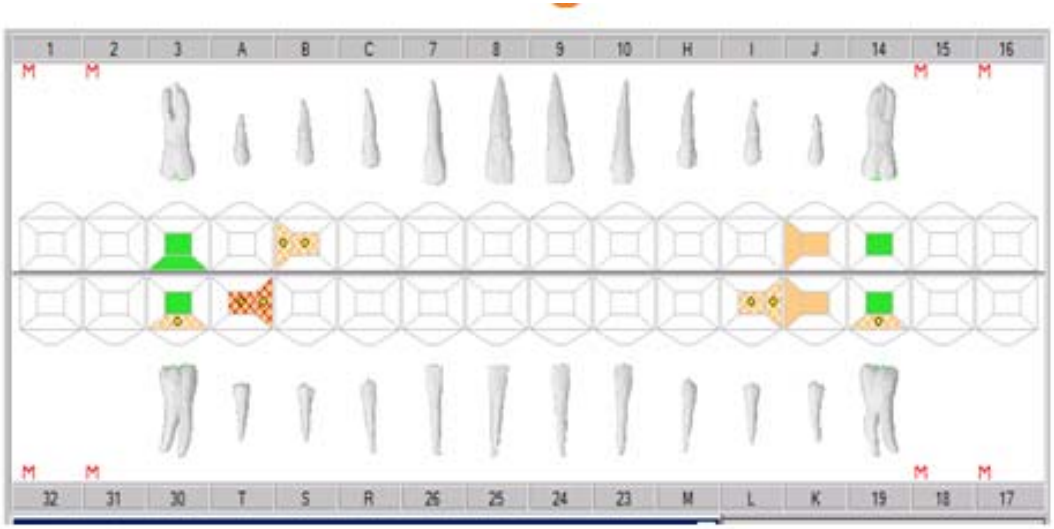
Do baseline socioeconomic health disparities decrease over time?

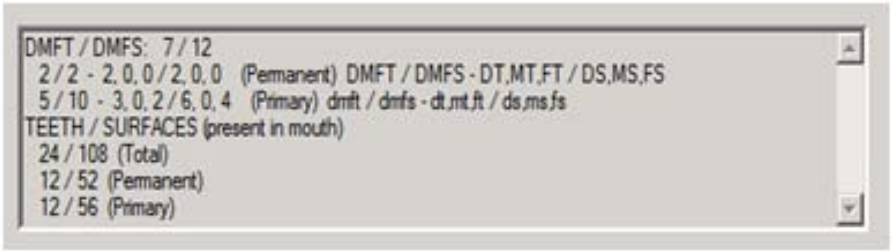
Δds & ΔDS, Δdmfs & ΔDMFS indices >0

Caries Indices

Validating Caries Indices From An Electronic Health Record

J.M. White[1], E.A. Mertz[1], J.M. Mullins[2], J.B. Even[2], T. Guy[2], E. Blaga[2], A. Kottek[1], S.V. Kumar[3], S. Bangar[3], R. Vaderhobli[1], R. Calinisan[4], R. Brandon[2], W. Santo[1] and S.A. Gansky[1]





Examiner Correlation vs Automated (n=48)

Examiner	Measure	Lin's Concordance Correlation	Lower 95% CL	Upper 95% CL
1	DMFS	1.00	1.00	1.00
1	DMFT	1.00	1.00	1.00
1	DS	1.00	1.00	1.00
1	DT	1.00	1.00	1.00
1	FS	1.00	1.00	1.00
1	FT	1.00	1.00	1.00
1	dmfs	1.00	0.99	1.00
1	dmft	1.00	1.00	1.00
1	ds	1.00	1.00	1.00
1	dt	1.00	1.00	1.00
1	fs	1.00	0.99	1.00
1	Ft	1.00	1.00	1.00
1	ms	0.99	0.99	0.99
1	mt	1.00	1.00	1.00
2	DMFS	1.00	1.00	1.00
2	DMFT	1.00	1.00	1.00
2	DS	1.00	1.00	1.00
2	DT	1.00	1.00	1.00
2	FS	1.00	1.00	1.00
2	FT	1.00	1.00	1.00
2	dmfs	1.00	1.00	1.00
2	dmft	1.00	1.00	1.00
2	ds	1.00	1.00	1.00
2	dt	1.00	1.00	1.00
2	fs	1.00	1.00	1.00
2	ft	1.00	1.00	1.00
2	ms	1.00	1.00	1.00
2	mt	1.00	1.00	1.00

All LCCs ≥ 0.99

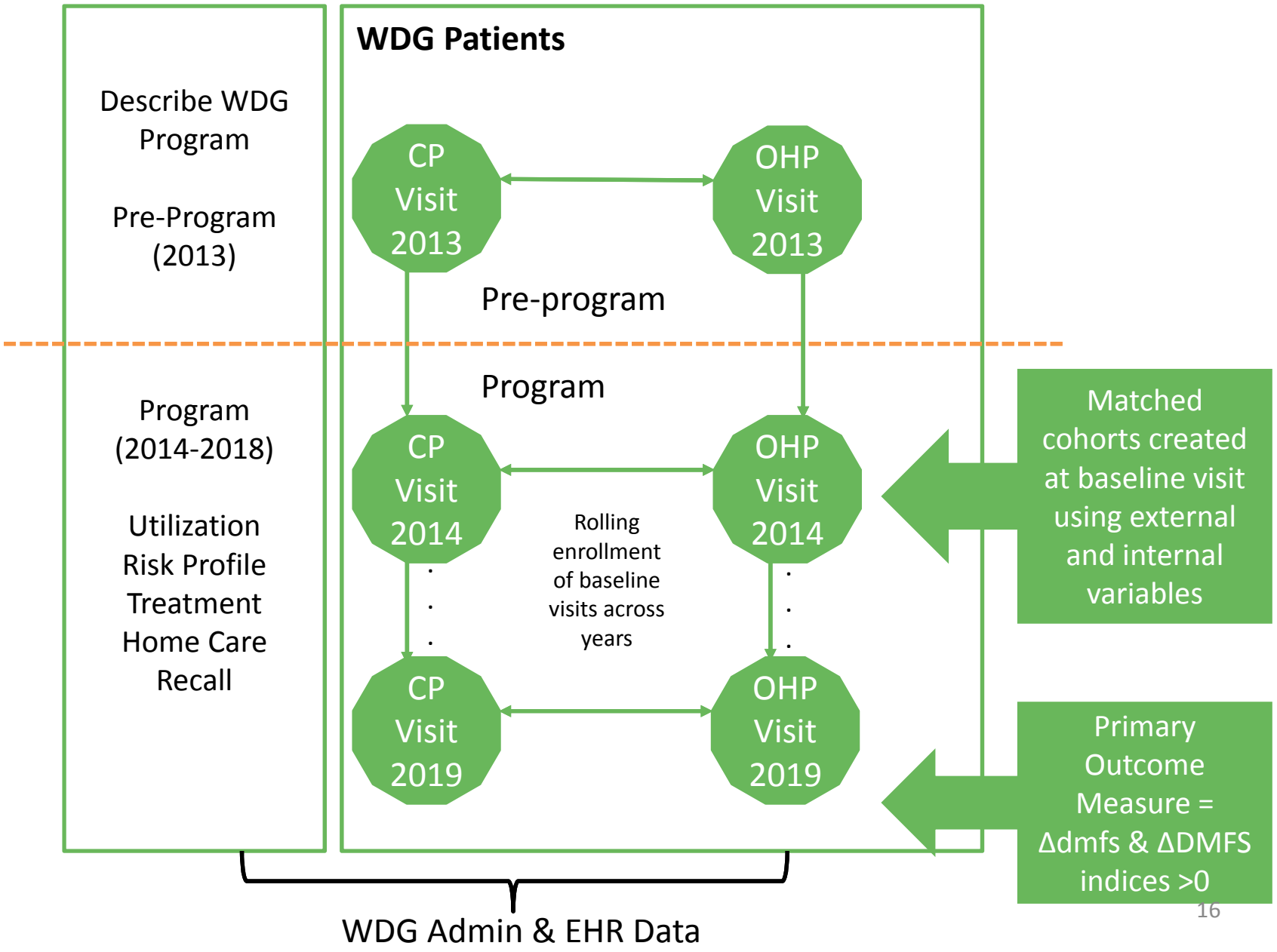
Disparities in Mean dmfs+DMFS at Baseline

	All ages			t-test	Age 0-5			t-test
	Total	OHP	CP	p	Total	OHP	CP	p
All Levels Combined	4.0 ±7.3	4.9 ±8.3	3.1 ±6.0	<0.0001	2.7 ±7.4	3.6 ±8.8	1.6 ±5.3	<0.0001
Low Risk	1.5 ±4.3	1.8 ±5.0	1.4 ±3.7	<0.0001	0.5 ±3.7	0.6 ±4.3	0.4 ±3.1	0.0008
Moderate Risk	4.9 ±7.7	5.4 ±8.5	4.4 ±6.8	<0.0001	4.4 ±9.7	5.0 ±10.6	3.1 ±7.8	0.0002
High/Extreme Risk	9.34 ±9.37	10.2 ±10.0	8.2 ±8.2	<0.0001	9.3 ±10.8	10.4 ±11.8	7.2 ±8.2	<0.0001
	Age 6-12			**t-test**	**Age 13-18**			**t-test**
	Total	OHP	CP	p	Total	OHP	CP	p
All Levels Combined	4.9 ±7.7	6.0 ±8.7	3.7 ±6.4	<0.0001	3.8 ±6.4	4.5 ±6.9	3.4 ±5.9	<0.0001
Low Risk	2.0 ±5.2	2.6 ±6.1	1.7 ±4.4	<0.0001	1.7 ±3.3	1.8 ±3.5	1.6 ±3.2	0.0559
Moderate Risk	6.1 ±8.4	6.7 ±9.1	5.3 ±7.5	<0.0001	3.8 ±5.2	3.8 ±5.1	3.8 ±5.3	0.7545
High/Extreme Risk	9.5 ±8.7	10.4 ±9.4	8.1 ±7.3	<0.0001	9.1 ±9.2	9.5 ±9.3	8.7 ±9.1	0.0007

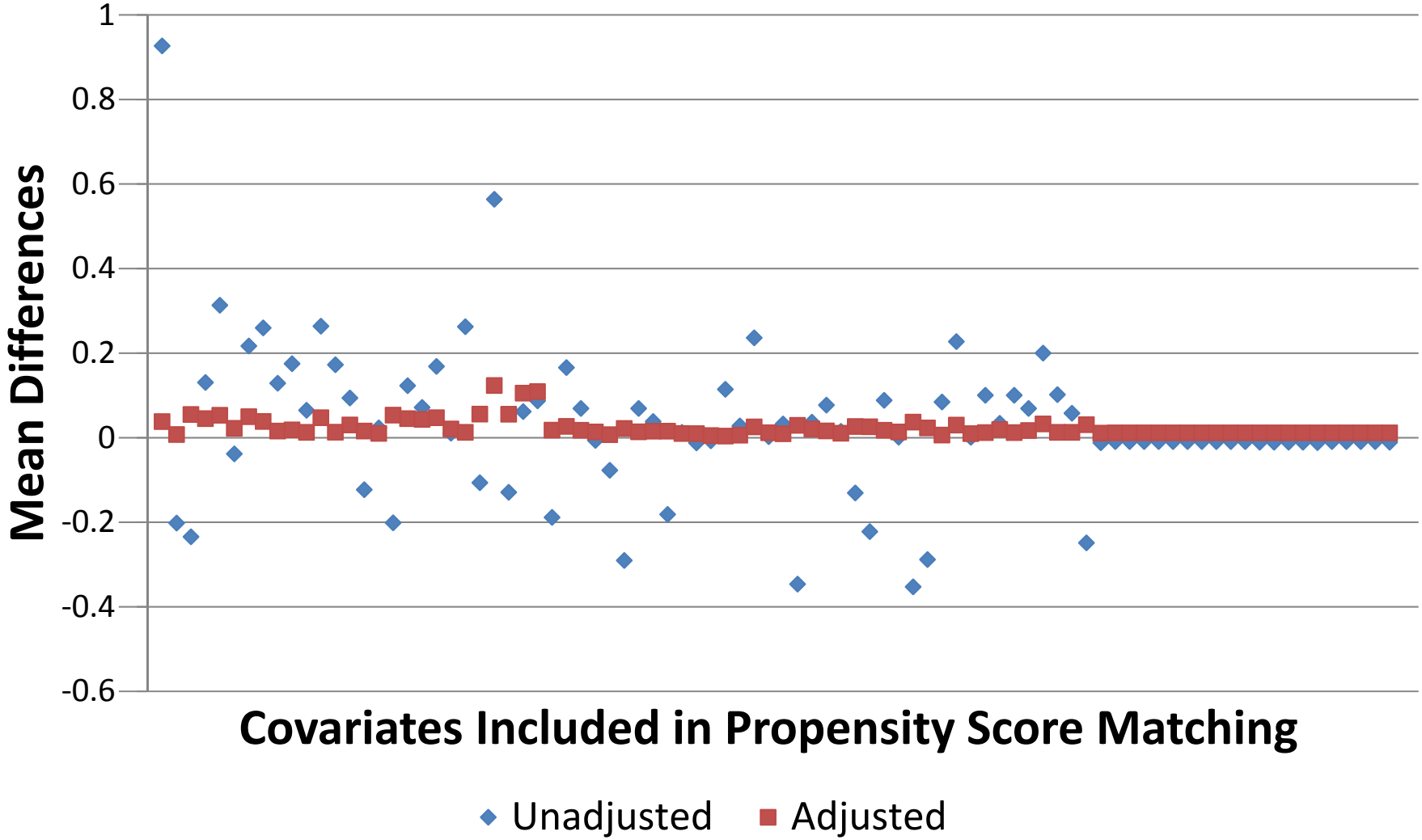
36 indices available including tooth level (t,T), surface and tooth count, incisal edges

Select Baseline Statistics All Patients (T0)	Total		OHP		CP			CP-OHP Mean %
	n	%	n	%	n	%	p-value	Diff
Year	66,670		32497	48.7	34173	51.3	<0.0001	2.5
2014	33,696	50.5	17030	52.4	16666	48.8		-3.6
2015	18,694	28.0	9057	27.9	9637	28.2		0.3
2016	14,280	21.4	6410	19.7	7870	23.0		3.3
Age	66,670		32497	48.7	34173	51.3	<0.0001	2.5
0-5	17,015	25.5	9302	28.6	7713	22.6		-6.1
6-12	28,008	42.0	13978	43.0	14030	41.1		-2.0
13-18	21,647	32.5	9217	28.4	12430	36.4		8.0
Visit Types	66,670		32497	48.7	34173	51.3	<0.0001	2.5
D0120 (CCare)	39,627	59.4	21178	65.2	18449	54.0		-11.2
D0150 (New Patient)	22,287	33.4	8688	26.7	13599	39.8		13.1
D0145 (Young Patient)	4,756	7.1	2631	8.1	2125	6.2		-1.9
Caries Risk Selected	64,079		31105	48.5	32794	51.2	<0.0001	2.6
Missing	*2,591*	*3.9*	*1392*	*4.3*	*1199*	*3.5*		*-0.8*
Low	36,209	56.5	15260	49.1	20949	63.9		14.8
Moderate	11,662	18.2	6237	20.1	5245	16.0		-4.1
High/Extreme	16,208	25.3	9608	30.9	6600	20.1		-10.8
Phase	66,194		32290	48.8	33904	51.2	<0.0001	2.4
Missing	*3,054*	*4.6*	*1587*	*4.9*	*1467*	*4.3*		*-0.6*
1	5,657	8.5	3790	11.7	1867	5.5		-6.2
2	11,347	17.1	6228	19.3	5119	15.1		-4.2
3	1,787	2.7	1025	3.2	762	2.2		-0.9
4	44,825	67.7	19867	61.5	24958	73.6		12.1

Program Evaluation Analytic Design: Descriptive Context and Matched Sample



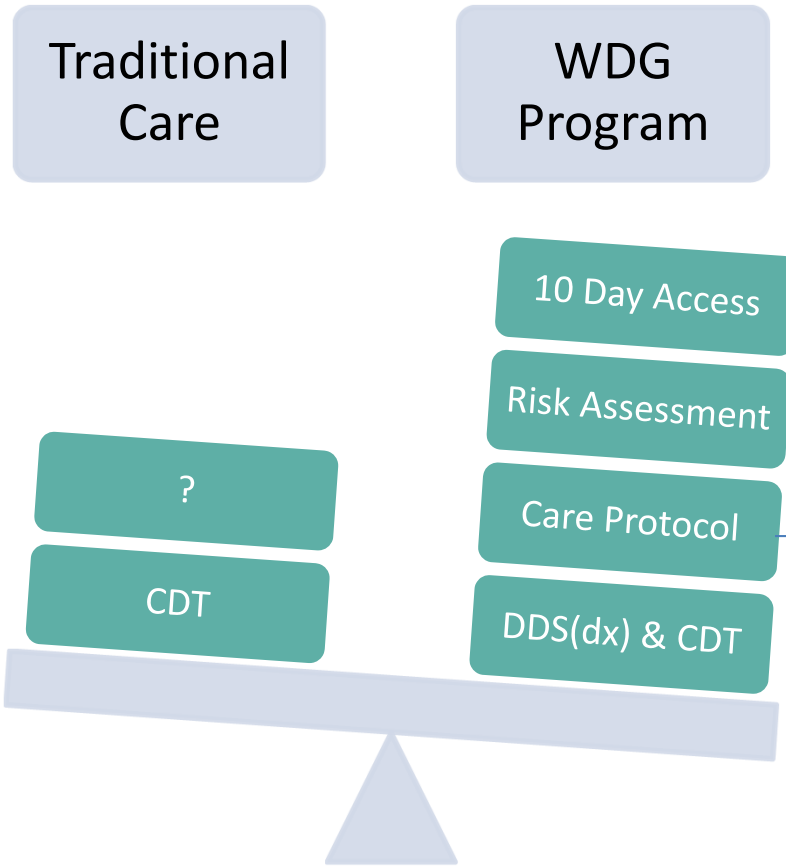
Preliminary Cohort Selection (EHR)



Provider Experience Over Time

Dental team's adherence to the program	• E-Chart completion • Appropriateness of care
Perception of program efficacy	• Provider interviews • Perceptions
Provider-patient interaction	• Provider interviews • Consistency, new care coordination roles

Prevention Program Cost



Pro Forma of Caries Prevention Program*

1. D0120/D0150/D0145
2. D1120
3. D1206
4. D0425
5. D0170
6. D1330
7. D1331
8. D0272
9. Recommendations
10. Prescriptions & Prevention Dispensed

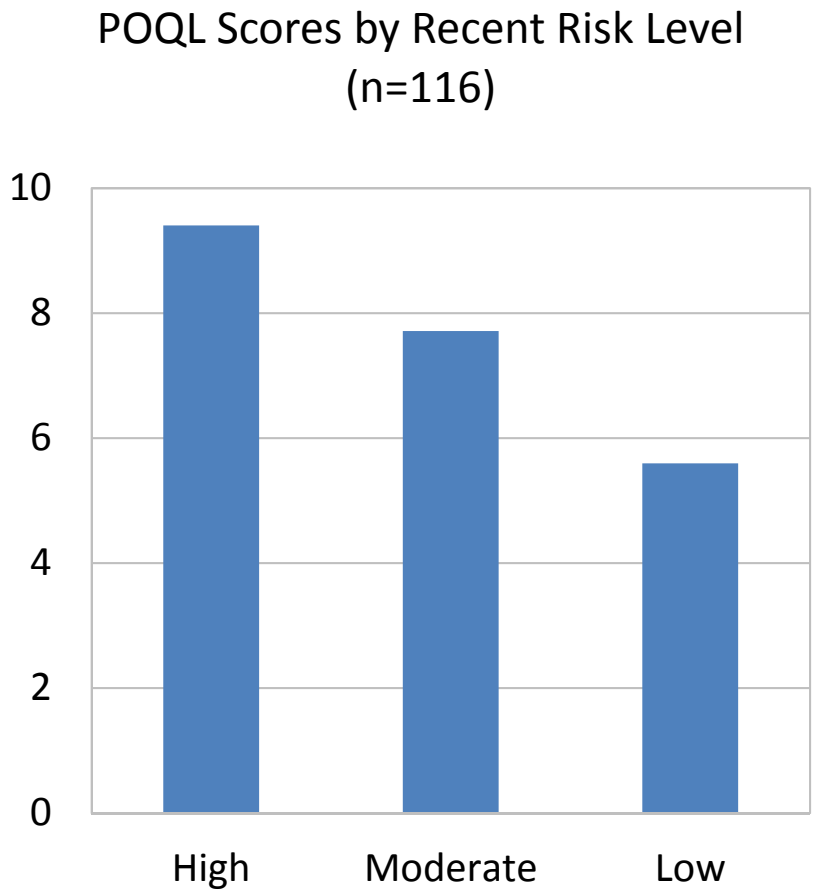
* Varies by risk status

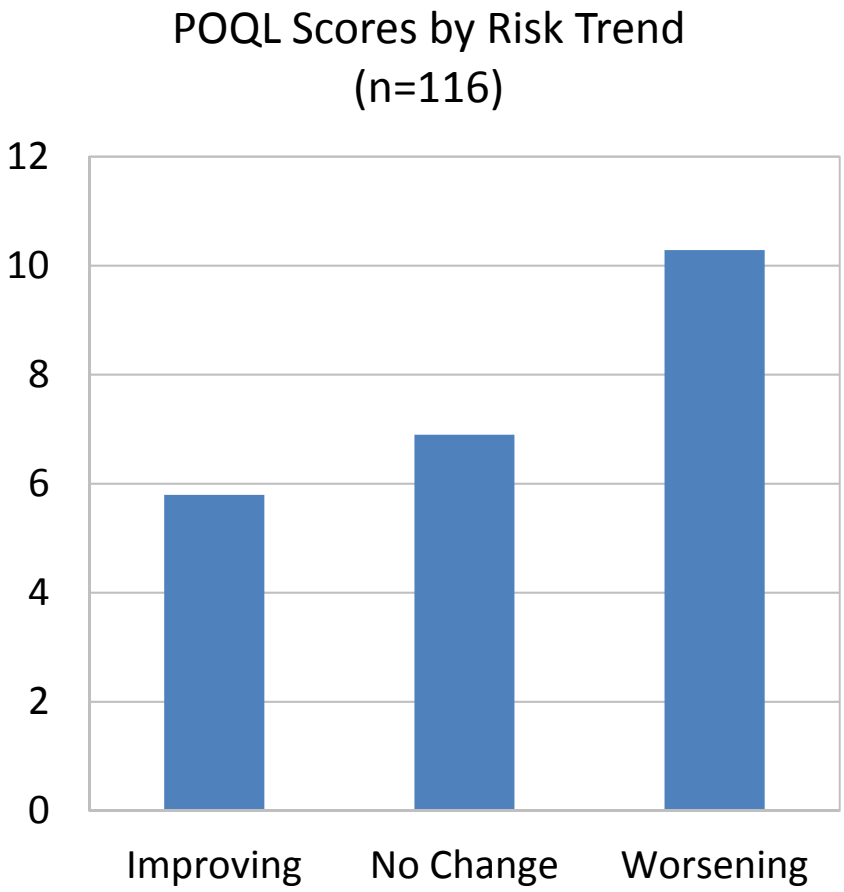
Utilization Cost

- Mean utilization cost of CARIES-related treatment for patients at different risk and insurance strata

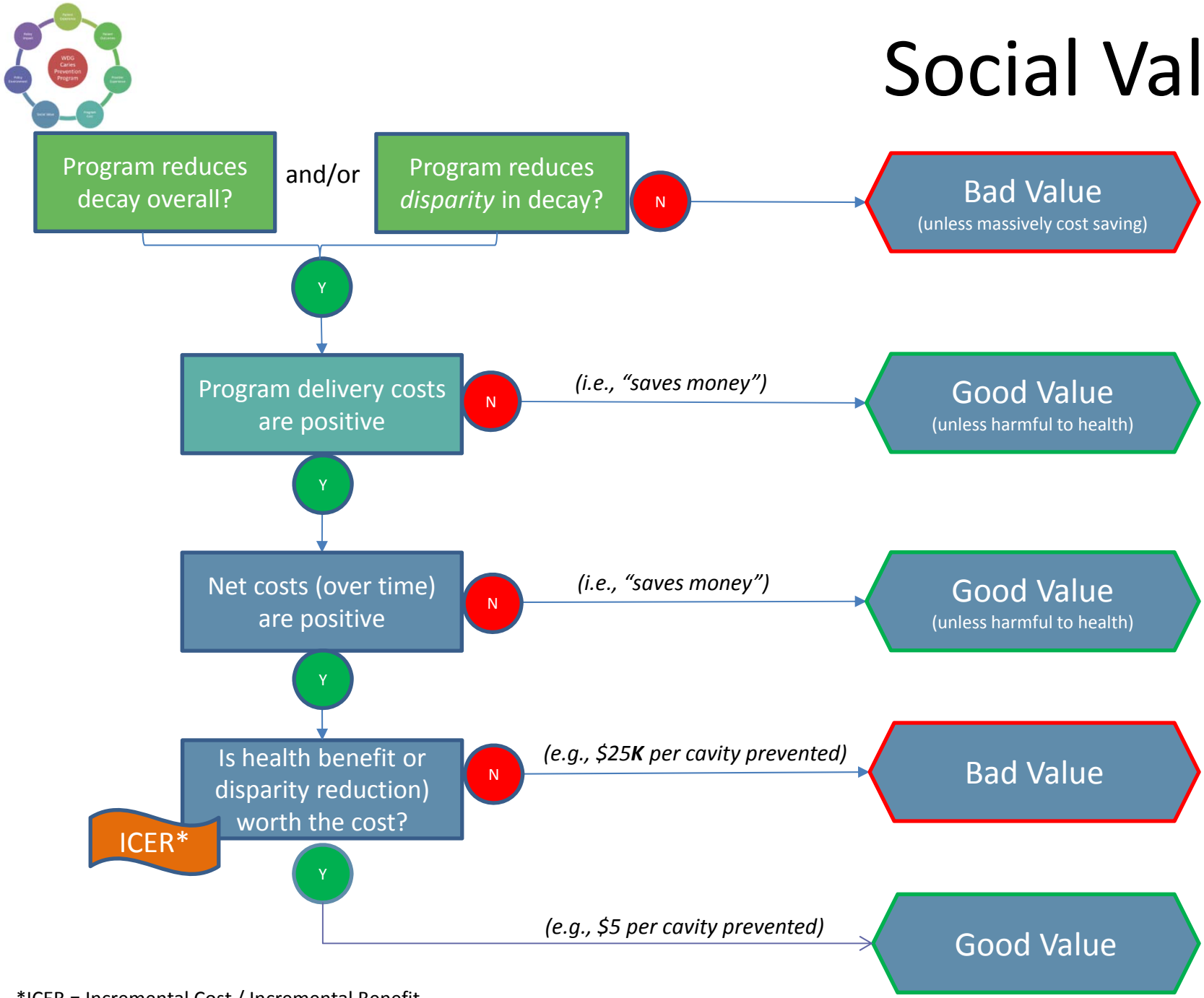
Caries Risk	OHP	CP
Low	$282	$245
Moderate	$281	$257
High	$287	$262
Extreme	$318	$408

Pediatric Oral Health Quality of Life Instrument Assessments



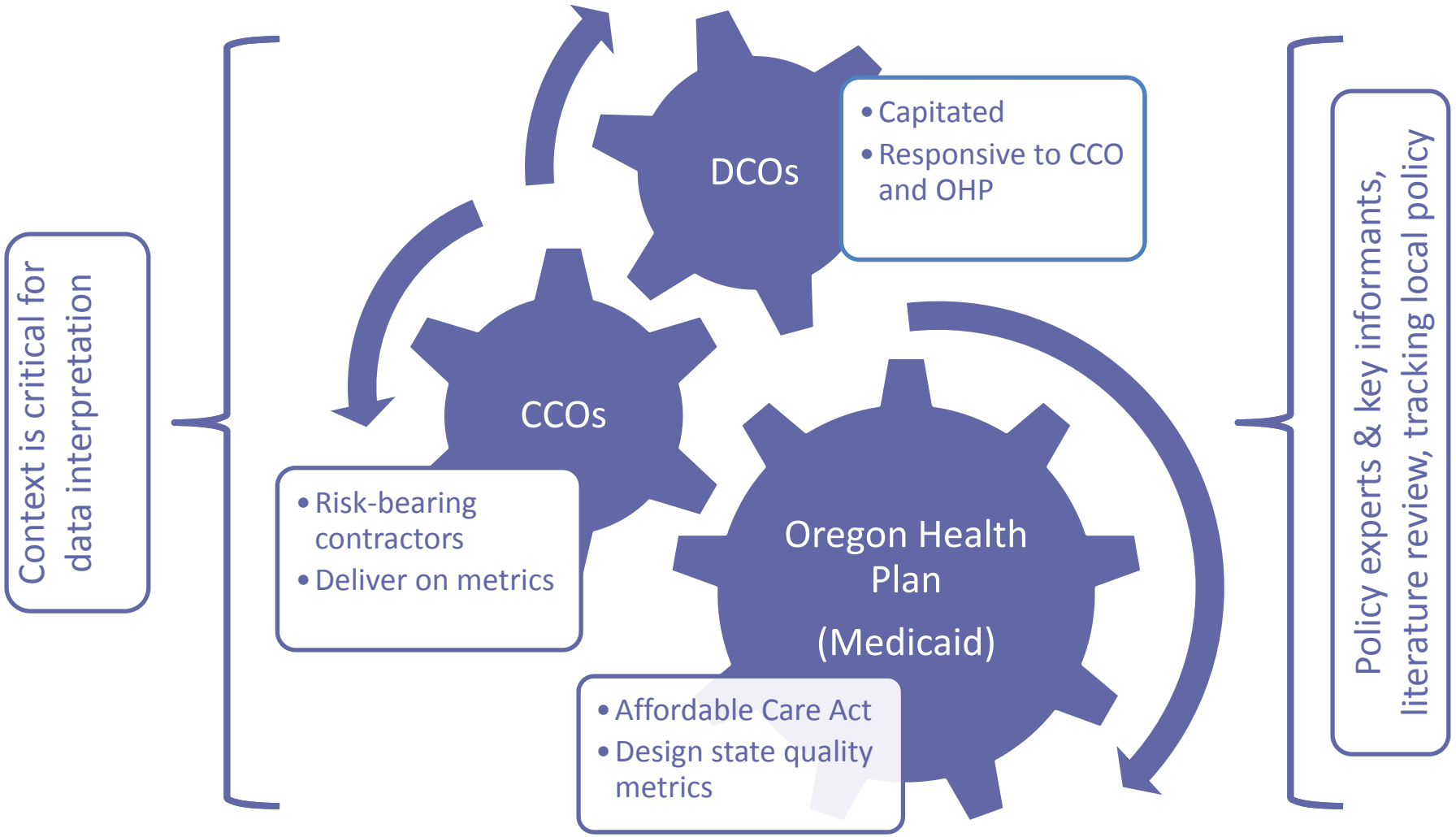


Social Value



*ICER = Incremental Cost / Incremental Benefit

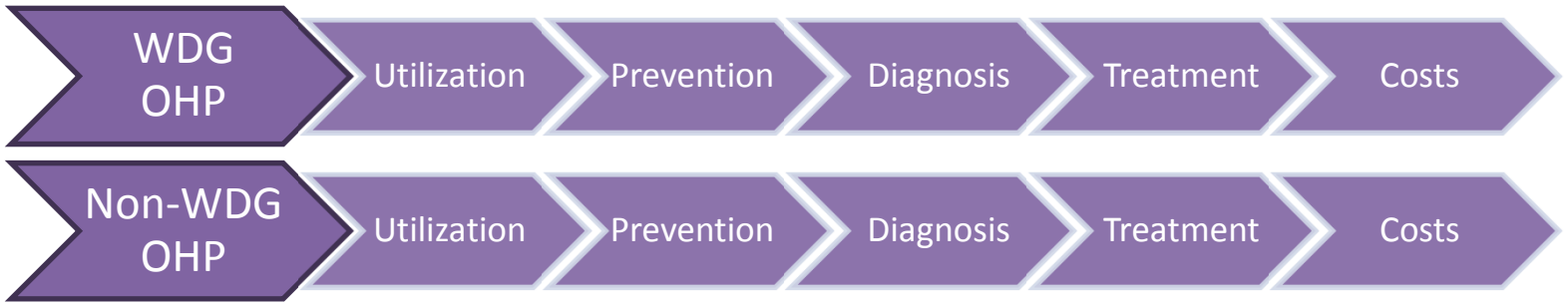
Policy Environment



Policy Impact

Medicaid annual claims data 2013-2018 with
WDG and longitudinal tracking codes

Cross-sectional and matched cohorts



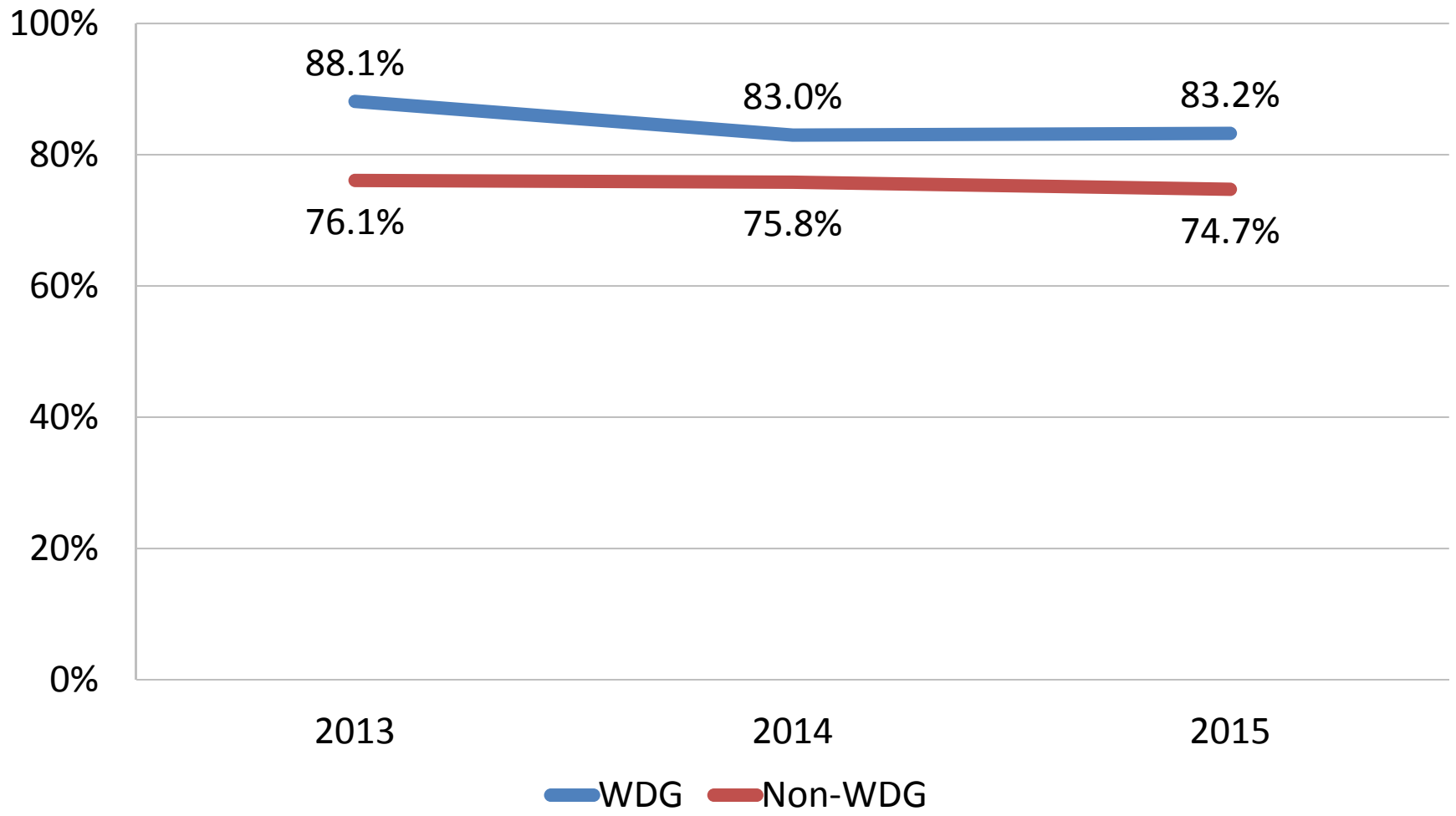
2013 – 2014 – 2015 – 2016 – 2017 – 2018

Oregon Health Plan
Oregon Resident Children

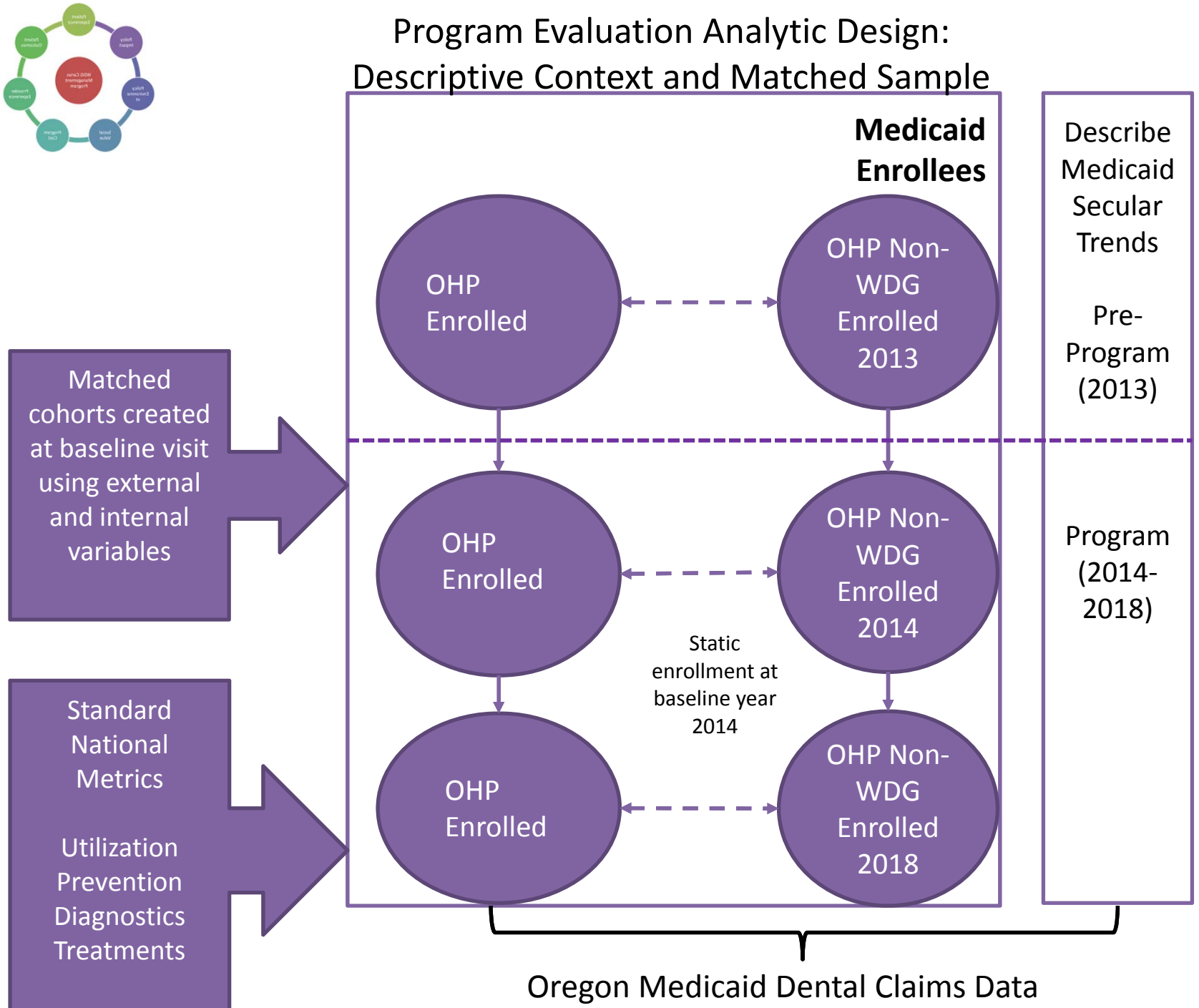
	Total pop 0-18	Total pop >90 continuous days of coverage		Pop >90 continuous days of coverage and any WDG enrollment		100% WDG pop >90 continuous days of coverage	
Year	n	n	%	n	%	n	%
2013	450,006	428,079	95.13%	52,767	14.06%	38,279	72.54%
2014	497,878	476,156	95.64%	43,918	10.16%	40,123	91.36%
2015	523,227	503,337	96.20%	43,008	9.34%	32,054	74.53%

Among OHP eligibles receiving any service: Total receiving either treatment for caries or a caries-preventive procedure

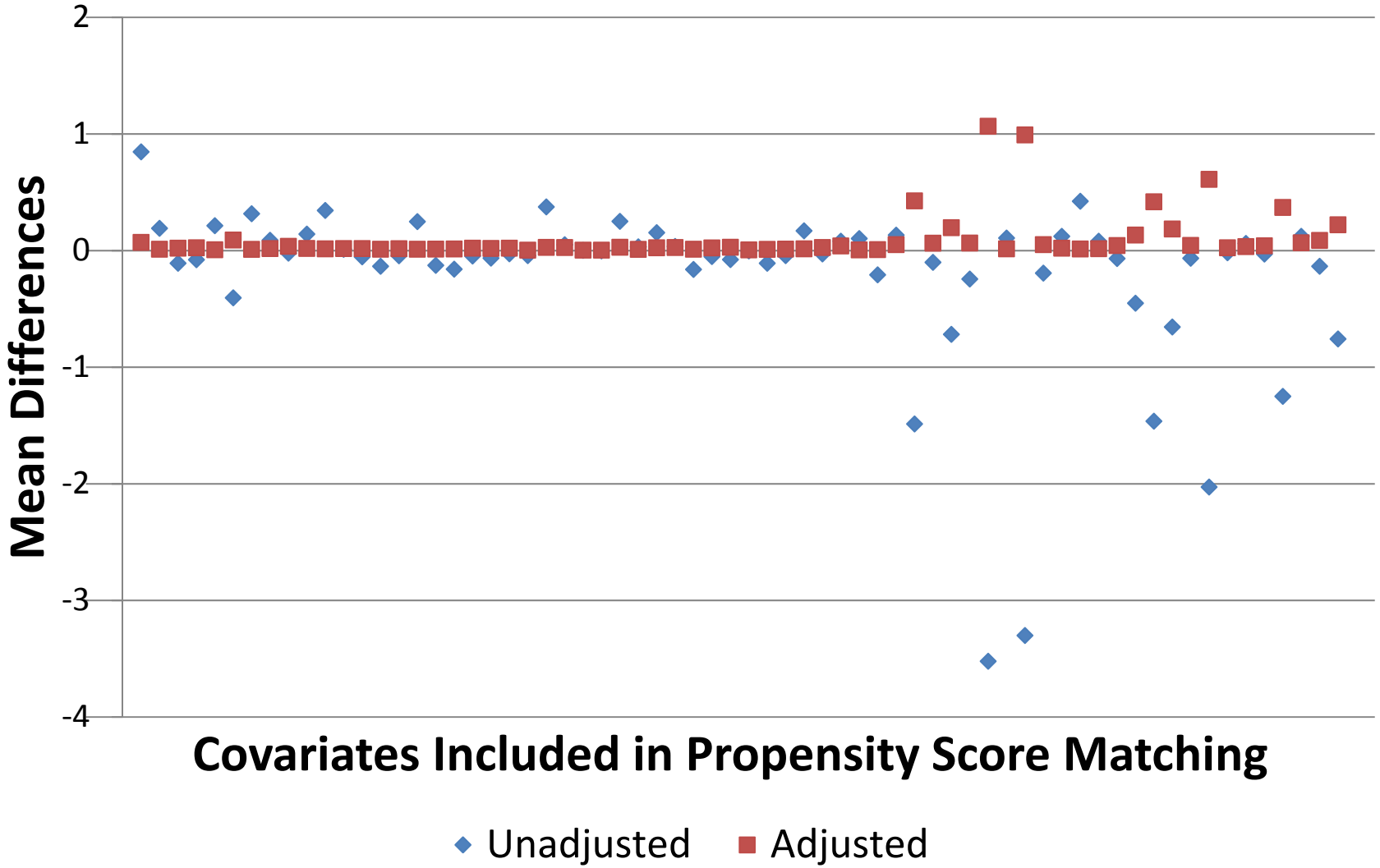
(Metric recreated from MRMIB CHIP Quality Report, California)



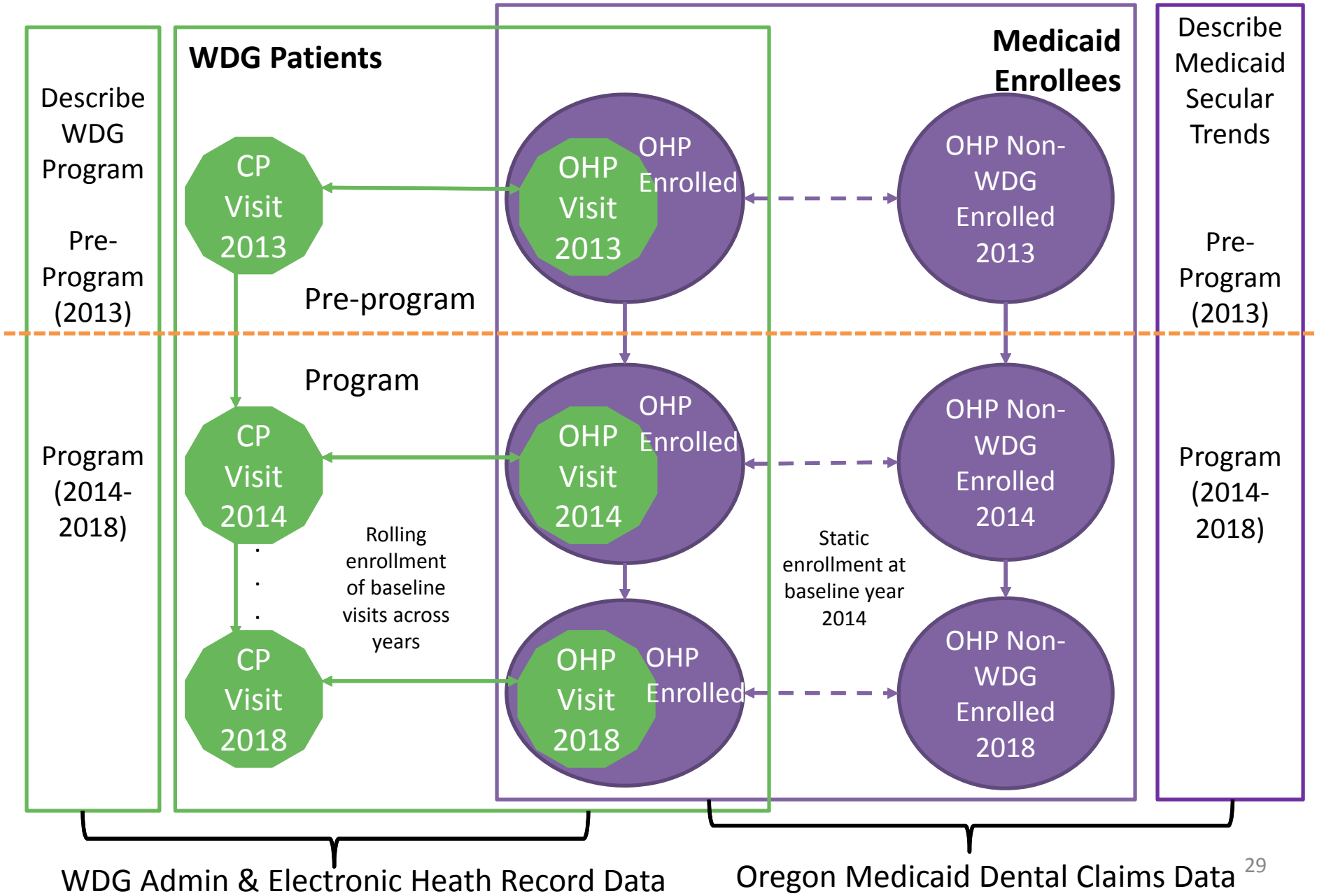
Program Evaluation Analytic Design: Descriptive Context and Matched Sample



Preliminary Cohort Selection (Claims)



Relationship of Internal and External Parallel Matched Samples



Assessing Data Quality

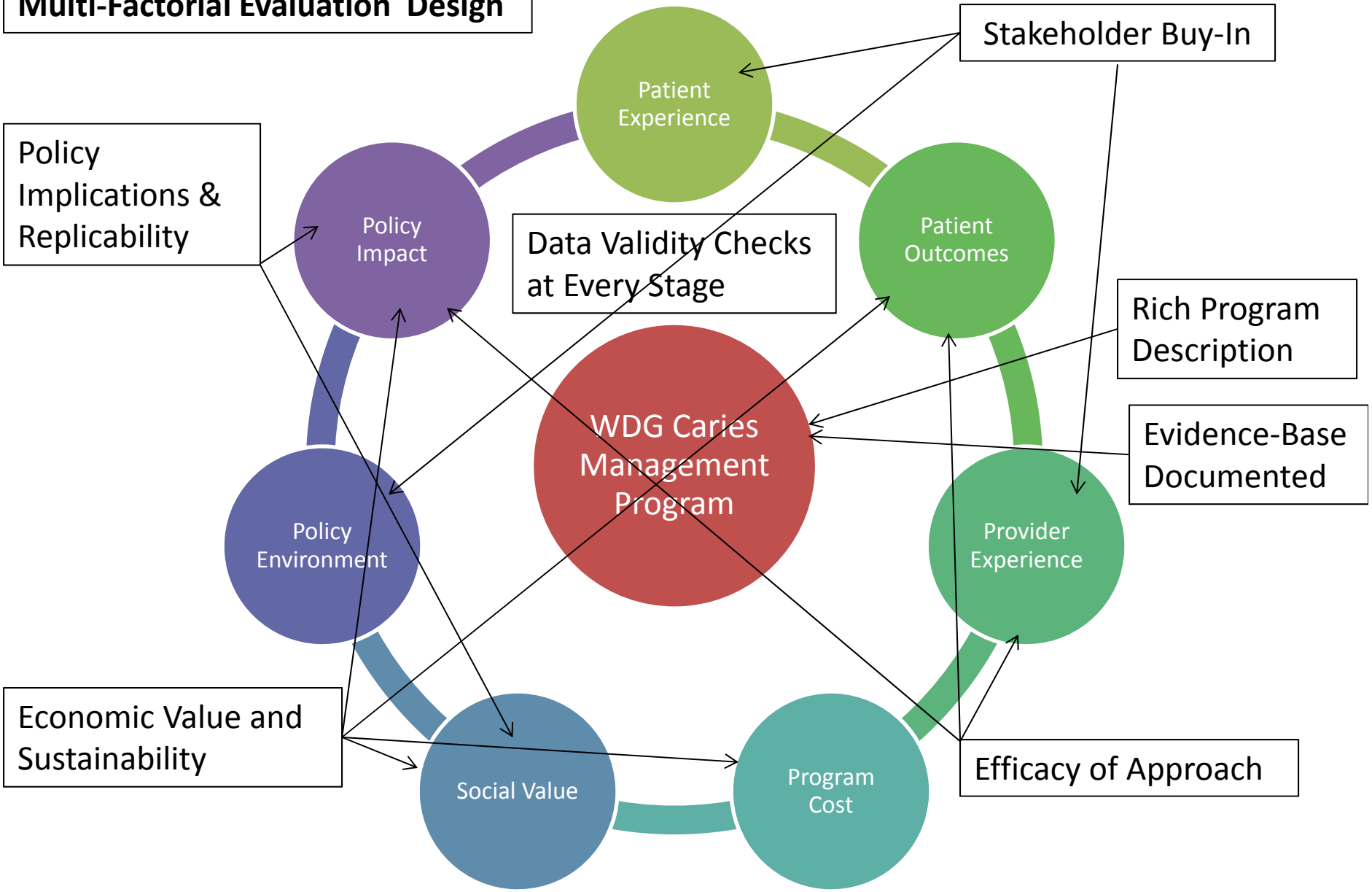
Table 1. Data Quality Dimensions Determining Fitness for Use of Research Data

Dimension	Conceptual definition	Operational examples
Completeness	Presence of the necessary data	Presence of necessary data elements, percent of missing values for a data element, percent of records with sufficient data to calculate a required variable (e.g., an outcome)
Accuracy	Closeness of agreement between a data value and the true value*	Percent of data values found to be in error based on a gold standard, percent of physically implausible values, percent of data values that do not conform to range expectations
Consistency	Relevant uniformity in data across clinical investigation sites, facilities, departments, units within a facility, providers, or other assessors	Comparable proportions of relevant diagnoses across sites, comparable proportions of documented order fulfillment (e.g., returned procedure report for ordered diagnostic tests)

**Consistent with the International Organization for Standardization (ISO) 8000 Part 2 definition of accuracy,[7] replaced "property value" in the ISO 8000 definition with "data value" for consistency with the language used in clinical research.*

Zozus MN, Hammond EH, Green BB, Kahn MG, Richesson R, Rusincovitch SA, Simon GE, Smerek MM. Assessing Data Quality for Healthcare Systems Data Used in Clinical Research (Version 1.0). NIH Health Care Systems Research Collaboratory. 07/28/2014. https://sites.duke.edu/rethinkingclinicaltrials/assessing-data-quality/

Multi-Factorial Evaluation Design



Questions?
Feedback?
Publication Suggestions?

Thank you!