

Supplemental Digital Content

SDC Table 1. Search strategies

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R)
<1946 to August 25, 2020>

#	Searches
1	exp health benefit plans, employee/
2	(Employer* or "employer sponsored" or "employer based" or "employer-led" or "self-insured" or "self-insurance" or "self-funded").ti,ab,kw.
3	1 or 2
4	exp Health Maintenance Organizations/
5	exp Managed Care Programs/
6	exp medication therapy management/
7	exp Telemedicine/
8	exp Concurrent Review/
9	exp Patient-Centered Care/
10	exp Accountable Care Organizations/
11	exp Deductibles/ and coinsurance/
12	exp cost sharing/
13	exp value-based purchasing/
14	("consumer-directed" or "Value-based" or "health maintenance organization*" or "managed care" or "preferred provider organization*" or "High deductible health plan" or "High deductible health plans" or "Contingent coverage" or "preauthorization" or "medication therapy manag*" or "Pharmaceutical benefit manag*" or Telemedicine or telehealth or "Worksite clinic*" or "Retail clinic*" or "On-site clinic*" or "Near Site clinic*" or Preauthorization or "Step therapy" or Precertification or "Concurrent Review*" or "Continued stay review*" or "Carve-out*" or "carveout*" or "carve out*" or "Patient-Centered Care" or "medical home*" or "Accountable Care Organization*" or "co-payment" or co-pay* or copayment* or copay* or co-insurance or coinsurance or "Cost sharing" or "Separate deductible*" or "Specialty drug*" or "specialty medication*" or Formular* or "Preferred drug*" or "Maintenance drug*" or "Mail order" or "bundled payment*" or "global payment" or "global payments" or capitation or capitated).ti,ab,kw.

15	("Tiered network*" or "Narrow network*" or "reference pricing" or "transparency" or "Centers of excellence").ti,kw,ab.
16	("health benefit" or "health benefits").ti,kw,ab.
17	"health plan*".ti,kw,ab.
18	insurance.ti,ab,kw.
19	16 or 17 or 18
20	15 and 19
21	4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 20
22	exp costs/ and cost analysis/
23	exp cost sharing/
24	exp drug costs/
25	exp cost of illness/
26	exp deductibles/ and coinsurance/
27	economics.fs.
28	(cost or costs or economic* or value or copay* or copayment* or premium* or "return on investment" or ROI or "total claims").ti,ab,kw.
29	(spend* and (health or healthcare or benefit* or plan or plans)).ti,kw,ab.
30	22 or 23 or 24 or 25 or 26 or 27 or 28 or 29
31	3 and 21 and 30
32	limit 31 to (address or editorial or interview or letter or news or newspaper article)
33	31 not 32

SCOPUS

(TITLE-ABS-KEY (employer* OR "employer sponsored" OR "employer based" OR "employer-led" OR "self-insured" OR "self-insurance" OR "self-funded"))

AND

((TITLE-ABS-KEY ("consumer-directed" OR "Value-based" OR "health maintenance organization*" OR "managed care" OR "preferred provider organization*" OR "High deductible health plan" OR "High deductible health plans" OR "Contingent coverage" OR preauthorization OR "Step therapy" OR precertification OR "Concurrent Review*" OR "Continued stay review*" OR "Carve-out*" OR

"carveout*" OR "carve out*" OR "Patient-Centered Care" OR "medical home*" OR "Accountable Care Organization*" OR "co-payment" OR co-pay* OR copayment* OR copay* OR co-insurance OR coinsurance OR "Cost sharing" OR "Separate deductible*" OR "Specialty drug*" OR formular* OR "Preferred drug*" OR "Maintenance drug*" OR "Mail order" OR "bundled payment*" OR "bundled payment*" OR "global payment*" OR capitation OR capitated)) OR (TITLE-ABS-KEY ("Tiered network*" OR "Narrow network*" OR "reference pricing" OR "transparency" OR "Centers of excellence") AND TITLE-ABS-KEY ("health benefit" OR "health benefits" OR "health plan*" OR insurance)))

AND

((TITLE-ABS-KEY (cost or costs or economic* or value or copay* or copayment* or premium* or "return on investment" or ROI or "total claims")))

Excluded: letters, editorials, notes, trade journals (pub type)

Value-based insurance design string:

((TITLE-ABS-KEY ("consumer-directed" OR "Value-based" OR "health maintenance organization*" OR "managed care" OR "preferred provider organization*" OR "High deductible health plan" OR "High deductible health plans" OR "Contingent coverage" OR preauthorization OR "Step therapy" OR precertification OR "Concurrent Review*" OR "Continued stay review*" OR "Carve-out*" OR "carveout*" OR "carve out*" OR "Patient-Centered Care" OR "medical home*" OR "Accountable Care Organization*" OR "co-payment" OR co-pay* OR copayment* OR copay* OR co-insurance OR coinsurance OR "Cost sharing" OR "Separate deductible*" OR "Specialty drug*" OR formular* OR "Preferred drug*" OR "Maintenance drug*" OR "Mail order" OR "bundled payment*" OR "bundled payment*" OR "global payment*" OR capitation OR capitated)) OR (TITLE-ABS-KEY ("Tiered network*" OR "Narrow network*" OR "reference pricing" OR "transparency" OR "Centers of excellence") AND TITLE-ABS-KEY ("health benefit" OR "health benefits" OR "health plan*" OR insurance))) AND (TITLE-ABS-KEY ("value-based insurance" OR "value-based health insurance" OR "value-based healthcare insurance" or "value-based benefit*" OR "value-based pricing"))

Excluded: letters, editorials, notes, trade journals (pub type)

Business Source Premier (Ebsco)

S14	S10 AND S13
S13	S11 OR S12
S12	TI (cost or costs or economic* or value or copay* or copayment* or premium* or "return on investment" or ROI or "total claims") OR AB (cost or costs or economic* or value or copay* or copayment* or premium* or "return on investment" or ROI or "total claims") OR KW (cost or costs or economic* or

	value or copay* or copayment* or premium* or "return on investment" or ROI or "total claims")
S11	((DE "COST" OR DE "AGENCY costs" OR DE "AIRPLANE costs" OR DE "ARBITRATION & award costs" OR DE "BEVERAGE processing plant costs" OR DE "BOILER costs" OR DE "CAPITAL costs" OR DE "CHEMICAL plant costs" OR DE "CONSTRUCTION costs" OR DE "COST effectiveness" OR DE "COST overruns" OR DE "DIRECTIONAL drilling costs" OR DE "DRILLING platform costs" OR DE "ELECTRONIC data processing costs" OR DE "EMPLOYEE training costs" OR DE "FUEL costs" OR DE "HEATING costs" OR DE "HISTORICAL costs (Accounting)" OR DE "INDUSTRIAL costs" OR DE "INSURANCE costs" OR DE "INTEREST costs" OR DE "INVENTORY costs" OR DE "LIGHTING costs" OR DE "MACHINE shop costs" OR DE "MAINTENANCE department costs" OR DE "NATURAL gas pipeline costs" OR DE "NEW product development costs" OR DE "OFFSHORE oil & gas industry costs" OR DE "OFFSHORE oil well drilling costs" OR DE "OPERATING costs" OR DE "OPPORTUNITY costs" OR DE "PACKAGING costs" OR DE "PETROLEUM industry -- Costs" OR DE "PRICE markup" OR DE "PRICES" OR DE "QUALITY control costs" OR DE "RADIOACTIVE waste disposal costs" OR DE "RENEWABLE energy costs" OR DE "ROAD costs" OR DE "SETTLEMENT costs" OR DE "SEWAGE disposal plant costs" OR DE "SPACE station costs" OR DE "SUPERCONDUCTING Super Collider costs" OR DE "TELEVISION broadcasting costs" OR DE "TRANSACTION costs" OR DE "TRAVEL costs" OR DE "UNDERWATER drilling costs" OR DE "URBAN transportation costs" OR DE "USER charges" OR DE "VALUE (Economics)" OR DE "VARIABLE costs" OR DE "WAREHOUSE costs" OR DE "WATER utility costs" OR DE "WEAPONS costs" OR DE "WOODSHOP costs" OR DE "WORK-related injury costs" OR DE "WORKERS' compensation costs" OR DE "ADMINISTRATIVE fees" OR DE "BUSINESS losses" OR DE "COST control" OR DE "FINANCIAL management") OR (DE "COST shifting")) OR (DE "DEDUCTIBLES (Insurance)") OR (DE "COINSURANCE")
S10	S3 AND S9
S9	S4 OR S5 OR S8
S8	S6 AND S7
S7	TI ("health benefit" or "health benefits" or health plan* OR Insurance) OR AB ("health benefit" or "health benefits" or health plan* OR Insurance) OR KW ("health benefit" or "health benefits" or health plan* OR Insurance)
S6	TI ("Tiered network*" or "Narrow network*" or "reference pricing" or "transparency" or "Centers of excellence") OR AB ("Tiered network*" or "Narrow network*" or "reference pricing" or "transparency" or "Centers of excellence") OR KW ("Tiered network*" or "Narrow network*" or "reference pricing" or "transparency" or "Centers of excellence")
S5	TI ("consumer-directed" or "Value-based" or "health maintenance organization*" or "managed care" or "preferred provider organization*" or "High deductible health plan" or "High deductible health plans" or "Contingent coverage" or "preauthorization" or "medication therapy manag*" or "Pharmaceutical benefit manag*" or Telemedicine or telehealth or "Worksite clinic*" or "Retail clinic*" or "On-site clinic*" or "Near Site clinic*" or Preauthorization or "Step therapy" or

	<p>Precertification or "Concurrent Review*" or "Continued stay review*" or "Carve-out*" or "carveout*" or "carve out*" or "Patient-Centered Care" or "medical home*" or "Accountable Care Organization*" or "co-payment" or co-pay* or copayment* or copay* or co-insurance or coinsurance or "Cost sharing" or "Separate deductible*" or "Specialty drug*" or Formular* or "Preferred drug*" or "Maintenance drug*" or "Mail order" OR "bundled payment*" OR "bundled payment*" OR "global payment*" OR capitation OR capitated) OR AB ("consumer-directed" or "Value-based" or "health maintenance organization*" or "managed care" or "preferred provider organization*" or "High deductible health plan" or "High deductible health plans" or "Contingent coverage" or "preauthorization" or "medication therapy manag*" or "Pharmaceutical benefit manag*" or Telemedicine or telehealth or "Worksite clinic*" or "Retail clinic*" or "On-site clinic*" or "Near Site clinic*" or Preauthorization or "Step therapy" or Precertification or "Concurrent Review*" or "Continued stay review*" or "Carve-out*" or "carveout*" or "carve out*" or "Patient-Centered Care" or "medical home*" or "Accountable Care Organization*" or "co-payment" or co-pay* or copayment* or copay* or co-insurance or coinsurance or "Cost sharing" or "Separate deductible*" or "Specialty drug*" or Formular* or "Preferred drug*" or "Maintenance drug*" or "Mail order" OR "bundled payment*" OR "bundled payment*" OR "global payment*" OR capitation OR capitated) OR KW ("consumer-directed" or "Value-based" or "health maintenance organization*" or "managed care" or "preferred provider organization*" or "High deductible health plan" or "High deductible health plans" or "Contingent coverage" or "preauthorization" or "medication therapy manag*" or "Pharmaceutical benefit manag*" or Telemedicine or telehealth or "Worksite clinic*" or "Retail clinic*" or "On-site clinic*" or "Near Site clinic*" or Preauthorization or "Step therapy" or Precertification or "Concurrent Review*" or "Continued stay review*" or "Carve-out*" or "carveout*" or "carve out*" or "Patient-Centered Care" or "medical home*" or "Accountable Care Organization*" or "co-payment" or co-pay* or copayment* or copay* or co-insurance or coinsurance or "Cost sharing" or "Separate deductible*" or "Specialty drug*" or Formular* or "Preferred drug*" or "Maintenance drug*" or "Mail order" OR "bundled payment*" OR "bundled payment*" OR "global payment*" OR capitation OR capitated)</p>
S4	<p>(((((DE "HEALTH maintenance organization medical offices") OR (DE "MANAGED care plans (Medical care)" OR DE "ACCOUNTABLE care organizations" OR DE "HEALTH maintenance organizations" OR DE "PREFERRED provider organizations (Medical care)" OR DE "PROVIDER-sponsored organizations (Medical care)")) OR (DE "DEDUCTIBLES (Insurance)") OR (DE "COINSURANCE")) OR (DE "COST shifting" OR DE "COST shifting in employer-based health insurance")) OR (DE "VALUE-based purchasing (Medical care)"))</p>
S3	S1 OR S2
S2	<p>TI (Employer* or "employer sponsored" or "employer based" or "employer-led" or "self-insured" or "self-insurance" or "self-funded") OR AB (Employer* or "employer sponsored" or "employer based" or "employer-led" or "self-insured" or "self-insurance" or "self-funded") OR KW (Employer* or "employer sponsored" or "employer based" or "employer-led" or "self-insured" or "self-insurance" or "self-funded")</p>

S1	(DE "EMPLOYER-sponsored health insurance" OR DE "MULTIPLE employer trusts") AND (DE "EMPLOYER health care coalitions" OR DE "EMPLOYER-sponsored health insurance costs" OR DE "COST shifting in employer-based health insurance" OR DE "COST control in employer-sponsored health insurance")
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Limit to Academic journals

VBID string:

DE "VALUE-based purchasing (Medical care)" OR TI (("value-based insurance" OR "value-based health insurance" OR "value-based healthcare insurance" or "value-based benefit*" OR "value-based pricing") OR AB ("value-based insurance" OR "value-based health insurance" OR "value-based healthcare insurance" or "value-based benefit*" OR "value-based pricing"))

+ Costs string (S13 in original search)

Limit to Academic journals

ABI/Inform (Proquest)

((MAINSUBJECT.EXACT("Group health insurance") OR noft(Employer* OR "employer sponsored" OR "employer based" OR "employer-led" OR "self-insured" OR "self-insurance" OR "self-funded"))

AND (((MAINSUBJECT.EXACT("Managed care") OR MAINSUBJECT.EXACT("Drug formularies") OR MAINSUBJECT.EXACT("PHOs")) OR MAINSUBJECT.EXACT("Health maintenance organizations HMOs") OR MAINSUBJECT.EXACT("Pharmacy benefit management") OR MAINSUBJECT.EXACT("Accountable care organizations") OR MAINSUBJECT.EXACT("Coinsurance") OR MAINSUBJECT.EXACT("Cost sharing")) OR noft("consumer-directed" OR "Value-based" OR "health maintenance organization*" OR "managed care" OR "preferred provider organization*" OR "High deductible health plan" OR "High deductible health plans" OR "Contingent coverage" OR "preauthorization" OR "medication therapy manag*" OR "Pharmaceutical benefit manag*" OR Telemedicine OR telehealth OR "Worksite clinic*" OR "Retail clinic*" OR "On-site clinic*" OR "Near Site clinic*" OR Preauthorization OR "Step therapy" OR Precertification OR "Concurrent Review*" OR "Continued stay review*" OR "Carve-out*" OR "carveout*" OR "carve out*" OR "Patient-Centered Care" OR "medical home*" OR "Accountable Care Organization*" OR "co-payment" OR co-pay* OR copayment* OR copay* OR co-insurance OR coinsurance OR "Cost sharing" OR "Separate deductible*" OR "Specialty drug*" OR "specialty medication*" OR Formular* OR "Preferred drug*" OR "Maintenance drug*" OR "Mail order" OR "bundled payment*" OR "global payment" OR "global payments" OR capitation OR capitated))

OR (noft("Tiered network*" or "Narrow network*" or "reference pricing" or "transparency" or "Centers of excellence") AND noft("health benefit" or "health benefits" or "health plan*" Or insurance))))

AND ((MAINSUBJECT.EXACT("Direct costs") OR MAINSUBJECT.EXACT("Payroll costs") OR MAINSUBJECT.EXACT("Costs") OR MAINSUBJECT.EXACT("Direct labor costs") OR

MAINSUBJECT.EXACT("Overhead costs") OR MAINSUBJECT.EXACT("Labor costs")) OR
MAINSUBJECT.EXACT("Deductible coverage") OR MAINSUBJECT.EXACT("Coinsurance") OR
MAINSUBJECT.EXACT("Cost sharing") OR noft(cost OR costs OR economic* OR value OR copay* OR
copayment* OR premium* OR "return on investment" OR ROI OR "total claims") OR noft((spend* AND
(health OR healthcare OR benefit* OR plan OR plans)))

Limit to Scholarly Journals

VBID string:

noft("value-based insurance" OR "value-based health insurance" OR "value-based healthcare insurance"
or "value-based benefit*" OR "value-based pricing" OR VBID)

Limit to scholarly journals

PAIS (Public Affairs Index Service)

noft(Employer* OR "employer sponsored" OR "employer based" OR "employer-led" OR "self-insured"
OR "self-insurance" OR "self-funded") AND ((MAINSUBJECT.EXACT.EXPLODE("Managed Care Services")
OR MAINSUBJECT.EXACT.EXPLODE("Telemedicine") OR noft("consumer-directed" OR "Value-based" OR
"health maintenance organization*" OR "managed care" OR "preferred provider organization*" OR
"High deductible health plan" OR "High deductible health plans" OR "Contingent coverage" OR
"preauthorization" OR "medication therapy manag*" OR "Pharmaceutical benefit manag*" OR
Telemedicine OR telehealth OR "Worksite clinic*" OR "Retail clinic*" OR "On-site clinic*" OR "Near Site
clinic*" OR Preauthorization OR "Step therapy" OR Precertification OR "Concurrent Review*" OR
"Continued stay review*" OR "Carve-out*" OR "carveout*" OR "carve out*" OR "Patient-Centered Care"
OR "medical home*" OR "Accountable Care Organization*" OR "co-payment" OR co-pay* OR
copayment* OR copay* OR co-insurance OR coinsurance OR "Cost sharing" OR "Separate deductible*"
OR "Specialty drug*" OR "specialty medication*" OR Formular* OR "Preferred drug*" OR "Maintenance
drug*" OR "Mail order" OR "bundled payment*" OR "global payment" OR "global payments" OR
capitation OR capitated)) OR (noft("Tiered network*" OR "Narrow network*" OR "reference pricing" OR
"transparency" OR "Centers of excellence") AND noft("health benefit" OR "health benefits" OR "health
plan*" OR insurance))) AND (MAINSUBJECT.EXACT.EXPLODE("Cost Containment") OR
(MAINSUBJECT.EXACT("Costs") OR MAINSUBJECT.EXACT.EXPLODE("Cost Sharing") OR
MAINSUBJECT.EXACT.EXPLODE("Health Care Costs") OR MAINSUBJECT.EXACT("Cost-Benefit Analysis")
OR MAINSUBJECT.EXACT.EXPLODE("Cost Effectiveness")) OR noft(cost OR costs OR economic* OR value
OR copay* OR copayment* OR premium* OR "return on investment" OR ROI OR "total claims") OR
noft(spend* AND (health OR healthcare OR benefit* OR plan OR plans)))

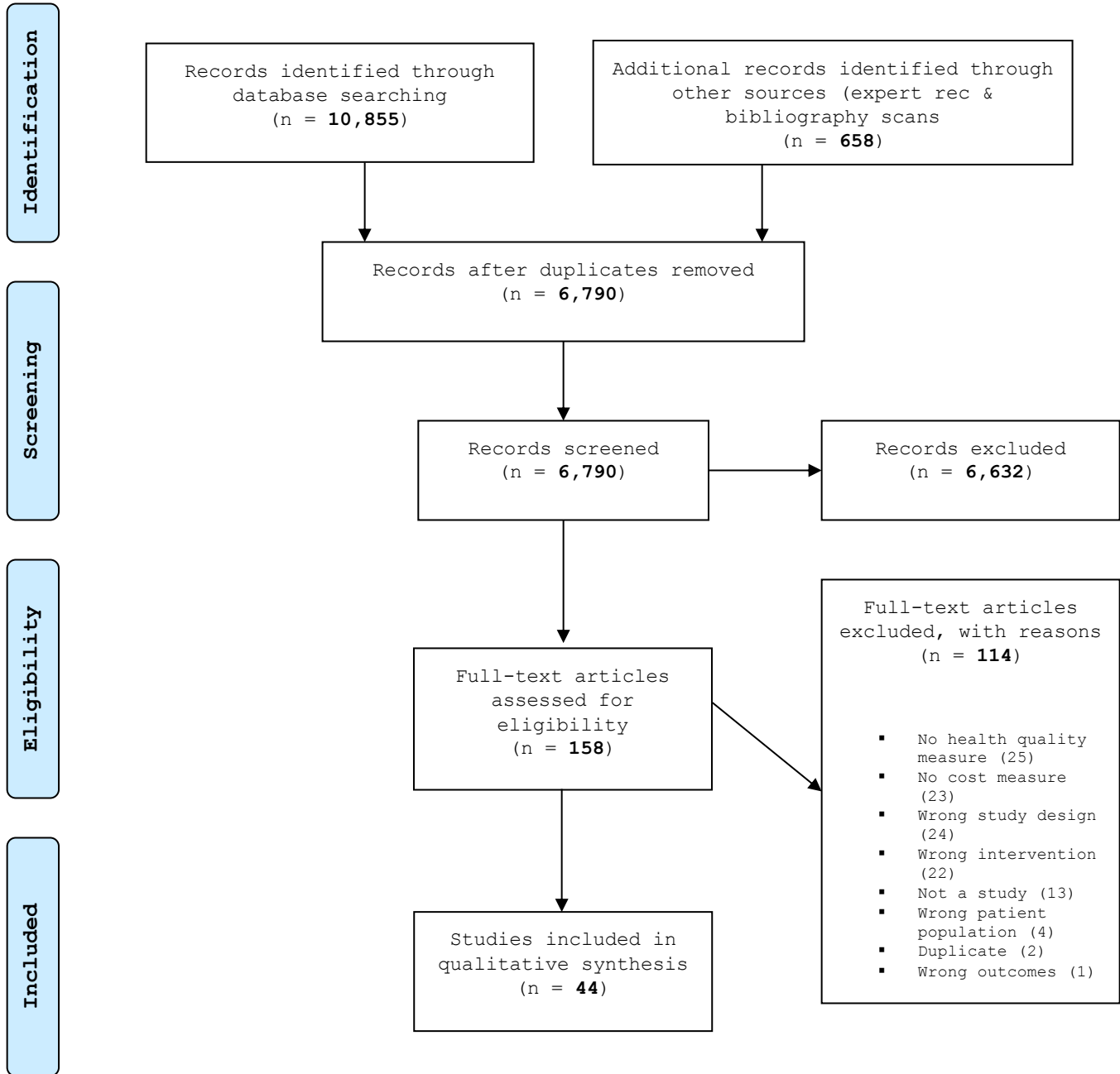
Limit to scholarly journals

VBID string:

noft("value-based insurance" OR "value-based health insurance" OR "value-based healthcare insurance"
or "value-based benefit*" OR "value-based pricing" OR VBID)

Limit to scholarly journals

SDC Table 2. PRISMA Flow Diagram



SDC Table 3. Summary Table

Efforts to Promote Access to High-Value Services

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Employer Spending Outcome	Health Outcomes	Quality assessment
<i>Access to Primary Care</i>	Sepulveda et al., 2016 ³⁵	Eliminated cost-sharing for primary care	Observational	Dependents less than age 18	N = 51,900	2 years	No significant change	Significantly beneficial	Good
	Glass et al., 2017 ³⁶	Implemented an onsite clinic with no copay	Observational	Employees and dependents	N = 543,373	7 years	Significantly adverse	Significantly beneficial	Fair
	Reeves & Kapp, 2013 ³⁷	Patient centered health home	Observational	Employees and adult beneficiaries	N = 615	3 years	Significantly beneficial	Significantly beneficial	Poor
	Ma et al., 2019 ³⁸	Eliminated cost-sharing for primary care	Quasi-experimental	Employees and dependents	N = 51,450	6 years	Significantly beneficial	Significantly beneficial	Fair
<i>Cost Sharing for Physical Therapy</i>	Maeng et al., 2017 ³⁹	Reduced copay for physical therapy for back pain	Observational	Adults with employer-sponsored health plans	N = 4,390	22 months	No significant change	Significantly beneficial	Fair
<i>Cost Sharing for Substance Abuse Treatment</i>	LoSasso & Lyons, 2002 ⁴⁰	Reduced copayments for substance abuse treatment	Observational	Persons with at least one diagnosis of alcohol or drug abuse or dependence	N = 943	180 days	Significantly adverse	Significantly beneficial	Poor
<i>Cost Sharing for Low-Value Services</i>	Gruber et al., 2020 ⁴¹	Increased cost sharing for low-value care	Quasi-experimental	Current or retired employees and dependents	N = 1,189,390	5 years	No change	Significantly beneficial	Fair

Efforts to Redesign Payment Models or Health Plans

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Employer Spending Outcome	Health Outcomes	Quality assessment
<i>HDHP-SO</i>	Wharam et al., 2018 ⁴⁵	HDHP-SO	Quasi-experimental	Commercially insured members in the Optum database	N=216,334	10 years	Significantly beneficial	Mixed results	Good
	Brot-Goldberg et al., 2017 ⁴²	HDHP-SO	Quasi-experimental	Employees and dependents	n=76,759	10 years	Significantly beneficial	Significantly adverse	Good
	Nair et al., 2009 ⁴³	HDHP-SO	Observational	Employees and dependents	N=8,794	2 years	No significant change	Significantly adverse	Poor
	Kozhimannil et al., 2011 ⁴⁴	HDHP-SO	Quasi-experimental	Women insured by Harvard Pilgrim Health Care	N=2,409	9 months	Significantly beneficial	No significant change	Fair
	Charlton et al., 2011 ⁴⁶	HDHP-SO	Quasi-experimental	Individuals covered through large Midwestern transport companies	N=3,474	4 years	Significantly beneficial	Significantly adverse	Fair
	Beeuwkes Buntin et al., 2011 ⁴⁷	HDHP-SO	Observational	Employees and dependents	N=808,707	2 years	Significantly beneficial	Significantly adverse	Fair
<i>Alternative Payment Model</i>	Song et al., 2014 ⁴⁸	Global budget	Observational	Employees and dependents	N=2,315,048	4 years	Significantly beneficial	Significantly beneficial	Good
	Lawler et al., 2017 ⁵⁰	Bundled payments	Observational	Employees, retirees, and dependents	N=5,907	1 year	No Significant Change	Mixed results	Fair
	Robinson et al., 2015 ⁴⁹	Reference payment for colonoscopy	Observational	Employees and dependent who underwent colonoscopy	N=293,811	5 years	Significantly beneficial	No significant change	Poor
<i>Expansion of Health Plan Choice</i>	Kravitz et al., 1998 ⁵¹	Expansion of health plan offerings	Observational	CHAMPUS beneficiaries	N = 1,273,900	3 years	Beneficial	Beneficial	Fair

Efforts to Restructure Drug Benefits

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Cost outcome(s)	Quality outcome(s)	Quality assessment
<i>Cost Sharing for Medications to Manage Chronic Conditions</i>	Nair et al., 2010 ⁵²	Reduced copayments for diabetes medication	Quasi-experimental	Employees and dependents with diabetes	N = 589	2 years	Significantly beneficial	No significant change	Poor
	Choudhry et al., 2012 ⁵⁸	Reduced copayments for statins and clopidogrel	Observational	Employees and retirees	N = 52,631	2 years	No significant change	Mixed results	Good
	Gibson et al., 2011 ⁵⁷	Reduced cost sharing for asthma, hypertension, and diabetes medications	Observational	Employees and dependents	N = 50,130	4 years	No significant change	Significantly beneficial	Good
	Barron et al., 2012 ⁵⁹	Study 1: waived copayments plus education for patients with diabetes Study 2: copayment reduction for members with diabetes	Observational	Patients with at least 1 medical claim for diabetes or at least 1 pharmacy claim for an anti-diabetes agent	Study 1: N = 474 Study 2: N = 1,212	1.5 years	Significantly adverse	Significantly beneficial	Fair
	Reid et al., 2015 ⁶¹	Waived copayments for anxiety and depression medications plus disease management	Observational	Plan members who filled a prescription for an anxiety or depression medication or were diagnosed with anxiety or depression	N = 529	2 years	No significant change	Significantly beneficial	Poor

Efforts to Restructure Drug Benefits (continued)

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Cost outcome(s)	Quality outcome(s)	Quality assessment
<i>Cost Sharing for Medications to Manage Chronic Conditions</i>	Nair et al., 2009 ⁵³	Reduced prescription copays for brand-name diabetes medications and testing supplies	Quasi-experimental	Employees and dependents	N = 225	2 years	Significantly adverse	Significantly adverse	Poor
	Gibson et al., 2011 ⁵⁵	Reduced cost sharing for antidiabetic medications	Observational	Employees and dependents	N = 2,204	4 years	No significant change	Significantly beneficial	Fair
	D'Souza et al., 2010 ⁶²	Reduced copayments for select asthma medications plus education	Quasi-experimental	Employees and dependents with asthma	N = 764	2 years	No significant change in total spending	Significantly beneficial	Good
	Kelly et al., 2009 ⁶⁶	Reduced cost sharing for asthma, hypertension, and diabetes medications	Observational	Employees and dependents	N = 9,624	4 years	Mixed results	Beneficial change	Poor
	Clark et al., 2014 ⁶³	Eliminated cost sharing for generic medication for individuals with diabetes or high cholesterol	Quasi-experimental	Employees, dependents, and retiree plan participants	N = 4,596	3.5 years	Significantly beneficial	Significantly beneficial	Fair
	Thornton Snider et al., 2016 ⁶⁴	Reduced cost sharing for diabetes medications	Observational	Plan members with type 2 diabetes	N = 92,410	9 years	Adverse	Significantly adverse	Good

Efforts to Restructure Drug Benefits (continued)

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Cost outcome(s)	Quality outcome(s)	Quality assessment
<i>Cost Sharing for Medications to Manage Chronic Conditions</i>	Philipson et al., 2010 ⁶⁵	Reduced cost-sharing for antiplatelet therapy	Observational	Employees and dependents	N = 14,325	2 years	Significantly beneficial	Significantly beneficial	Fair
	Pesa et al., 2012 ⁵⁴	Reduced copayments for 30-day fill of antihypertensive medication	Observational	Beneficiaries with hypertension	N = 28,688	1 year	Significantly beneficial	Significantly beneficial	Good
	Gibson et al., 2006 ⁵⁶	Lowered cost sharing for statins	Observational	Plan members over 18 who used statins	N = 117,366	2.5 years	No significant change	Significantly beneficial	Fair
<i>Pharmacy Benefit Redesign</i>	Merrick, 1998 ⁶⁷	Behavioral health carve-out	Quasi-experimental	State employees and dependents	N = 2,259	2.5 years	Beneficial	Significantly beneficial	Poor
	Huskamp et al., 2003 ⁶⁸	Employer 1: Three-tier formulary with increased copayments Employer 2: three-tier formulary with increased copayments for nonpreferred drugs	Quasi-experimental	Employees and dependents	Employer 1: N = 111,518 Employer 2: N = 38,704	33 months	Employer 1: Significantly beneficial Employer 2: significantly beneficial	Employer 1: Significantly adverse Employer 2: Adverse	Good
	Shirneshan et al., 2016 ⁷⁰	Implementation of a more restrictive formulary	Observational	Employees and dependents of 3 employers	N = 182,280	2 years	Significantly beneficial	Mixed results	Fair
	Klepser et al., 2007 ⁷¹	4-tier coinsurance design	Observational	Plan members	N = 54,227	19 months	Significantly beneficial	Significantly adverse	Fair
	Smith et al., 2020 ⁷⁸	Carve in (vs Carve out) pharmacy benefit	Observational	Plan members	N = 331,390	2 years	Carve-in: significantly beneficial, compared to carve-out	Carve-in: significantly beneficial, compared to carve-out	Good
	Motheral & Henderson, 1999 ⁷⁹	Closed formulary	Quasi-experimental	Employer group beneficiaries	N = 5,890	1.5 years	Significantly beneficial	Significantly adverse	Fair

Efforts to Restructure Drug Benefits (continued)

Category	Study	Benefit Change	Study design	Population	Number of participants	Length of intervention/follow-up period	Cost outcome(s)	Quality outcome(s)	Quality assessment
<i>Pharmacy Benefit Redesign</i>	Fairman et al., 2003 ⁷³	Change from open formulary with 2 tiers to 3 tiers	Quasi-experimental	Plan members	N = 7,709	2.5 years	Significantly beneficial	No significant change	Fair
	Huskamp et al., 2005 ⁶⁹	3-tier formulary with increased copayments for all drugs	Quasi-experimental	Children treated for ADHD	N = 36,102	3 years	Significantly beneficial	Significantly adverse	Fair
	Mark et al., 2010 ⁷⁴	Step therapy for antidepressants	Observational	Employees and dependents	N = 60,796	4 years	Mixed results	Significantly adverse	Good
	Yeung et al., 2017 ⁷⁵	Revised cost sharing for medication based on value estimates	Observational	Employees and dependents	N = 7,201	7 years	No significant change	No significant change	Fair
	Miller et al., 2007 ⁷⁶	Formulary changes, quantity limits, and mandatory pill splitting	Quasi-experimental	Plan members	N = 10,728	3 years	Significantly beneficial	Potentially adverse	Good
	Brixner et al., 2007 ⁷¹	Two interventions: 1) copayment increase in the second or third tier of \$5 or greater, and 2) changing from copayment to coinsurance.	Observational	Beneficiaries with asthma, diabetes mellitus, hypertension, osteoarthritis, or allergic rhinitis	N = 8,848	2 years	No significant change	Mixed results	Fair
<i>Increased Copayments for Medications</i>	Motheral & Henderson, 1999 ⁷⁹	Increased copay for brand and generic drugs	Quasi-experimental	Employees and dependents	N = 3,184	1.5 years	Significantly beneficial	No significant change	Good