



The Impact of an Increasingly Toxic Drug Supply on Growing Morbidity Among People Who Inject Drugs

An Epidemiologic Update from the Field

Kentucky Overdose Prevention Summit
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Jon E. Zibbell, PhD

Senior Scientist
RTI International, Atlanta, GA

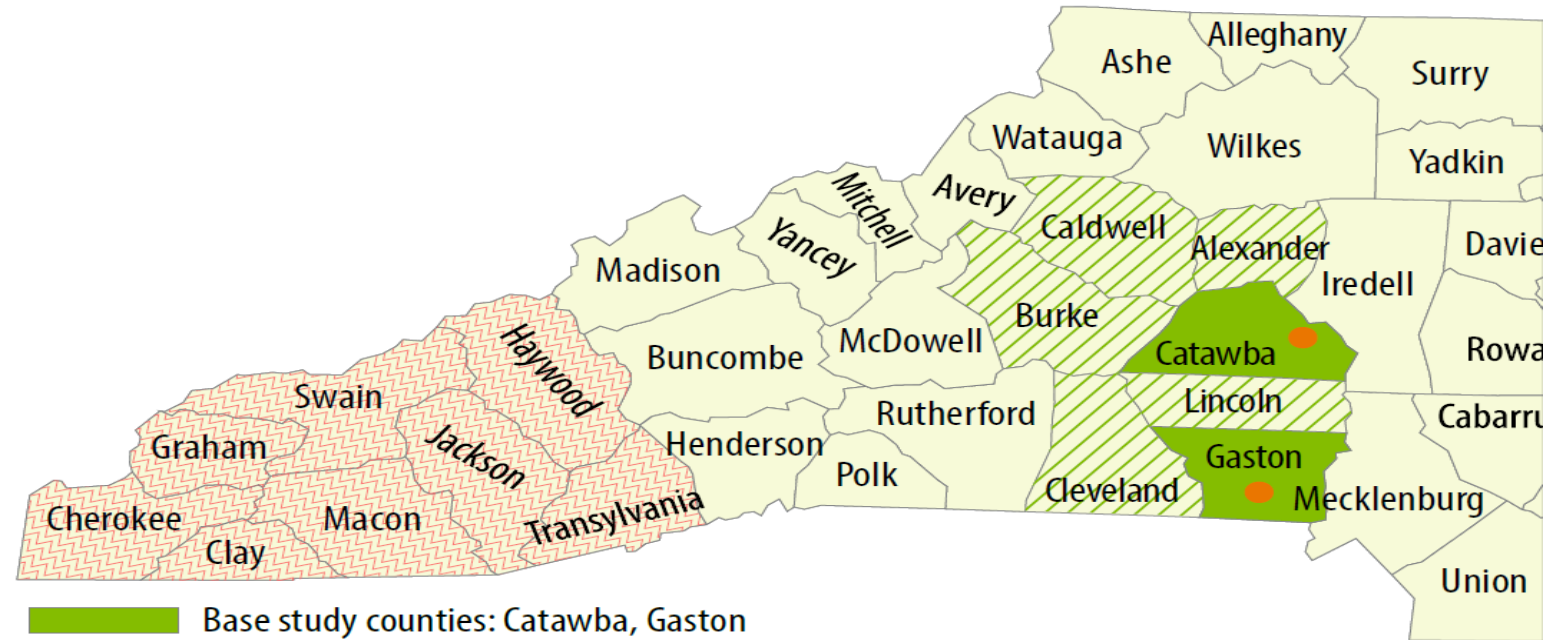
Conflict(s) of Interest

- No Disclosures or Conflicts of Interests to Report

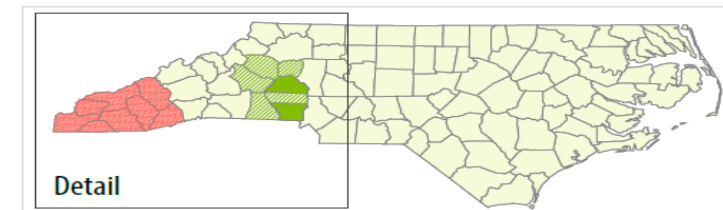
Objectives

- ❑ *Present* real-time evidence on the late fentanyl crisis, including supply and consumption patterns, overdose presentations, and infectious disease risk;
- ❑ *Demonstrate* how emerging sedative-adulterants (e.g., xylazine) are compounding risk, complicating response, and driving increases in morbidity, with a focus on novel X wounds;
- ❑ *Translate* recent study findings into actionable intelligence that you can take back to your communities and tailor to your local needs and capacity.

The Appalachian Foothills of West-Central North Carolina



-  Base study counties: Catawba, Gaston
-  Feeder counties
-  Base study sites: Hickory (Catawba), Gastonia (Gaston)
-  Counties from the Rural Opioid Initiative



Population-level changes in the number of PWID in the US

- ❑ The first update to the number of people who inject drugs in the U.S. in nearly ten years.
- ❑ There were an estimated **3,694,500 PWID in the U.S. in 2018**
 - (95% CI: 1,872,700–7,273,300)
 - 1.46% of the adult population (95% CI: 0.74% – 2.87%)
- ❑ From 1.5 million in 2012 to more than 3.6 million in 2018
- ❑ Findings suggest the population size of PWID has substantially grown in the past decade
- ❑ The estimated prevalence of injection drug use was highest among:
 - **male** persons (2.1%; 95% CI: 1.1–4.2%)
 - **non-Hispanic White** persons (1.8%; 95% CI: 0.9–3.6%)
 - adults aged **18–39 years** (1.8%; 0.9–3.6%)

Regional changes in fentanyl consumption among PWID

Drug and Alcohol Dependence 274 (2025) 112749

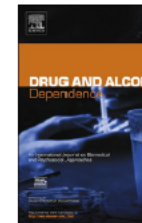


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Longitudinal patterns of opioid and stimulant use by route of administration among people who inject drugs in the South Atlantic Fentanyl Test Strip Study: A latent transition analysis

Nicholas Peiper^a, Arnie Aldridge^b, Stephen Tueller^b, Judith Feinberg^c,
Jon E. Zibbell^{b,*}

^a *University of Louisville, USA*

^b *RTI International, USA*

^c *West Virginia University, USA*

New Modeling Research on Injection-Related HIV & HCV Infections

Modeling the impact of changing drug markets and structural determinants on HCV and/or HIV transmission among people who inject drugs in the United States: A rural and urban comparison



Natasha K. Martin^{a,b,*}, Daniela Abramovitz^a, William H. Eger^a, Joseph R. Friedman^a, Annick Borquez^a, Jaskaran S. Cheema^a, Tara Stamos-Beusig^c, Jack Stone^b, Peter Vickerman^b, Heather Bradley^d, Ryan P. Westergaard^{e,1}, Steffanie A. Strathdee^{a,1}

^a Division of Infectious Diseases and Global Public Health, University of California San Diego, United States

^b School of Population Health Sciences, University of Bristol, United Kingdom

^c Harm Reduction Coalition San Diego, United States

^d Rollins School of Public Health, Emory University, United States

^e Division of Infectious Diseases, University of Wisconsin School of Medicine and Public Health, United States

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ABSTRACT

Background: The impact of changing drug use patterns on hepatitis C virus (HCV) and HIV incidence among people who inject drugs (PWID) in the US is understudied.

Methods: An HCV and HIV transmission model was calibrated to urban and rural area data (San Diego, CA and Central/Northern Wisconsin). Fentanyl use among PWID was assumed to increase mortality and injecting-related risk of HIV and HCV based on San Diego data. We predicted HCV/HIV incidence with recent trends (in fentanyl use, transition from injecting to smoking drugs, opiate agonist treatment (OAT) and incarceration), and scenarios with no trend changes since 2020. We calculated the population attributable fraction of fentanyl on incidence, comparing to a no fentanyl counterfactual from 2015 to 2025.

Results: High and increasing self-reported fentanyl use among PWID was observed in Central/Northern Wisconsin (20 % in 2018 to 45 % in 2021) and San Diego (51 % in 2021 to 66 % in 2023). Between 2015–2025, modeling suggests fentanyl use contributed to 18 % (95 %CI 9–25) and 34 % (95 %CI 26–45) of new HCV infections among PWID in Central/Northern Wisconsin and San Diego, respectively. Fentanyl contributed to 10 % (95 %CI 1–26) of HIV infections in San Diego; no HIV was observed among Central/Northern Wisconsin PWID. Fentanyl-associated risk was mitigated by increased OAT, reduced incarceration (Wisconsin), and shifts from injecting to smoking drugs (San Diego).

Conclusions: Fentanyl use increased HCV and/or HIV in an urban and rural area, suggesting expanded access to harm reduction, alongside interventions to reduce blood-borne virus transmission risk among PWID who use fentanyl are urgently needed.

- ❖ Between **2015–2025**, modeling suggests fentanyl use contributed to **18 % of new HCV infections** among PWID in Central/Northern Wisconsin and **34 %** among PWID in San Diego
- ❖ Fentanyl contributed to **10 % of HIV infections** in San Diego; no HIV was observed among Central/Northern Wisconsin PWID.

Drugs Identified in Samples by Expected vs. Lab-tested Results, NC March 2021–December 2023; N=1,144

Drug Expected	N	Heroin		Fentanyl		Xylazine		Cocaine		Meth-amphetamine	
		Primary	Trace	Primary	Trace	Primary	Trace	Primary	Trace	Primary	Trace
Heroin	238	4.2	0.8	79.0	5.9	28.6	10.1	15.1	15.5	10.1	7.6
Fentanyl	409	0.5 %	0.7 %	85.6	4.6	26.2	11.7	7.3	12.5	10.5	6.6
Heroin and Fentanyl	114	0.9	1.8	83.3	5.3	31.6	10.5	9.6	15.8	11.4	9.6
Xylazine	77	1.3	2.6	89.6	1.3	50.6	11.7	6.5	7.8	10.4	7.8
Xylazine and Fentanyl	73	1.4	2.7	93.2	1.4	52.1	12.3	5.5	8.2	9.6	6.8
Cocaine	48	0.0	0.0	10.4	4.2	2.1	2.1	89.6	2.1	2.1	2.1
Cocaine and Fentanyl	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
Meth-amphetamine	171	0.0	0.0	7.6	1.8	0.6	1.2	1.2	4.7	90.6	2.9
Meth-amphetamine and Fentanyl	13	0.0	0.0	53.8	7.7	7.7	7.7	0.0	23.1	61.5	23.1

Select Drug Sample Results Assumed to be Fentanyl

Burke County (2025)

- acetaminophen
- xylazine
- methamphetamine (T)
- caffeine
- lidocaine
- fentanyl

McDowell County (2025)

- methamphetamine (T)
- acetaminophen
- lidocaine
- fentanyl
- medetomidine
- xylazine
- phenethyl 4-ANPP

A word of caution for community drug checking in the era of novel, illicit, synthetic drugs...

From Property to Consequence: How Fentanyl Reshapes Drug Use & Drug-Related Harm

Property

Fentanyl is smokable at low heat

Heavy sedation & narcolepsy-like effects

Short duration of effect & rapid-onset withdrawal

Rapid onset & high potency

Consequence

- PWID are smoking fentanyl
- Presents viable alternative to injecting
- Reduces infectious disease risk
- Fentanyl resin is a cause for concern

- Unpredictable/Uncontrollable *Deep Sedation*
- Disrupts functioning/harder to hide use
- Qualitatively different from heroin 'nod'
- Feels more like sedative than an opioid

- Compulsive re-dosing with smoking & injecting
- Daily injections upwards of 30+
- Multiple injection per injection episode (MIPIE)
- Severe vein damage & rising SSTIs

- OD risk highest in first minutes;
- smoking = 80% bioavailability; injecting 100%
- 20% less bioavailability is too little to ignore!

Response

- Presence of Resin requires immediate action
- Resin makes stems/pipes hot commodities
- Resin can increase OD risk amongst fentanyl naïve persons

- A more manageable high when smoking
- Comes on slower & last longer when smoking
- Compulsory use of illicit stimulants to function

- Smoking reduces injection frequency
- YET: Smokers consume more fentanyl—by weight—compared with injectors
 - ergo, a more expensive habit

- No completely safe RoA with fentanyl
 - some are safer than others
- Frequent re-dosing needed regardless of method

Fentanyl's properties are not passive — they actively reshape use behavior, harm, and risk.

Xylazine: Pharmacology, Clinical Risk & Consumer Response: Epidemiologic Overview

Pharmacology & Physical Effects

MECHANISM & ORIGIN

- Alpha-2 Adrenergic agonist; clonidine analog
- Not FDA-approved for humans
- Used as veterinary anesthetic across species
- Kappa opioid activity observed in animal models

SEDATION PROFILE

- Extreme sedation (deep sleep) lasting hours
- Significantly worsens heavy sedation from fentanyl
- 'Knock-out effect'

SUPPLY & EPIDEMIOLOGY

- Adulterant in fentanyl; consumers know its presence
- Supply increasingly toxic but less lethal
- Rising morbidity amid declining OD mortality
- Stronger analogs (medetomidine) and other novel opioids (nitazenes) emerging

Adverse Health Consequences

CARDIOVASCULAR

- Hypotension — dangerous blood pressure drop
- Bradycardia — significantly slowed heart rate
- Severity of these effects precluded FDA approval

OVERDOSE COMPLICATIONS

- Naloxone has no effect on xylazine
- Breathing may resume but unconsciousness persists
- Standard OD protocols are insufficient
- Sustained monitoring required

DEPENDENCE & WITHDRAWAL

- Daily use produces physical dependence
- Xylazine withdrawal treated with clonidine
- Requires targeted clinical management
- Detoxes and hospitals need to be informed of multiple dependencies

SKIN & SOFT TISSUE

- Unknown mechanism — but thought to be auto-immune response that triggers skin cells to turn necrotic
- Wounds are deep, necrotic, and slow to heal

Consumer Harm Reduction

DETECTION

- Point-of-Use Test strips
- Community-based drug surveillance
- Subject Matter Experts

RESPONDING TO OVERDOSE

- Give naloxone to reverse the opioid component
- May need several doses 2 mins apart (e.g., benzo use)
- Do not leave them alone; unconsciousness can persist

REDUCING SEDATION HARM

- Try not to use alone; or ensure someone can respond
- Avoid positions that restrict airway or circulation
- Cardiovascular risk persists even if sedation tolerance develops

TREATMENT & DISCLOSURE

- Inform healthcare providers of xylazine use
- Opioid agonist therapy does not manage xylazine withdrawal
- Seek clinical support — benzo-type protocols may apply

Growing incidence of novel wounds is a public health crisis

- **Lost among skyrocketing OD deaths** is an alarming burden of SSTIs and invasive bacterial infections (e.g., endocarditis) among PWID
- **Abscesses and bacterial infections** have been a concern for PWID for decades but factors driving recent increases in prevalence and change in characteristics are poorly understood
- In this era of increasing contamination of the illicit drug supply with novel and synthetic drugs, **a new public health crisis is emerging**

A word about pictures...

Standing alone, photographs promise an understanding they cannot deliver.

In the company of words, they take on meaning, but they slough off one meaning and take on another with alarming ease

—Susan Sontag

Wound Typologies

Abscess



'Missed Shot'



X-wound



Growing Incidence of Deep, Necrotic Wounds

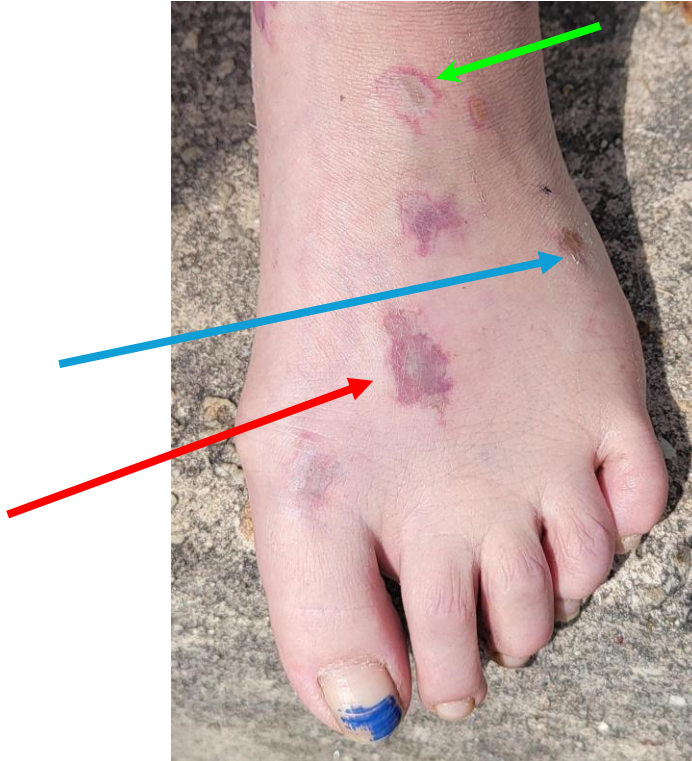
	Etiological Factors	Characteristics
Skin/Soft Tissue Infections		
	Injection Drug Use	Proximate to injection site
	Bacterial Exposure	Infectious with known standard of care
	Non-sterile injecting equipment	Vein damage
	High injection frequency	Manageable healing capacity
Novel Wounds		
	Sniffing, Smoking & Injecting	Often distal to injection site; mostly extremities & not trunk
	Not related to bacterial exposure	Chronic & non-infectious wounds require long-term care
	Illicit opioid adulterants (e.g., xylazine)	Distinct in presentation from SSTIs
	Xylazine: unknown mechanism of action	Witting & unwitting exposure

X-Wounds: Initial Presentation

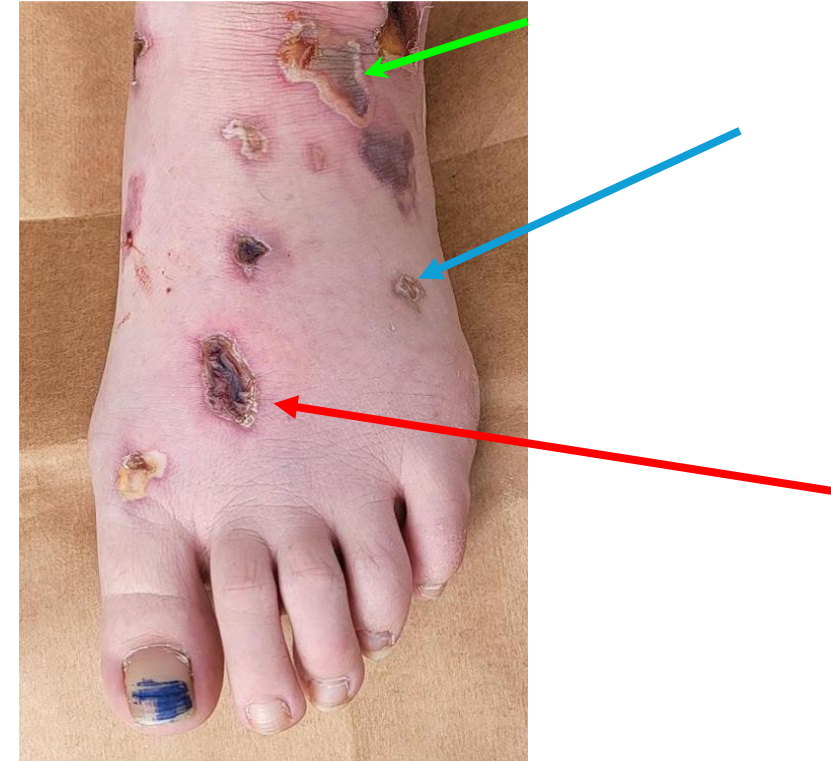


X-Wound Progression

+ - One Day



+ - Five Days



X-Wounds in Gastonia, NC



X-Wound, Gastonia, NC



X-Wounds, Gastonia, NC



X-Wounds in Baltimore & Philadelphia



Healing Progression of X-Wounds



Xylazine-Related Wounds and Sores: *Clinical Observation & Emerging Evidence*

What We Know

INFECTION & TREATMENT

- Early wounds are initially not infected
- Antibiotic intervention not typically required during healing

HEALING & PAIN

- Sores can heal — early care is critical
- Sores tend to be painless initially
- Large wounds (fist-sized+) present with less pain than expected

WOUND PRESENTATION & CARE

- Large, deep wounds do not begin as large sores
- Basic wound care greatly improves outcomes
- Wounds do not require airing out

SECONDARY PREVENTION

- Avoid injecting into or near wound edges
- Rotate injection sites to allow limb recovery

What We Now Understand

WHERE SORES APPEAR

- Can occur distal to injection sites
- May affect different limbs from where injection occurs
- Uncommon on trunk (unless at injection sites)

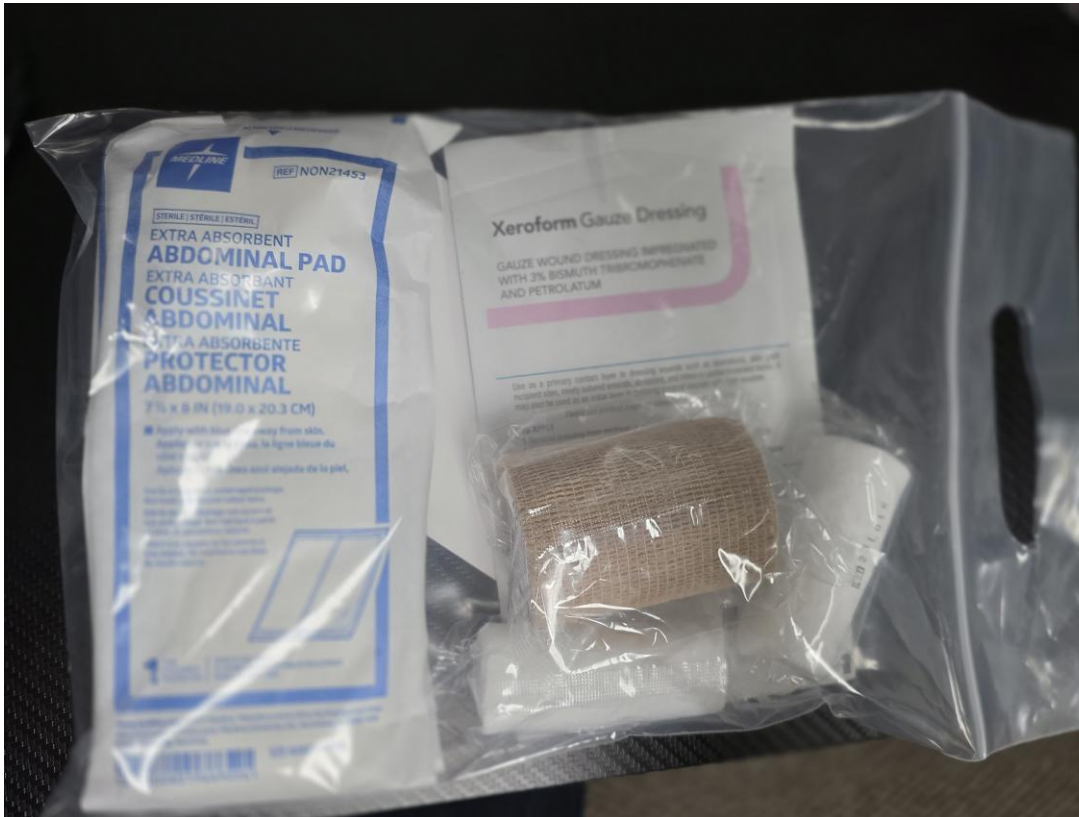
ROUTES OF ADMINISTRATION

- Nasal insufflation can cause sores
- Rectal and vaginal routes reported to cause soft-tissue injury

EARLY PRESENTATION

- Begins as a small spot, presenting as darkened area with a round blister, and specifically Purple or red blister

Wound Care Kits and **How-To-Use** Directions



How to Take Care of Your Wound With These Supplies: Xeroform, ABD Pad, Rolled Bandage



1. **Wash the wound** with **regular soap & water** (tap, bottled, or saline/sterile if available). **Gently pat the wound dry** with a clean cloth.



2. **Cut or fold the yellow gauze** (Xeroform) to the size of the wound and **apply it directly onto the wound**.



3. **Cut or fold the white pad** (ABD pad) to the size of the wound and **put it on top of the Xeroform**.



4. **Wrap rolled gauze or a sticky bandage** over the ABD pad and tape or tuck it to keep it snug.



5. **Change the dressing every 2 days** or as needed.



Defining the Medical Home

A patient-centered philosophy that drives primary care excellence

The medical home is best described as a model or philosophy of primary care that is patient-centered, comprehensive, team-based, coordinated, accessible, and focused on quality and safety. It has become a widely accepted model for how primary care should be organized and delivered throughout the health care system, and is a philosophy of health care delivery that encourages providers and care teams to meet patients where they are, from the most simple to the most complex conditions. It is a place where patients are treated with respect, dignity, and compassion, and enable strong and trusting relationships with providers and staff. Above all, the medical home is not a final destination. Instead, it is a model for achieving primary care excellence so that care is received in the right place, at the right time, and in the manner that best suits a patient's needs.

In 2007, the major primary care physician associations developed and endorsed the [Joint Principles of the Patient-Centered Medical Home](#). The model has since evolved, and today PCC actively promotes the medical home as defined by the [Agency for Healthcare Research and Quality \(AHRQ\)](#).

Features of the Medical Home

Adapted from the AHRQ definition, PCC describes the medical home as an approach to the delivery of primary care that is:

- **Patient-centered:** A partnership among practitioners, patients, and their families ensures that decisions respect patients' wants, needs, and preferences, and that patients have the education and support they need to make decisions and participate in their own care.
- **Comprehensive:** A team of care providers is wholly accountable for a patient's physical and mental health care needs, including prevention and wellness, acute care, and chronic care.
- **Coordinated:** Care is organized across all elements of the broader health care system, including specialty care, hospitals, home health care, community services and supports.
- **Accessible:** Patients are able to access services with shorter waiting times, "after hours" care, 24/7 electronic or telephone access, and strong communication through health IT innovations.
- **Committed to quality and safety:** Clinicians and staff enhance quality improvement to ensure that patients and families make informed decisions about their health.

Study Team(s)

Scientific Research Team

- ❖ Arnie Aldridge
- ❖ Erin Erickson
- ❖ Aminah Isiaq
- ❖ Dierdre Middleton
- ❖ Asher Schranz
- ❖ Claudia Squire

Field Research Team

- ❖ Kelly Cera
- ❖ Pete Clark
- ❖ Karen Lowe
- ❖ Michelle Mathis