

NIH Biographical Sketch Common Form

Name: Ramay, Brooke Monroe

Persistent Identifier (PID) of the Senior/Key Person: <https://orcid.org/0000-0001-8527-4067>

Position Title: Associate Research Professor

Organization and Location: Paul G. Allen School for Global Health, Washington State University, Pullman, Washington, United States

PROFESSIONAL PREPARATION

INSTITUTION AND LOCATION	DEGREE	Start Date	Completion Date	FIELD OF STUDY
University of California San Francisco, San Francisco, California, United States	DOCTOR OF PHARMACY	09/2002	05/2006	Clinical Pharmacy
University of California Santa Barbara, Santa Barbara, California, United States	BACHELOR OF SCIENCE	09/1997	08/2001	Chemistry/ Spanish language (minor)

Appointments and Positions

2019 - present	Associate Research Professor, Paul G. Allen School for Global Health, Washington State University, Pullman, Washington, United States
2023 - present	Academic Afiliate, Center for Health Studies, Insitute of Research, Universidad del Valle de Guatemala, Guatemala, Not Applicable, N/A, Guatemala
2008 - present	Academic Affiliate, Department of Clinical Pharmacy, University of California San Francisco, San Francisco, California, United States
2021 - 2024	Academic Afiliate, College of Pharmacy and Pharmaceutical Sciences, Spokane, Washington, United States
2014 - 2022	Assistant Research Professor, Center for Health Studies, Institute of Research, Universidad del Valle de Guatemala, Guatemala, Guatemala, Not Applicable, N/A, Guatemala
2007 - 2023	Assistant Professor of Clinical Pharmacology , Department of Pharmaceutical Chemistry, Faculty of Sciences and Humanities, Univesidad del Valle de Guatemala, Guatemala, Not Applicable, N/A, Guatemala

Products

Products Closely Related to the Proposed Project

1. Caudell MA, Castillo C, Santos LF, Grajeda L, Romero JC, Lopez MR, Omulo S, Ning MF, Palmer GH, Call DR, Cordon-Rosales C, Smith RM, Herzig CTA, Styczynski A, Ramay BM. Risk factors for colonization with extended-spectrum cephalosporin-resistant and carbapenem-resistant Enterobacterales among hospitalized patients in Guatemala: An Antibiotic Resistance in Communities and Hospitals (ARCH) study. IJID Reg. 2024 Jun;11:100361. PubMed Central PMCID: [PMC11021947](https://pubmed.ncbi.nlm.nih.gov/PMC11021947/).
2. Ramay BM, Caudell MA, Castillo C, Grajeda L, Santos LF, Romero JC, Lopez MR, Omulo S, Ning MF, Palmer GH, Smith RM, Herzig CTA, Styczynski A, Cordon-Rosales C, Call DR. Risk factors associated with community colonization of extended-spectrum cephalosporin-resistant Enterobacterales from an antibiotic resistance in communities and hospitals (ARCH) study, Guatemala. Sci Rep. 2025 May 29;15(1):18925. PubMed Central PMCID: [PMC12122697](https://pubmed.ncbi.nlm.nih.gov/PMC12122697/).
3. Ramay BM, Castillo C, Grajeda L, Santos LF, Romero JC, Lopez MR, Gomez A, Caudell M, Smith RM, Styczynski A, Herzig CTA, Bollinger S, Ning MF, Horton J, Omulo S, Palmer GH, Cordon-Rosales C, Call DR. Colonization With Antibiotic-Resistant Bacteria in a Hospital and Associated Communities in Guatemala: An Antibiotic Resistance in Communities and Hospitals (ARCH) Study. Clin Infect Dis. 2023 Jul 5;77(Suppl 1):S82-S88. PubMed Central PMCID: [PMC10321699](https://pubmed.ncbi.nlm.nih.gov/PMC10321699/).
4. Ramay BM, Caudell MA, Cordon-Rosales C, Archila LD, Palmer GH, Jarquin C, Moreno P, McCracken JP, Rosenkrantz L, Amram O, Omulo S, Call DR. Antibiotic use and hygiene interact to influence the distribution of antimicrobial-resistant bacteria in low-income communities in Guatemala. Sci Rep. 2020 Aug 13;10(1):13767. PubMed Central PMCID: [PMC7426860](https://pubmed.ncbi.nlm.nih.gov/PMC7426860/).
5. Ramay BM, Yoder J, Castillo C, Fahsen N, Grajeda L, Santos LF, Romero JC, Lopez MR, Palmer GH, Cordon-Rosales C,

Call DR. Assessing effects of pneumococcal vaccination (PCV13) and rotavirus vaccination (RV) on colonization with extended-spectrum cephalosporin-resistant Enterobacterales (ESCrE) in Guatemalan children. Vaccine. 2025 Nov 14;66:127852. PubMed PMID: [41086757](#).

Other Significant Products, Whether or Not Related to the Proposed Project

1. Bowers DR, Secaira C, Sandoval N, Melgar M, Chavez N, Lou-Meda R, Maldonado H, Ramay BM. Antimicrobial stewardship practices in Guatemala: communication, perceptions, and behaviors regarding antimicrobial prescribing. Antimicrob Steward Healthc Epidemiol. 2025;5(1):e188. PubMed Central PMCID: [PMC12394028](#).
2. Rojop N, Moreno P, Grajeda L, Romero J, Reynoso L, Muñoz E, Palmer GH, Córdón-Rosales C, Call DR, Ramay BM. Informal sale of antibiotics in Guatemalan convenience stores before and after implementation of federal antibiotic dispensing legislation. BMC Pharmacol Toxicol. 2024 Jan 25;25(1):11. PubMed Central PMCID: [PMC10809560](#).
3. Ramay BM, Jara J, Moreno MP, Lupo P, Serrano C, Alvis JP, Arriola CS, Veguilla V, Kaydos-Daniels SC. Self-medication and ILI etiologies among individuals presenting at pharmacies with influenza-like illness: Guatemala City, 2018 influenza season. BMC Public Health. 2022 Aug 13;22(1):1541. PubMed Central PMCID: [PMC9374570](#).
4. Garzaro P, Fahsen N, Pieters MM, Craig C, Pratt CQ, Lozier MJ, Cordon-Rosales C, Call DR, Ramay BM. Qualitative and quantitative evaluation of hand hygiene knowledge, attitudes, and practices among healthcare workers in Quetzaltenango, Guatemala in the COVID-19 context. PLOS Glob Public Health. 2025;5(5):e0004546. PubMed Central PMCID: [PMC12077707](#).
5. Maldonado H, Ramay B, Versporten A, Pauwels I, Goossens H, Escobar A, Alvarado A, Mudawar D, Muj I, Us J, Melgar M, Galvez N, Chavez N, Lou R, Gil S, Munoz E, Torres S, Choi S, Sandoval N. The global point prevalence survey of antimicrobial consumption and resistance (Global-PPS): results of antimicrobial prescribing in four Guatemalan hospitals in 2021. Abstract #01921. Abstracts/program book for the 33rd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID). 2023 April 15. Available from: <https://www.escmid.org/congress-events/escmid-global/past-congresses/>

Certification:

I certify that the information provided is current, accurate, and complete. This includes but is not limited to information related to domestic and foreign appointments and positions.

I also certify that, at the time of submission, I am not a party to a malign foreign talent recruitment program.

Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§ 287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802.

Certified by Ramay, Brooke Monroe in SciENcv on 2026-01-15 07:49:01

NIH BIOGRAPHICAL SKETCH SUPPLEMENT

Name: Ramay, Brooke Monroe

Persistent Identifier (PID) of the Senior/Key Person: <https://orcid.org/0000-0001-8527-4067>

Position Title: Associate Research Professor

Organization and Location: Paul G. Allen School for Global Health, Washington State University, Pullman, Washington, United States

Personal Statement

I am a clinical pharmacist whose research focuses on the epidemiology of gut colonization with multi-drug resistant Enterobacterales. This work integrates microbial characterization with human and animal data to identify modifiable risk factors and elucidate bidirectional transmission between hospitals and communities. Although antibiotic-driven amplification in hospitals is well characterized, the determinants of transmission across hospital and community settings remain poorly described. Research is conducted in Guatemala, where high colonization prevalence provides a unique setting to test these hypotheses and translate findings into policy and practice.

Ongoing and recently completed projects I would like to highlight include:

6 NU3HCK000022-02-01- Centers for Disease Control and Prevention (CDC)

Protecting and Improving Health Globally: Building and Strengthening Public Health Impact, Systems, Capacity, and Security

Ramay (PI) | 09/15/2021 – 09/14/2026

Role: Principal Investigator

Goal: To identify the directionality and impact of health care utilization on colonization with antimicrobial-resistant Enterobacterales among adults residing in the Western Highlands of Guatemala.

1U01GH002241 – CDC

An Integrated Surveillance Platform for Infectious Diseases and Their Burden on Antibiotic Resistance Call (PI) | 09/15/2018 – 09/14/2023 Role: Lead Investigator

Goal: To quantify the prevalence of commensal antimicrobial-resistant bacteria at the community level in the Western Highlands of Guatemala, with subsequent assessment in a national public hospital in the same region.

1U01GH002241 – CDC (Subaward: 133940-SPC004598)

An Integrated Surveillance Platform for Infectious Diseases and Their Burden on Antibiotic Resistance – Supplemental COVID-19 Funds

Call (PI) | 10/01/2020 – 09/14/2023

Role: Lead Investigator

Goal: To (1) monitor sewage to detect COVID-19 transmission hotspots in Guatemala City, and (2) distribute alcohol-based hand rub (ABHR) to 19 healthcare facilities within the catchment area of the Quetzaltenango Regional Hospital in Guatemala (3) Carry out water chlorination intervention in 3 healthcare facilities in Quetzaltenango, Guatemala.

Honors

2022	Deans Apple Teaching Award, Department of Clinical Pharmacy, University of California San Francisco
2006	National Pharmacist Licensure, National Association of Boards of Pharmacy (NABP), United States
2006	California Pharmacist License, California State Board of Pharmacy
2021 - 2025	Distinguished Investigator, Center for Health Studies, Institute of Research, Universidad del Valle de Guatemala
2018 - 2020	Distinguished Faculty, Faculty of Humanities and Sciences, Universidad del Valle de Guatemala
2002 - 2006	University of California Regent Scholar, University of California San Francisco

Contribution to Science

1. Estimating prevalence of antimicrobial resistance in gut colonizing isolates

Gut colonization with antimicrobial-resistant bacteria represents a major reservoir for subsequent infection and transmission. My primary research activities focus on quantifying the prevalence and identifying the environmental, clinical, and behavioral risk factors associated with gastrointestinal colonization by extended-spectrum cephalosporin-resistant (ESCrE) and carbapenem-resistant Enterobacterales (CRE) in humans residing in the Western Highlands of Guatemala (Ramay, CID, 2023). Using a One Health framework, our team integrates data from hospitals and surrounding communities to elucidate how antimicrobial use, hygiene practices, and healthcare exposures contribute to the emergence and persistence of resistant strains (Caudell, IJID Regions, 2024; Ramay, Sci Rep, 2025). Findings from these studies inform evidence-based mitigation strategies, most recently through participation in the development of Guatemala's National Action Plan to Combat Antimicrobial Resistance.

2. Identifying targeted interventions

My research program has leveraged existing antimicrobial resistance (AMR) surveillance platforms to identify hygiene-related and health care–related risk factors for colonization with antibiotic-resistant Enterobacterales. Earlier work from our group demonstrated that inadequate hygiene practices, as well as exposure to health care facilities, significantly increase the risk of colonization with resistant Enterobacterales (Ramay, Sci Rep, 2020). Building on these findings, we partnered with health care facilities to assess hand hygiene practices (Garzaro, PLOS Global Public Health, 2025) and to evaluate the impact of vaccination on reducing gut colonization with resistant bacteria (Ramay, Vaccine, 2025). These efforts aim to quantify exposure risks from environmental sources of resistant bacteria and generate evidence to guide sustainable infection prevention strategies within Guatemala's public health system.

3. Initiating antimicrobial stewardship programs

In collaboration with physicians, pharmacists, and hospital administrators, we implemented antimicrobial stewardship programs (ASPs) across four public hospitals in Guatemala. These initiatives aimed to optimize antibiotic use (Maldonado, ECCMID, 2021), improve prescribing practices (Bowers, Antimicrob Steward Healthc Epidemiol, 2025), and strengthen infection control capacity within Ministry of Health facilities. Our work generated evidence demonstrating that stewardship interventions can substantially improve antibiotic prescribing behaviors and achieve long-term sustainability in low-resource settings. As part of these efforts, clinical pharmacists were successfully integrated into public hospitals for the first time, marking a critical advancement in the institutionalization of stewardship practices in Guatemala's healthcare system. Our findings have informed Ministry of Health guidelines on antimicrobial use and contributed to national AMR containment strategies.

4. Quantifying antibiotic use in communities

My research in Guatemala has focused on characterizing patterns of antibiotic use in the community, with particular emphasis on self-medication (Ramay, BMC Public Health, 2018) and access to antibiotics outside formal health care settings (Rojop, BMC Pharmacol Toxicol, 2024). This work examined how medication cost, health-literacy limitations, and gaps in access to clinical care shape decisions to obtain and use antibiotics without prescriptions, often through informal retail outlets and pharmacies. Findings from these studies provide some of the first empirical evidence from Guatemala linking informal antibiotic access, self-directed treatment decisions, and inappropriate antibiotic use, informing national and regional discussions on antimicrobial stewardship, pharmacy regulation, and community-based interventions to curb antimicrobial resistance.

Certification:

I certify that the information provided is current, accurate, and complete. This includes but is not limited to information related to domestic and foreign appointments and positions.

I also certify that, at the time of submission, I am not a party to a malign foreign talent recruitment program.

Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§ 287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802.

