

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF PUERTO RICO

ZULAY RODRIGUEZ VELEZ; YOHAMA
GONZALEZ MILAN; LEILA G. GINORIO
CARRASQUILLO; AND JULISSA PIÑERO,

Plaintiffs,

v.

HON. PEDRO R. PIERLUISI URRUTIA, IN
HIS OFFICIAL CAPACITY AS
GOVERNOR OF THE COMMONWEALTH
OF PUERTO RICO,

Defendant.

Civil No. 21-1366 (PAD)

Motion Submitting Expert Report and Curriculum Vitae of Dr. Joel Hay

The plaintiffs, Zulay Rodriguez Velez, Yohama Gonzalez, Leila G. Ginorio Carrasquillo, and Julissa Piñero, as announced during yesterday's closing argument session, respectfully submit the expert report by Dr. Joel Hay, which is updated with recent statistics, and which explains the graphs and documents admitted as Exhibit No. 4 of the Preliminary Injunction hearing, together with Dr. Hay's curriculum vitae.

Dated: August 17, 2021

Respectfully submitted,

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JURY TRIAL DEMANDED

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I. Introduction

1. I, Joel W. Hay, Ph.D., having been retained by Counsel for Plaintiffs-Relators (“Plaintiffs”) to provide expert testimony in the above-captioned action, submit this Expert Report.

2. I have been asked to verify the data and analysis contained in the claim regarding the Executive Order No. 2021-058 (“Vaccine Mandate”) on public employees by the Governor of Puerto Rico. I have not reached any conclusions regarding liability in this case and do not offer any opinion in this regard. I have specifically been asked to review the analyses on Puerto Rico’s COVID-19 vaccination rates, testing, cases, new admissions, hospitalizations, and deaths, based on data from the Centers for Disease Control and Prevention (CDC) and the Puerto Rico Health Department.

II. Background and qualifications

3. In 1974, I received my B.A. in Economics, *summa cum laude*, from Amherst College. I then went on to receive my M.A. in Economics (1975), my M.Ph. in Economics (1976) and my Ph.D. in Economics (1980) from Yale University.

4. I am a tenured Full Professor and Founding Chair of Pharmaceutical Economics and Policy in the School of Pharmacy, with joint appointments in the Department of Economics and at the Schaeffer Center for Health Policy and Economics at the University of Southern California (“USC”). I am the Director of the Schaeffer Center/School of Pharmacy Clinical Economics Research and Education Program (CERAP) at USC. I also served for 15 years as the USC Project Coordinator for the Rand Evidence-Based Medicine Practice Centers of Southern California funded by the U.S. Agency for Health Research and Quality. I was a Health Economics Research Scholar at the former UCLA Center for Pediatric Vaccine Research. I am a founding member and founding Executive Board member of the American Society for Health Economics (ASHEcon) and a founding member and founding Executive Board member of the International Society of Pharmacoeconomics and Outcomes Research (ISPOR).

5. From 1978 to 1980, I was an Assistant Research Professor at USC. Then, from 1980 to 1984, I was an Assistant Professor in the Department of Behavioral Sciences and Community Health and Department of Economics at the University of Connecticut. I was also a Senior Policy Analyst with Project Hope from 1983 to 1985. Then, from 1985 to 1992, I was a Senior Research Fellow at the Hoover Institution at Stanford University. In 1992 I was recruited to USC to found the Department of Pharmaceutical Economics and Policy. I have been a tenured USC faculty member since then.

6. I have authored or coauthored over 600 scientific abstracts, reports, and presentations, including 200+ peer-reviewed scientific articles and commentaries in the fields of drug and pharmaceutical research pipeline valuation, pharmaceutical markets, pharmaceutical economics, health economics, outcomes research, disease management, statistics, econometrics, epidemiology, and health care in journals including: *American Journal of Cardiology*; *American Journal of Health-Systems Pharmacy*; *American Journal of Managed Care*; *American Journal of Public Health*; *Archives of Neurology*; *Cancer*; *CNS Drugs*; *Haemophilia*; *Health Care Financing Review*; *Health Economics, Health Policy*; *JAMA*; *Journal of AIDS*; *Journal of the American Geriatrics Society*; *Journal of Business & Economic Statistics*; *Journal of Clinical Gastroenterology*; *Journal of Health Economics*; *Journal of Health Politics, Policy and Law*; *Journal of Human Resources*; *Journal of the Royal Statistical Association*; *New England Journal of Medicine*; *Medical Care*; *Pediatrics*; and *Value in Health*.

7. I have taught health and pharmaceutical economics to thousands of PharmD students, MD students, DMD students, nursing students, physician assistant students, nurse practitioner students, undergraduate students and others. I developed and founded the M.S. and Ph.D. graduate programs in Pharmaceutical Economics and Policy at USC in 1994. These programs have grown to become the largest and best-known graduate programs in the field. Since then, this program has graduated over 120 students with advanced degrees in pharmaceutical economics and policy. My graduate students

have won numerous teaching and research awards, including 14 awards for top peer-reviewed research presentations at scientific conferences where I was mentor and co-author.

8. In addition to the hundreds of pharmacoeconomic studies that I have conducted, I have published numerous peer-reviewed scientific articles and abstracts on drug pricing, cost effectiveness and the economic value of drugs. I recently served as guest editor of a special issue of the *International Journal of the Economics of Business* commemorating 50 years of pharmaceutical economics research.¹

9. In April 2015, I was one of three invited outside experts who presented to the Directors and Staff of the Office of Medical Policy (Dr. Jonathan Jarow) and the Center for Drug Evaluation and Research (Dr. Robert Temple) at the U.S. Food and Drug Administration (FDA) on regulation of economics claims for pharmaceutical products. In 2016, I was an Invited Forum Participant in the AMCP Partnership Forum: FDAMA Section 114 Improving the Exchange of Health Care Economic Data for the Academy of Managed Care Pharmacy. This forum provided further insights into sharing economic information under FDA regulatory guidelines leading to two conference review publications.²

10. I have served as a consultant to the U.S. Centers for Medicare and Medicaid Services, U.S. Agency for Healthcare Research and Quality, U.S. Centers for Disease Control and Prevention, U.S. Public Health Service, FDA, U.S. Environmental Protection Agency, Government of Hungary, Hong Kong Centre for Economic Research, Hong Kong Medical Executives Association, World Bank,

¹ Hay, JW. A Special Commemorative Issue Honoring William S. Comanor and 50 Years of Pharmaceutical Economics. *International Journal of the Economics of Business* 2015; 22(2):165–168. A PDF of this document have been provided along with this report.

² Hay, JW. AMCP Partnership Forum: FDAMA Section 114—Improving the Exchange of Health Care Economic Data. *Journal of Managed Care & Specialty Pharmacy* 2016; 22(7): 826–831; Hay, JW. AMCP Partnership Forum: Enabling the Exchange of Clinical and Economic Information Pre-FDA Approval. *Journal of Managed Care & Specialty Pharmacy* 2017; 23(1):105–112.

California AIDS Commission, California Medi-Cal Drug Advisory Board, County of San Diego Medically Indigent Adult Program, and County of Sacramento Homeless Program.

11. I have also written numerous health-related op-eds published in papers such as Los Angeles Times, New York Times, Wall Street Journal, San Francisco Chronicle, San Diego Union, Sacramento Bee, Orange County Register and Newsday. I have been interviewed numerous times on television and radio regarding health-related and drug-related policy issues, including media networks such as American Public Media, NPR, PBS, CBS, ABC, NBC, Fox News, C-SPAN, CBC, BBC and the Australian Broadcast Company.

12. I have served as a member of the Expert Advisory Panel on Drug Utilization Review, United States Pharmacopeial Convention; an Executive Committee member for the federally sponsored Southern California Evidence-Based Medicine Practice Center; and a member of the *JAMA* Web Site HIV/AIDS Editorial Review Panel. I also recently completed a third consecutive two-year term as a Study Section member for the Extramural Grants Review Program for the Agency for Healthcare Research and Quality of the U.S. Department of Health and Human Services.

13. From 2004 to 2010, I was a founding member of the Health Policy Scientific Council of the International Society for Pharmacoeconomics and Outcomes Research. From 2006 to 2010, I was founding Co-Chair of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Drug Cost Task Force. In 2010, this Task Force published 6 peer-reviewed guideline papers on pharmaceutical price and costing methodology in the journal *Value in Health*, all of which I edited and co-authored.³

³ These articles include:

Garrison LP, Mansley E, Abbott T, Bresnahan B, Hay JW, Smeeding J. Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: Part II: A Societal Perspective. *Value in Health* 2010; 13(1):8-13.

Hay JW, Jhaveri M, Tangirala MK, Kaliner M. Cost and Resource Utilization Comparisons of Second Generation Antihistamines vs. Montelukast in Treatment of Allergic Rhinitis: Retrospective Analysis of a Large National Insurance Claims Database. *Allergy and Asthma Proceedings* 2009 Nov-Dec; 30(6):634-42.

Hay JW, Smeeding J, Carroll NV, Drummond M, Garrison LP, Mansley EC, Mullins CD, Mycka JM, Seal B, Shi L. Good Research Practices in Measuring Drug Costs for Cost Effectiveness Analysis: A Report of the ISPOR Drug Cost

14. I served as the Founding Editor-in-Chief of *Value in Health*, the peer-reviewed scientific journal of the International Society for Pharmacoeconomics and Outcomes Research, from its 1998 inception until 2003. In its first scientific citation impact factor, *Value in Health* was ranked number one in two categories for the year 2004 by the ISI Journal Citation Reports® (JCR) with an impact factor of 3.657. *Value in Health* led all other journals listed both in the Health Care Sciences and Services category in the JCR Science Edition and in the Health Policy & Services category in the JCR Social Sciences Edition. These categories include all journals relating to health economics and pharmaceutical economics.

15. I have had over 40 years of experience in graduate school level teaching and conducting research in the field of econometrics. Econometrics is the most advanced form of statistical methods for analyzing real world data because it has always recognized and developed methods to detect for both observable variable confounding and unobservable variable confounding in complex statistical equations estimated on real world data. While other statistical fields like epidemiology use regression methods to adjust for observable confounders (e.g., unless you adjust for gender, weight and age, comparing height variation in the population is meaningless) only econometrics has had the method of instrumental variable to adjust for unobserved confounding. For this reason, econometricians have had

Task Force. *Value in Health* 2010; 13(1):3-7.

Hay JW, Zhou Z. Commentary: A Systematic Review of the Cost-Effectiveness of rFVIIa and APCC in the Treatment of Minor/Moderate Bleeding Episodes for Haemophilia Patients with Inhibitors. *Haemophilia* 2010; 16(2):366-368.

Mansley E, Carroll N, Chen K, Shah N, Tak Piech C, Hay JW, Smeeding J. Good Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: A Managed Care Perspective - A Report of the ISPOR Drug Cost Task Force Part III. *Value in Health* 2010; 13(1):14-17.

Mullins CD, Seal B, Seoane-Vazquez E, Sankaranarayanan J, Asche C, Jayadevappa R, Lee W, Romanus D, Wang J, Hay JW, Smeeding J. Good Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: A Report of the ISPOR Drug Cost Task Force – Part IV: Medicare, Medicaid and Other US Government Payers Perspectives. *Value in Health* 2010; 13(1):18-24.

Mycka J, Dellamano R, Kolassa EM, Wonder M, Ghosh S, Hay JW, Smeeding J. Good Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: An Industry Perspective: A Report of the ISPOR Drug Cost Task Force – Part V. *Value in Health* 2010; 13(1):25-27.

Shi L, Hodges M, Drummond M, Ahn J, Li SC, Hu S, Augustovski F, Hay JW, Smeeding J. Good Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: An International Perspective: A Report of the ISPOR Drug Cost Task Force – Part VI. *Value in Health* 2010; 13(1):28-33.

statistical methods that can adjust for unobservable confounding (e.g., many unobserved variables can explain height beyond the observable variables; such as genetics, nutrition, exercise, metabolomics, proteomics, etc.).⁴ For this reason only econometricians can tease out causal relationships in real world data and be confident as to whether unobservable variables could overwhelm the findings from existing data. Recent advances in Machine Learning and Artificial Intelligence have dramatically improved our abilities to generate valid and reliable results from insurance claims and other administrative databases.

16. I also have decades of experience in designing, conducting, and analyzing Randomized Controlled Trials (RCT). I have conducted RCTs for major pharmaceutical companies, such as Johnson & Johnson as well as numerous NIH-funded RCTs on medical and health care interventions. I co-authored a major critical review of the Rand Health Insurance Experiment, the largest randomized demonstration project ever conducted on how variation in co-payments and family insurance premiums affected health, finances and other outcomes in families randomly assigned to different health insurance plans. I have been admitted as an expert in evaluating FDA statistical analysis plans for drugs in development.

17. With all of my experience in analyzing both RCT and real word data, I have a keen understanding of the strengths and weaknesses of both study designs. RCTs are the gold standard for assessing causality but they are very expensive and time consuming. Real world data analysis is cheap and fast but often subject to observable and unobservable variable biases unless proper econometric methods are used to detect and correct for these biases.

18. I have served as a legal expert consultant and/or testifying expert witness in hundreds of cases, mostly involving economic valuation of pharmaceuticals. I have been qualified to testify in

⁴ Angrist JD and Pischke JS. Mostly Harmless Econometrics: An Empricist's Companion. Princeton University Press. Princeton, New Jersey: 2009.

court as an expert witness in dozens of cases and I have never been excluded from testifying. My testimony has regularly been specifically cited in court rulings as more credible and convincing than that of opposing witnesses.

19. A copy of my curriculum vitae and recent legal testimony are attached as Appendix A and Appendix B to this report. A list of materials I have considered in writing this report is included in Appendix C.

20. I have been retained as a technical expert in this matter to provide my opinions regarding the analysis of COVID-19 vaccination rates, cases, hospitalizations, and deaths. I am providing my services pro bono; thus, no part of my compensation is dependent upon my opinions given or the outcome of this case.

III. Summary of Opinions

21. My opinions and calculations related to vaccination rates, testing, cases, hospitalizations, and deaths are as follows.

22. Puerto Rico is the most highly vaccinated state/territory in the United States, thus a vaccine mandate is not only unnecessary, but an example of gross government overreach given that there is no evidence indicating that a vaccine mandate will affect the course of the pandemic.

23. Testing and positivity rates are meaningless metrics, first because there are inherent problems with polymerase chain reaction (PCR) and antigen testing to detect virus, and second because there is selection bias among those individuals who choose to get tested. Further, there is poor accessibility to testing sites and an insurmountable financial burden to pay for weekly testing if unvaccinated.

24. Confirmed cases have been on an overall downward trend as indicated by first averaging daily cases as a 7-day moving average to remove inconsistencies in day-of-week reporting, then taking

the first and second daily differences of cases, which clearly show a decreasing burden of cases. However, even these confirmed cases are problematic because they are based on flawed tests.

25. Even if the data on confirmed cases are reliable, it is clear there is no danger of overwhelming the hospital or health care system. Bed availability has remained at ~40% the entire duration of the pandemic. Interestingly, it has not budged during the three big COVID-19 waves, indicating that pandemic increases are mostly coding errors, since they substitute one-for-one for reductions in other causes of death in Puerto Rico.

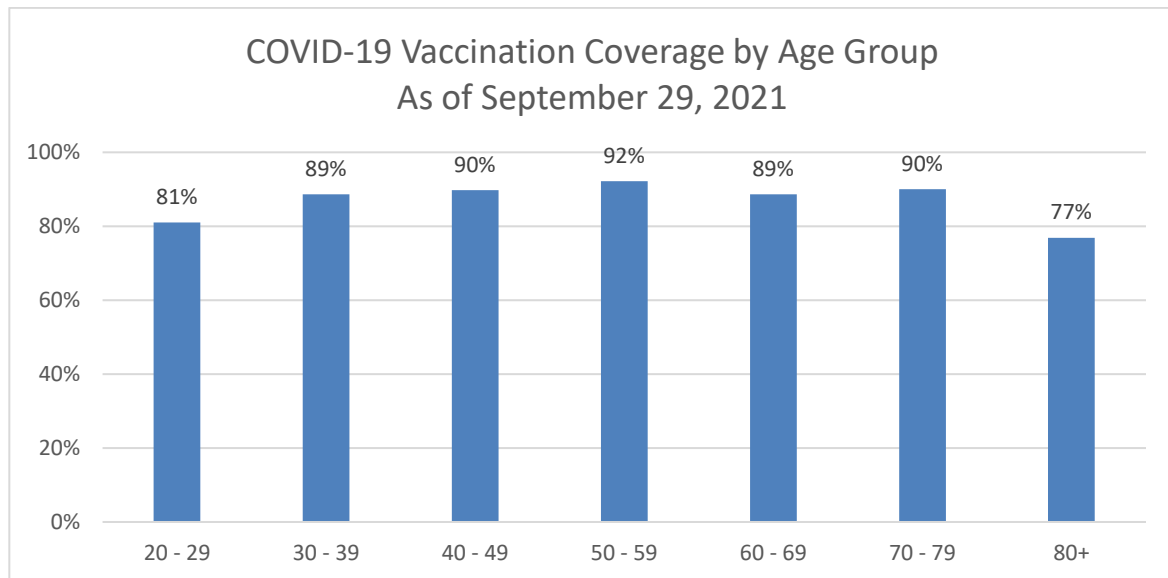
26. Similar to the unreliability of test results for confirmed cases, COVID-19 deaths cannot necessarily be attributed to COVID-19. It is clear that COVID-19 is not a leading cause of death in Puerto Rico, and as with cases, deaths have shown a decreasing trend since the start of the pandemic. In fact, the daily change in the number of presumed COVID-19 deaths has never exceeded 2. The maximum number of presumed COVID-19 deaths in any one day has never exceeded 16. Relatedly, the case fatality rate is very low, particularly among pediatric age groups, even when conditioning on the falsely elevated positive test results, which are unreliable.

27. Finally, COVID-19 is an endemic virus in both humans and animals. It cannot and will not be eradicated regardless of how many draconian, non-evidence-based measures the government chooses to impose. The data presented in my report indicate that there is no scientific basis whatsoever behind a vaccine mandate and attempts to obfuscate the facts are deliberate efforts to destroy the personal freedoms, the pursuit of happiness and the livelihoods of the residents of Puerto Rico.

IV. Puerto Rico remains one of the most highly vaccinated states/territories in the United States.

28. According to the Puerto Rico Department of Health, as of September 29, 2021, 78.1% of Puerto Rico residents 12 years and older have been fully vaccinated and 87% have received at least

one dose.⁵ The percentage of those who have received at least one dose of vaccine is shown below by age group.⁶



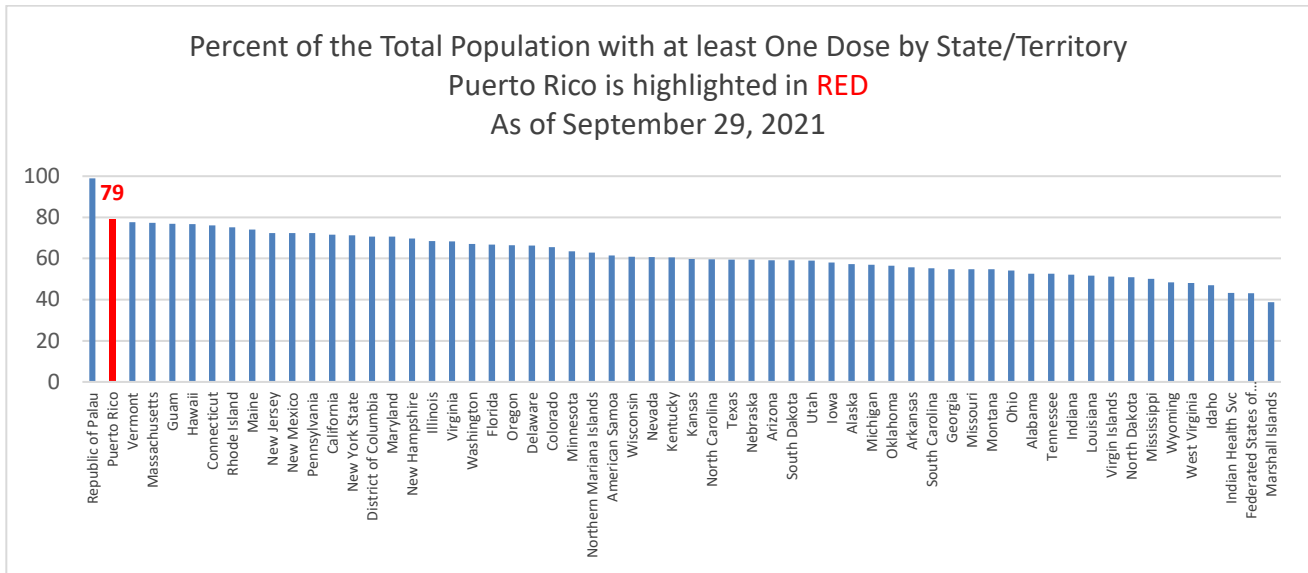
29. According to the Centers for Disease Control and Prevention (CDC), as of September 29, 2021, Puerto Rico ranks 2nd in the United States for percent of the total population with at least one dose of COVID-19 vaccine as shown in the table below.⁷ The total population includes both eligible and ineligible residents for COVID-19 vaccine. Although this number differs slightly from that reported by the Puerto Rico Department of Health due to multiple data streams,⁸ it is clear that Puerto Rico is the top vaccinated region in the United States after the Republic of Palau.

⁵ The Puerto Rico Department of Health. COVID-19 Figures. Accessed on September 29, 2021. Available: <https://covid19datos.salud.gov.pr/#vacunacion>

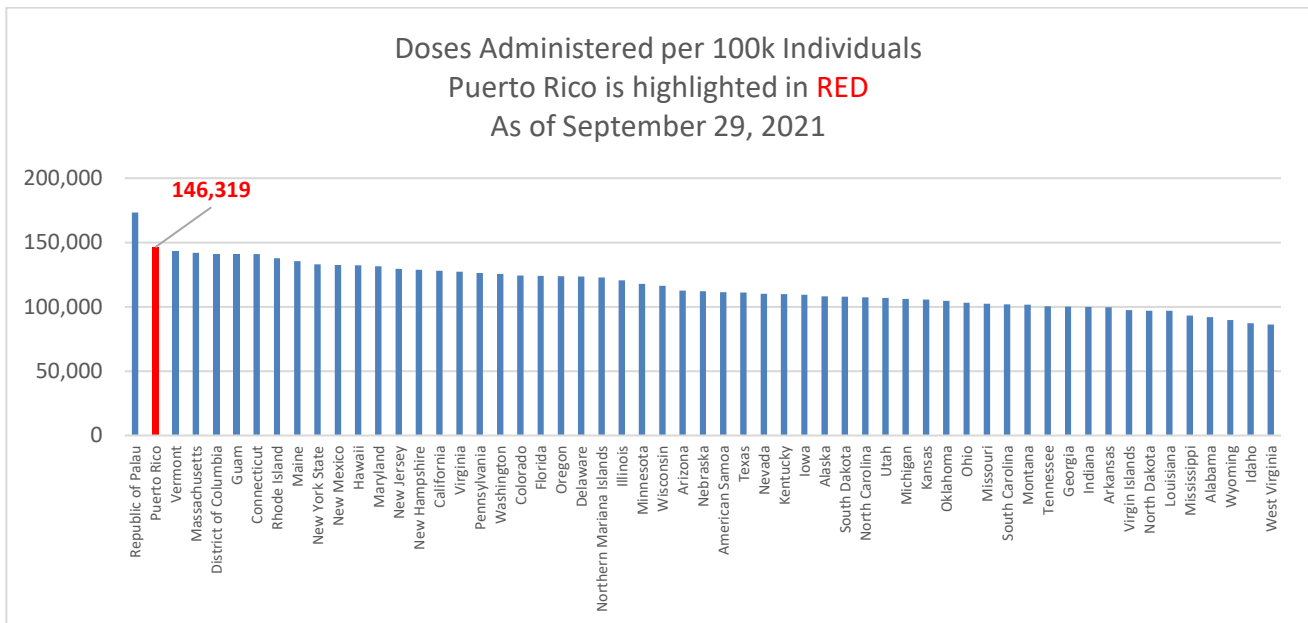
⁶ U.S. Census Bureau (2019). Sex by Age American Community Survey 1-year estimates. Retrieved from https://censusreporter.org/data/table/?table=B01001&geo_ids=04000US72&primary_geo_id=04000US72#valueType|estimate

⁷ The Republic of Palau is listed as the most vaccinated state/territory, but is actually independent of the United States [see: <https://www.doi.gov/oia/islands/palau>]. However, the CDC includes the Republic of Palau in its COVID-19 data and thus it is included in this figure for consistency.

⁸ Centers for Disease Control and Prevention. FAQ: COVID-19 Data and Surveillance. Accessed on September 19, 2021. Available: <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/faq-surveillance.html>

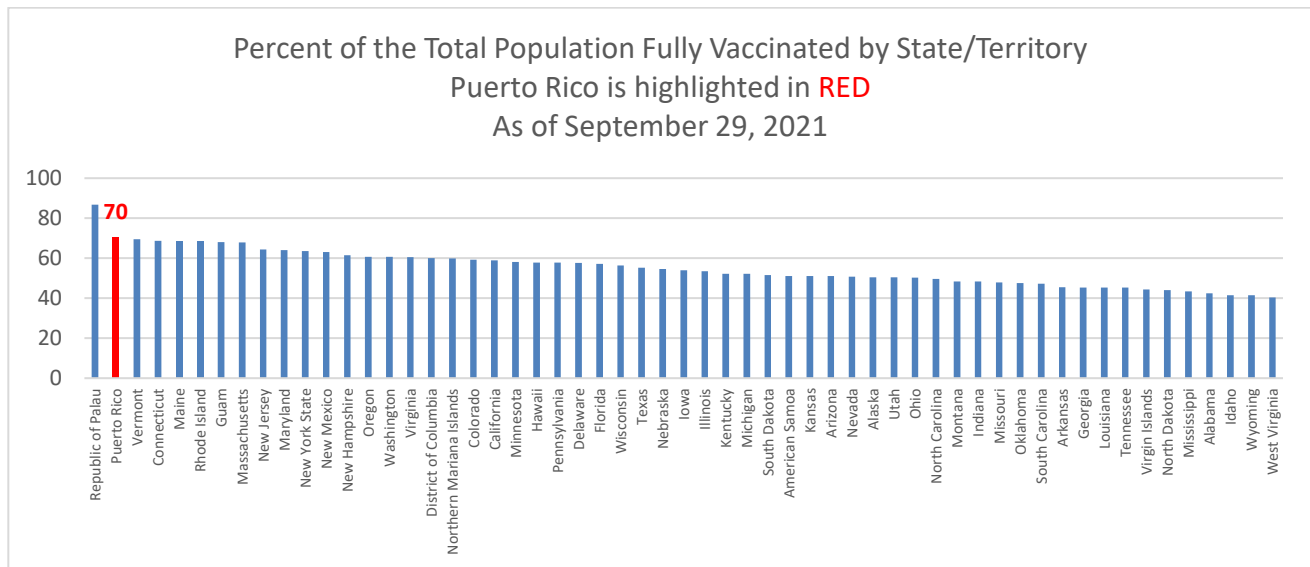


30. In fact, Puerto Rico is 2nd in the United States for total doses administered per 100,000 individuals:



31. Likewise, Puerto Rico ranks 2nd in the United States for percent of the population fully vaccinated as shown in the figure below:⁹

⁹ Centers for Disease Control and Prevention. COVID-19 Data Tracker. Accessed on September 29 2021. Available: https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-people-fully-percent-total



32. Finally, I understand from Counsel’s clinical expert, Dr. Bostom, that for every case of asymptomatic COVID-19 infection prevented by vaccine, 86 serious AEs are caused. This renders any sort of vaccine mandate more harmful than beneficial.

V. Testing and positivity rates are completely useless metrics due to problems related to the tests, selection bias, and inaccessibility and financial burden for Puerto Rico residents.

33. Positivity rate is a completely meaningless metric because individuals who choose to receive testing are not a random sample of Puerto Rico’s population. As I explain in the following Paragraphs, testing is subject to numerous problems, both because of the procedure itself and because of issues with the test development.

34. First and foremost, PCR for the detection of positive cases is highly flawed because the number of PCR cycles used to run the tests is too high. The Minimum Information for Publication of Quantitative Real-Time PCR Experiment (MIQE) Guidelines explicitly state: “[CT] values >40 are suspect because of the implied low efficiency and generally should not be reported”.¹⁰ According to Kary Mullis, the Nobel Prize-winning biochemist who invented the PCR technique: “If you have to go

¹⁰ Bustin SA, Benes V, Garson JA, et al. The MIQE guidelines: Minimum information for publication of quantitative real-time PCR experiments. Clin Chem. 2009;55(4):611-622. doi:10.1373/clinchem.2008.112797

more than 40 cycles[...]there is something seriously wrong with your PCR”¹¹ and in August 2020, even the New York Times reported:

Tests with thresholds so high may detect not just live virus but also genetic fragments, leftovers from infection that pose no particular risk — akin to finding a hair in a room long after a person has left, Mina [an epidemiologist at the Harvard T.H. Chan School of Public Health] said.

Any test with a cycle threshold above 35 is too sensitive, agreed Juliet Morrison, a virologist at the University of California, Riverside. “I’m shocked that people would think that 40 could represent a positive,” she said.

A more reasonable cutoff would be 30 to 35, she added. Mina said he would set the figure at 30, or even less. Those changes would mean the amount of genetic material in a patient’s sample would have to be 100-fold to 1,000-fold that of the current standard for the test to return a positive result.¹²

35. In December 2020, the WHO put out a memo which stated: “for patients with high levels of circulating virus (viral load), relatively few cycles will be needed to detect virus and so the Ct value will be low. Conversely, when specimens return a high Ct value, it means that many cycles were required to detect virus. ***In some circumstances, the distinction between background noise and actual presence of the target virus is difficult to ascertain***” [emphasis added].¹³ This memo was updated in January 2021, stating: “...careful interpretation of weak positive results is needed (1). The cycle threshold (Ct) needed to detect virus is inversely proportional to the patient’s viral load. ***Where test results do not correspond with the clinical presentation, a new specimen should be taken and retested using the same or different NAT technology***” [emphasis added].¹⁴

¹¹ Innis MA, Gelfand DH, Sninsky JJ, White TJ. (1990). PCR Protocols: A Guide to Methods and Applications. Pages 8-9. Academic Press, Inc. Preview available: <https://shorten.one/JdGNu>

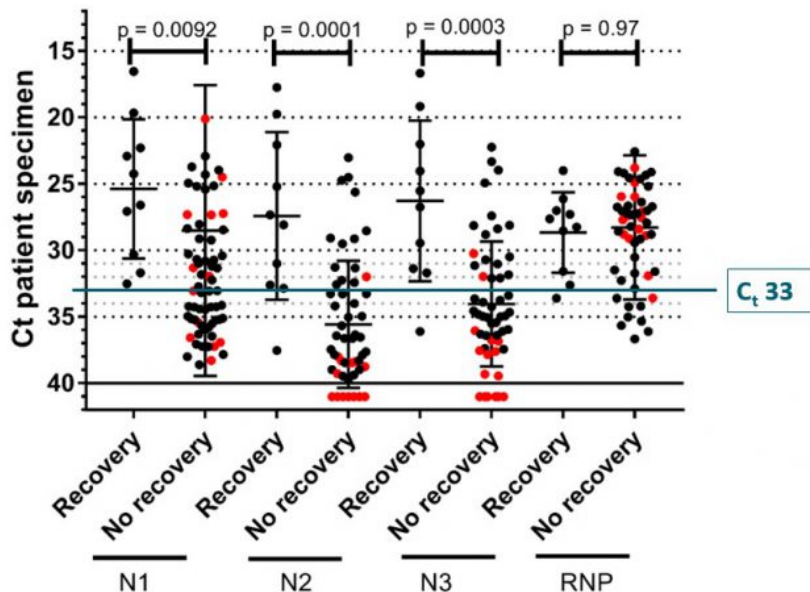
¹² Mandavilli, A. (2020, Aug 29). Your coronavirus test is positive. maybe it Shouldn’t be. New York Times Retrieved from <http://libproxy.usc.edu/login?url=https://www-proquest-com.libproxy2.usc.edu/newspapers/your-coronavirus-test-is-positive-maybe-shouldn-t/docview/2438253829/se-2?accountid=14749>

¹³ World Health Organization. WHO Information Notice for IVD Users. Nucleic acid testing (NAT) technologies that use real-time polymerase chain reaction (RT-PCR) for detection of SARS-CoV-2. December 14, 2020. Accessed September 29, 2021. Available: <https://web.archive.org/web/20210120083427/https://www.who.int/news/item/14-12-2020-who-information-notice-for-ivd-users>

¹⁴ World Health Organization. WHO Information Notice for Users 2020/05: Nucleic acid testing (NAT) technologies that use polymerase chain reaction (PCR) for detection of SARS-CoV-2. January 20, 2021. Accessed September 29, 2021. Available: <https://www.who.int/news/item/20-01-2021-who-information-notice-for-ivd-users-2020-05>

36. Yet the same New York Times article reported: “Most tests set the limit at 40, a few at 37. This means that you are positive for the coronavirus if the test process required up to 40 cycles, or 37, to detect the virus.” Similarly, the National Health System in the UK uses a Ct of up to 40 cycles to detect positivity.¹⁵ This directly contradicts CDC data from August 2020 (now since removed from their site), which showed that any specimen amplified to a Ct of ≥ 33 cycles could not yield replication-competent virus:¹⁶

Figure 5. CDC unpublished data showing median Ct values and their 95% confidence intervals among specimens from which replication-competent virus was recovered and not recovered according to the Ct value for the amplification target (N1, N2, or N3) in the CDC RT-PCR assay. RNP = human RNase P, a positive control for the presence of adequate human sample. Red dots indicate specimens with inconclusive RT-PCR amplification according to their corresponding Ct values and culture results.



37. The Robert Koch Institute in Germany similarly stated that no replicable virus could be recovered in cell culture when the Ct value was >30 (also since removed from their site):¹⁷

Results (previously unpublished) from diagnostics at the RKI show that the loss of cultivation in cell culture was associated with an RNA amount of

¹⁵ NHS England. Guidance and Standard Operating Procedure COVID-19 Virus Testing in NHS Laboratories. Accessed September 29, 2021. Available: <https://www.rcpath.org/uploads/assets/90111431-8aca-4614-b06633d07e2a3dd9/Guidance-and-SOP-COVID-19-Testing-NHS-Laboratories.pdf>

¹⁶ CDC. Duration of Isolation and Precautions for Adults with COVID-19. Accessed September 29, 2021. Available: <https://web.archive.org/web/20200828153214/https://www.cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html>

¹⁷ Robert Koch Institute. Instructions for testing patients for infection with the novel coronavirus SARS - CoV -2. September 24, 2020. Accessed September 29, 2021. Available: https://web.archive.org/web/20200925013250/https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Vorl_Testung_nCoV.html

<250 copies / 5 µL RNA eluate determined by real-time PCR. ***In the test system used, this RNA concentration corresponded to a Ct value> 30.***

38. Apart from the problems with amplified cycle thresholds to falsely elevate positive test rates, the development of the PCR test itself was highly flawed, and several scientists have demanded the retraction of the publication claiming to have validated a robust diagnostic methodology for detection of COVID-19 in public health laboratories.¹⁸ In their review of this publication, the authors noted:

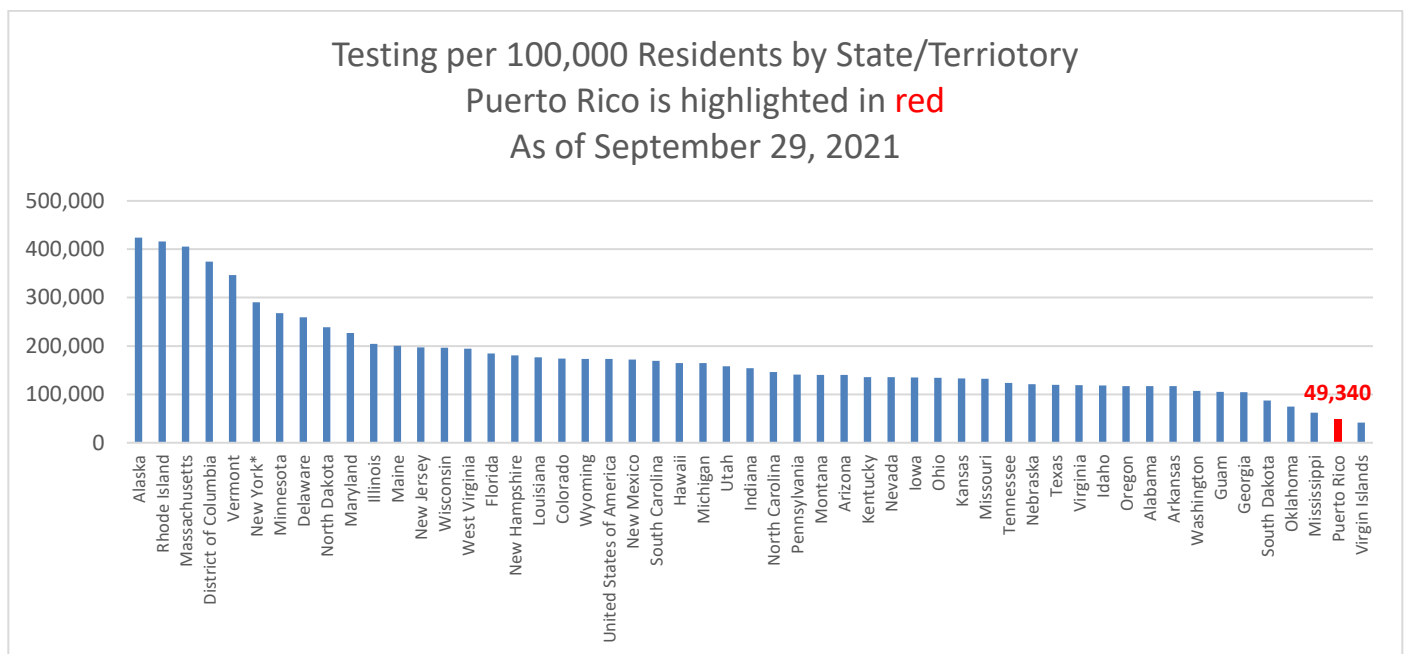
The published RT-qPCR protocol for detection and diagnostics of 2019-nCoV and the manuscript suffer from ***numerous technical and scientific errors, including insufficient primer design, a problematic and insufficient RT-qPCR protocol, and the absence of an accurate test validation. Neither the presented test nor the manuscript itself fulfils the requirements for an acceptable scientific publication.*** Further, serious conflicts of interest of the authors are not mentioned. Finally, the very short timescale between submission and acceptance of the publication (24 hours) signifies that a systematic peer review process was either not performed here, or of problematic poor quality. We provide compelling evidence of several scientific inadequacies, errors and flaws.

The most grievous of these problems is that the diagnostic test was developed on: “...***in silico (theoretical) sequences, supplied by a laboratory in China,*** because at the time neither control material of infectious (“live”) or inactivated SARS-CoV-2 nor isolated genomic RNA of the virus was available to the authors. To date no validation has been performed by the authorship based on isolated SARS-CoV-2 viruses or full length RNA thereof” [emphasis added].¹⁹ This means that the so-called diagnostic capabilities of the PCR test was designed in the complete absence of actual virus. As the authors note, PCR is highly sensitive and its specificity highly influenced by biomolecular design errors, suggesting that none of the PCR tests in existence are useful.

¹⁸ Borger P, Malhotra BR, Yeadon M, Craig C, McKernan K, et al. External peer review of the RTPCR test to detect SARS-CoV-2 reveals 10 major scientific flaws at the molecular and methodological level: consequences for false positive results. Accessed September 29, 2021. Available: <https://cormandrogenreview.com/report/>

¹⁹ Borger P, Malhotra BR, Yeadon M, Craig C, McKernan K, et al. External peer review of the RTPCR test to detect SARS-CoV-2 reveals 10 major scientific flaws at the molecular and methodological level: consequences for false positive results. Accessed September 29, 2021. Available: <https://cormandrogenreview.com/report/>

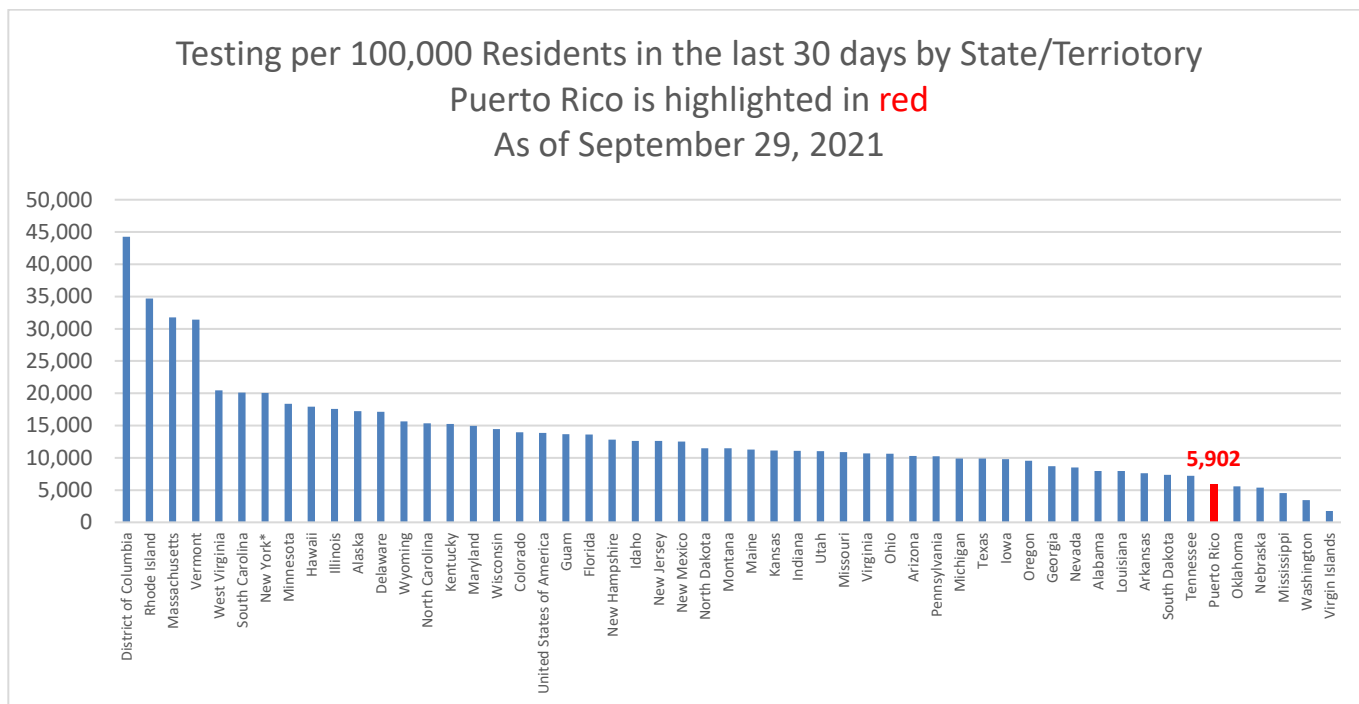
39. Nonetheless, despite imposing testing mandates, the Puerto Rico government has not provided the necessary resources for resident to meet these demanding requirements. According to the CDC, Puerto Rico ranks *second lowest* in the United States for the number of tests per 100,000 residents because the government has failed to make COVID-19 testing available and accessible, claiming it is due to supply shortages.²⁰ The table below shows that the number of tests per 100,000 residents in Puerto Rico is considerably lower than the other states and territories except Virgin Islands.²¹



40. Compared to other states and territories, availability and accessibility of COVID-19 testing in Puerto Rico has not improved in recent months as shown in the figure below, which shows COVID-19 testing per 100,000 residents by state and territory in the past 30 days prior to September 29, 2021.

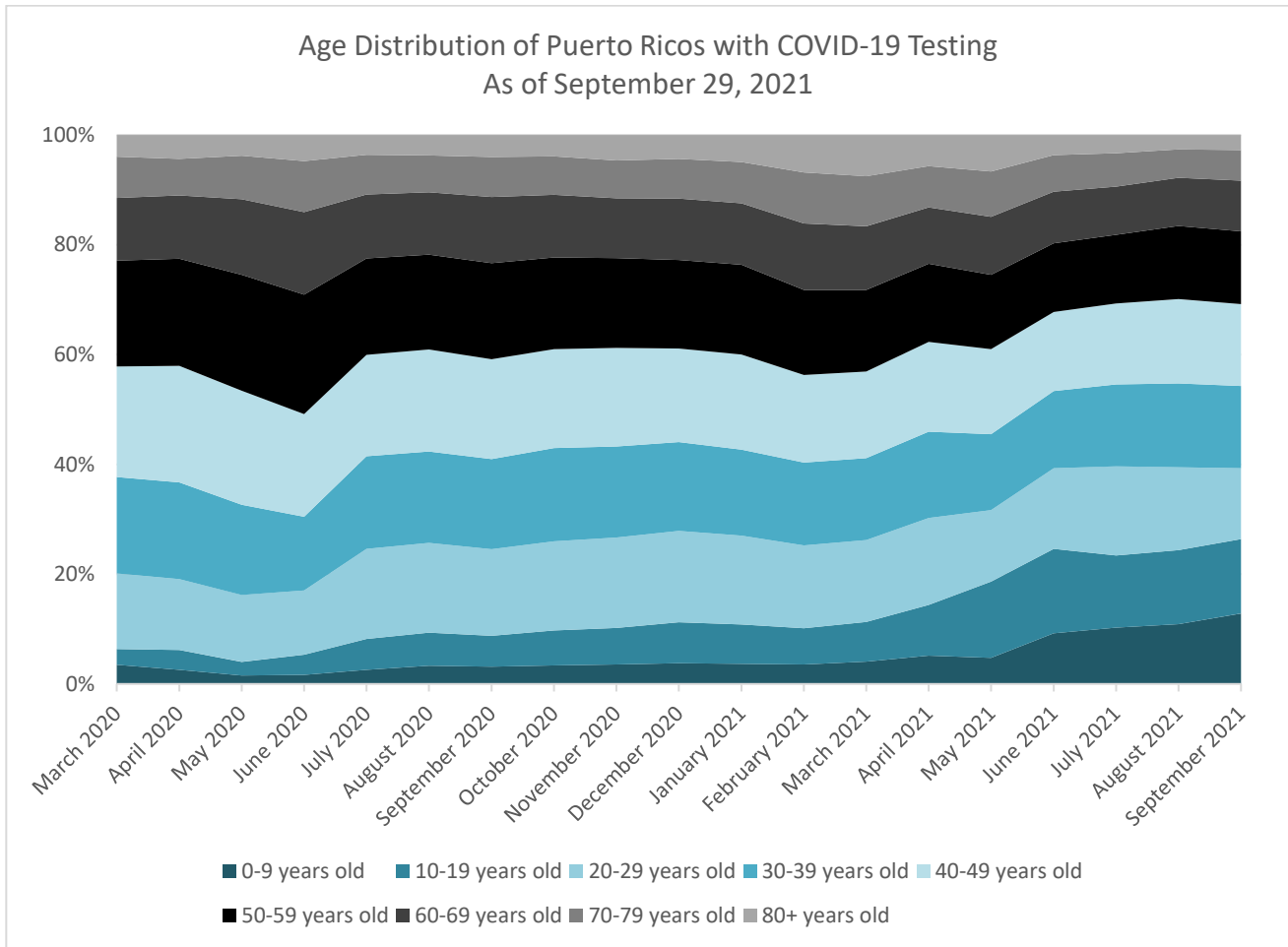
²⁰ Alcaldes urgen acción de Salud ante escasez de pruebas de COVID-19 en los municipios. Noticias Puerto Rico. LA PERLA DEL SUR. September 7, 2021. Available: <https://www.periodicolaperla.com/alcaldes-urgen-accion-de-salud-ante-escasez-de-pruebas-de-covid-19-en-los-municipios/>

²¹ CDC COVID Data Tracker. United States COVID-19 Cases, Deaths, and Laboratory Testing (NAATs) by State, Territory, and Jurisdiction. Accessed September 29, 2021. Available: https://covid.cdc.gov/covid-data-tracker/#cases_testsper100k7day



41. A naïve comparison of COVID-19 related statistics at different time points, such as cases, hospitalization, deaths, and positivity rates, all of which are contingent upon testing, is misleading. For instance, not only does the availability and accessibility of COVID-19 testing change over time, but also the characteristics of individuals who are seeking testing. For example, the figure below shows that the age distribution of Puerto Rico residents seeking COVID-19 testing has changed over time, with a greater number of younger Puerto Ricans <40 years of age, who are at significantly lower risk of COVID-19 related hospitalization and deaths, receiving testing in recent months (blue highlighted regions):²²

²² Puerto Rico Department of Health. COVID-19 EN CIFRAS EN PUERTO RICO. Accessed September 29, 2021. Available: <https://covid19datos.salud.gov.pr/#pruebas>



42. Thus, COVID-19 related statistics, especially cases and positivity rates, from recent months in 2021 should not be compared to those from early months in 2020 without appropriately adjusting for temporal changes in behavioral patterns and characteristics of Puerto Ricans seeking COVID-19 diagnosis, vaccination, and testing.

43. Finally, it should be noted that, due to selection bias in seeking and receiving COVID-19 testing, the positivity rate is not a reflection of the true positivity rate in the population. Because only a higher at-risk population is seeking testing, the true positivity rate is much lower than what is being reported. This is due to several factors as described below.

44. I understand from Counsel that health plans in Puerto Rico only cover COVID-19 testing if individuals receive a medical referral, and that such a referral will only be made among

symptomatic individuals. However, this makes no sense for asymptomatic, non-infected employees who are being required to test. If testing is required of non-vaccinated employees, then free testing should not be limited to just those who are symptomatic, which would defeat the purpose of asking employees to receive routine testing.

45. Nonetheless, even if an individual received a medical referral, in some instances, health plans only cover up to 4, but as few as 2 tests per month. For Puerto Ricans without health insurance, those without a medical referral, and those who require more than two tests per month, each COVID-19 test costs \$50-100 in out-of-pocket cost. Puerto Rico's mean annual wage for all occupations is \$30,750, or \$2,562.50 per month.²³ Assuming a testing requirement of twice weekly and a \$100 out-of-pocket (OOP) cost:

Line Item	Value	Reference or Calculation
Required Tests per Week	2	
Weeks per Year	52	
Required Tests per Year	104	tests per week * weeks per year
Covered Tests per Month	4	
Months per Year	12	
Covered Tests per Year	48	covered tests per month * covered tests per year
OOP Tests per Year	56	required - covered tests per year
OOP Cost per Test	\$100	per Counsel
Total OOP Cost per Year	\$5,600	OOP tests * OOP cost per test
Total OOP Cost per Month	\$467	total cost per year / 12 months

46. The financial burden of testing thus amounts to **18.2%** of an individual's mean monthly wage for testing requirements alone, in a territory with nearly *four* times the poverty rate of the United States (national rate 11.4% in 2020),²⁴ two times poorer than Mississippi, and where >43% of the

²³ US Bureau of Labor Statistics. May 2020 State Occupational Employment and Wage Estimates Puerto Rico. Accessed September 12, 2021. Available: https://www.bls.gov/oes/current/oes_pr.htm#00-0000

²⁴ Measuring the Nation's Social and Economic Well-Being. Accessed September 13, 2021. Available: <https://www.census.gov/library/visualizations/2021/comm/measuring-nations-well-being.html>

population lives beneath the Federal Poverty Line (FPL).²⁵ Puerto Rico also has the highest income inequality in the United States according to the Gini index, with a score of 0.551, far worse than New York (Gini index 0.515).²⁶ If I assume the median household income in Puerto Rico of \$20,539 (\$1,711.58 per month), the OOP cost for testing increases to **27.3%** of monthly income. If only two tests per month are covered by insurance, the financial burden increases to 26% of an individual's mean monthly wage, or 39% of median monthly income.

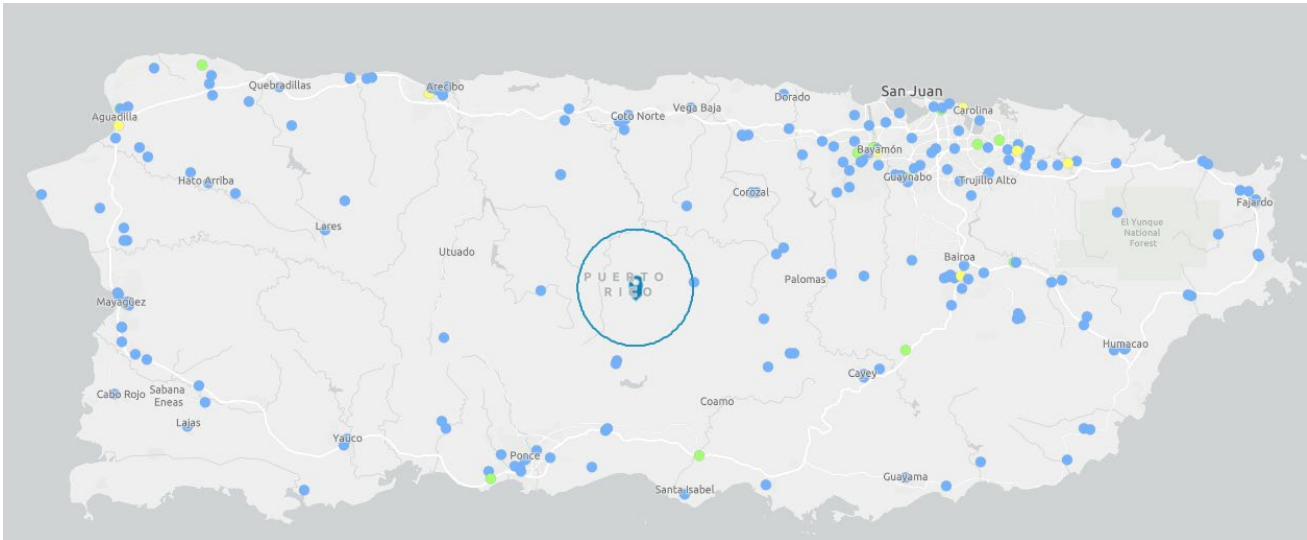
47. The OOP testing cost thus represents not only an extreme financial burden, but a completely unreasonable expectation that those who either do not believe they have been exposed, or those who choose not to receive vaccination, are required to test twice weekly, particularly when the government has not made COVID-19 testing more available and accessible to its residents. Such testing requirements represent an undue burden, which could be resolved if employees were able to work remotely at home, thus removing these unreasonable requirements. And given that many, if not most, employees have worked at home for much of the pandemic thus far without requiring vaccination or testing, there is no reason to abruptly impose such an extreme financial and unnecessary inconvenience that is not backed by any empiric data.

48. Further, testing sites are scattered throughout the island and not necessarily readily accessible to all residents. Therefore, Puerto Rico residents have to spend considerable time traveling to testing sites. For those who need routine COVID-19 testing, total travel time can be burdensome as they will have to take off from work and family. The map below shows the distribution of all testing sites (colored circles), where there are clearly large gaps in various regions throughout the island:²⁷

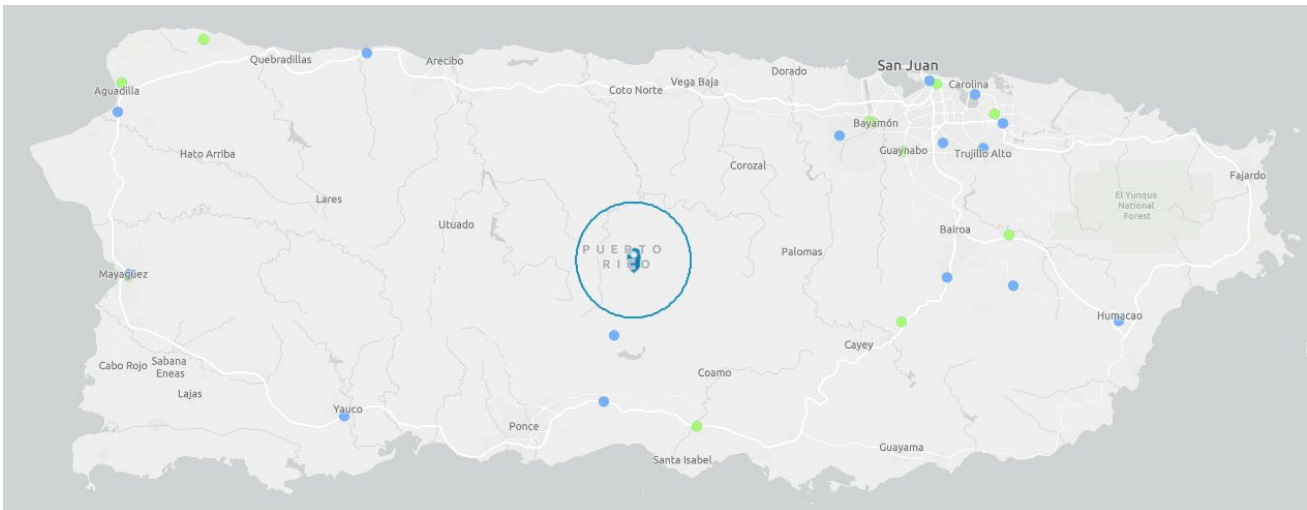
²⁵ US Census Bureau. QuickFacts Puerto Rico. Accessed September 14, 2021. Available: <https://www.census.gov/quickfacts/PR>

²⁶ Guzman G. Household Income: 2019. American Community Survey Briefs. September 2020. [Online] Available: <https://www.census.gov/content/dam/Census/library/publications/2020/acs/acsbr20-03.pdf>

²⁷ GISCorps COVID-19 Testing Sites Locator. Accessed September 12, 2021. Available: <https://www.arcgis.com/apps/webappviewer/index.html?id=2ec47819f57c40598a4eaf45bf9e0d16>



49. For sites providing same-day results, there is far less availability:



50. Thus, any testing that does occur is skewed not only towards those with financial means or employer flexibility to take time to get tested, but also only towards those who truly believe they are at risk of hospitalization and death. This inherent selection bias means that the true positivity rate in the population is significantly lower than what the reported numbers in the Puerto Rico Department of Health COVID-19 Dashboard.

51. Comparison of COVID-19 related statistics from various data sources further illustrates selection bias. According to the CDC's Nationwide Commercial Laboratory Seroprevalence Survey, which measures how many Puerto Ricans have been infected and have antibodies against COVID-

19,²⁸ as of July 2021, Puerto Rico has 75.3% seroprevalence, with a 95% confidence interval of 72.0% to 78.4%. This indicates that 3 in 4 Puerto Ricans already have been infected and have antibodies against COVID-19, suggesting that Puerto Rico is at or very close to herd immunity (i.e., 50-80% seroprevalence).^{29,30} While this may be true, it should be noted that the reported estimate was based on 1,300 samples from commercial laboratories in Puerto Rico, which may not be representative of the Puerto Rico's population. Still, this particular example illustrates the dangers of naïve comparison due to selection bias. Nonetheless, the CDC's Seroprevalence Survey shows that Puerto Rico has the highest seroprevalence for antibodies against COVID-19 in the United States. The national average is 20.6%.

VI. Confirmed cases are not increasing, and due to problems with testing mentioned in previous paragraphs, are not a reliable metric.

52. The first Delta variant confirmed case in Puerto Rico was reported on June 15, 2021.³¹ Between June 15, 2021, and September 29, 2021, the daily average of 7-day moving average (7dMA) was 254 confirmed cases per day.³² In contrast, between November 1, 2020, and May 31, 2021, the daily average of 7dMA was 400 confirmed cases per day. Thus, even with the presence of the Delta variant, there have been nearly half the daily 7dMA confirmed cases compared to the height of the pandemic. Below is a figure showing the 7dMA of *confirmed*³³ cases over time, which indicates that

²⁸ Centers for Disease Control and Prevention. Commercial Laboratory Seroprevalence Surveys. Accessed on September 12, 2021. Available: <https://covid.cdc.gov/covid-data-tracker/#national-lab>

²⁹ Johns Hopkins Bloomberg School of Public Health. What is herd immunity and how do we achieve it? Accessed on September 12, 2021. Available: <https://publichealth.jhu.edu/2021/what-is-herd-immunity-and-how-can-we-achieve-it-with-covid-19>

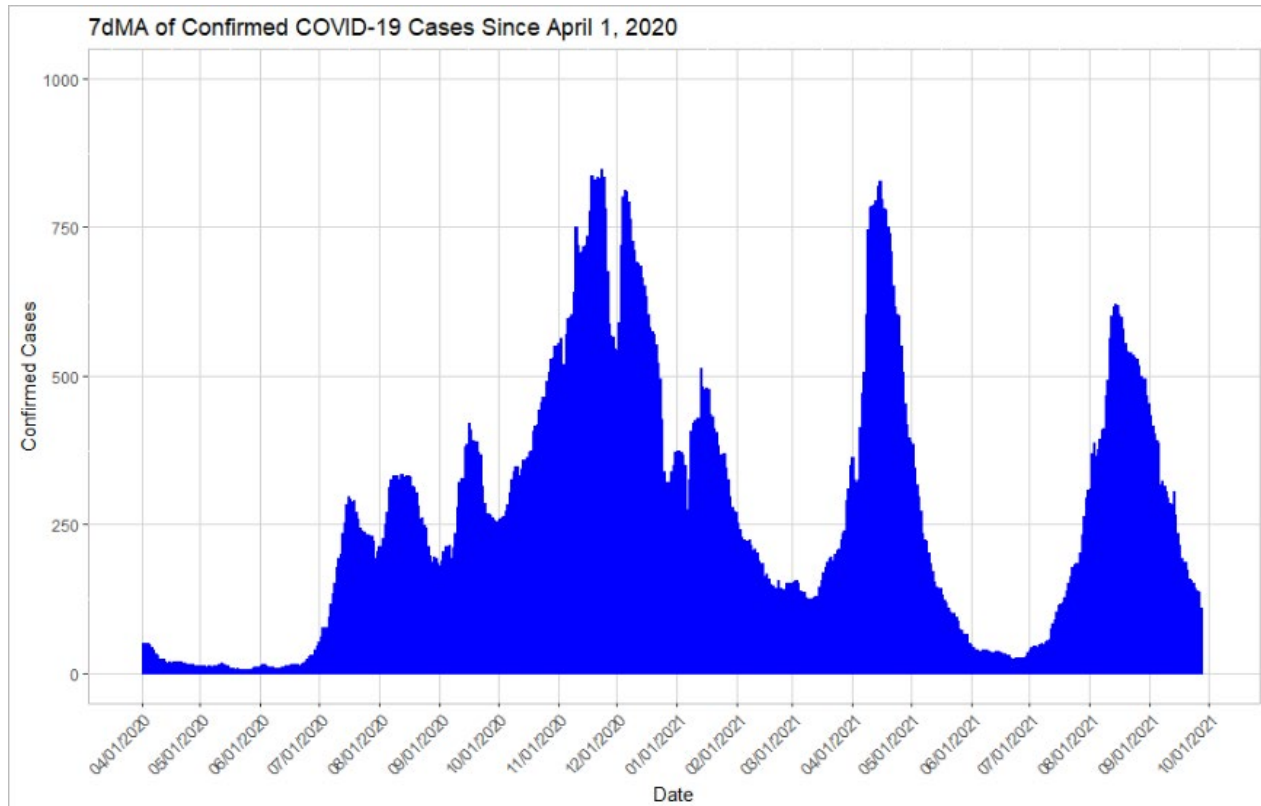
³⁰ Anderson RM, Vegvari C, Truscott J, Collyer BS. Challenges in creating herd immunity to SARS-CoV-2 infection by mass vaccination. *Lancet*. 2020 Nov 21;396(10263):1614-1616. doi: 10.1016/S0140-6736(20)32318-7. Epub 2020 Nov 4. PMID: 33159850; PMCID: PMC7836302.

³¹ Secretary of Health calls for calm after the first case of the Delta variant in Puerto Rico. PR Headline News. Accessed on August 28, 2021. Available: <https://www.puertoricoheadlinenews.com/secretary-of-health-calls-for-calm-after-the-first-case-of-the-delta-variant-in-puerto-rico/>

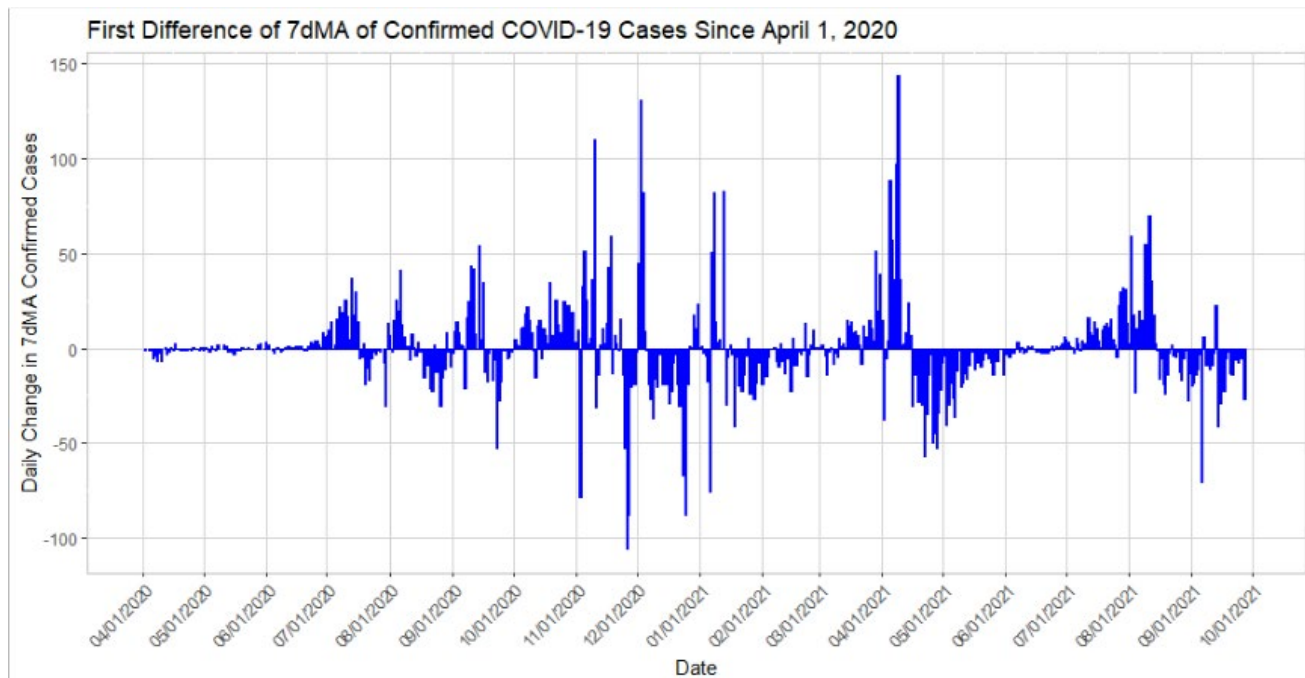
³² The Puerto Rico Health Department. Accessed on September 29, 2021. Available: <https://covid19datos.salud.gov.pr/>

³³ As stated in Paragraph 21, even PCR-confirmed cases are subject to a number of problems.

confirmed cases are rapidly decreasing, and never reached the peak that they did in Fall and Winter 2020.



53. When evaluating the daily rate of change of confirmed cases, I find that, since May 1, 2021, there have been fewer confirmed cases than Winter 2020. Since mid-August, there have been daily *decreases* in the 7dMA of confirmed COVID-19 cases as indicated by the large downward spikes:



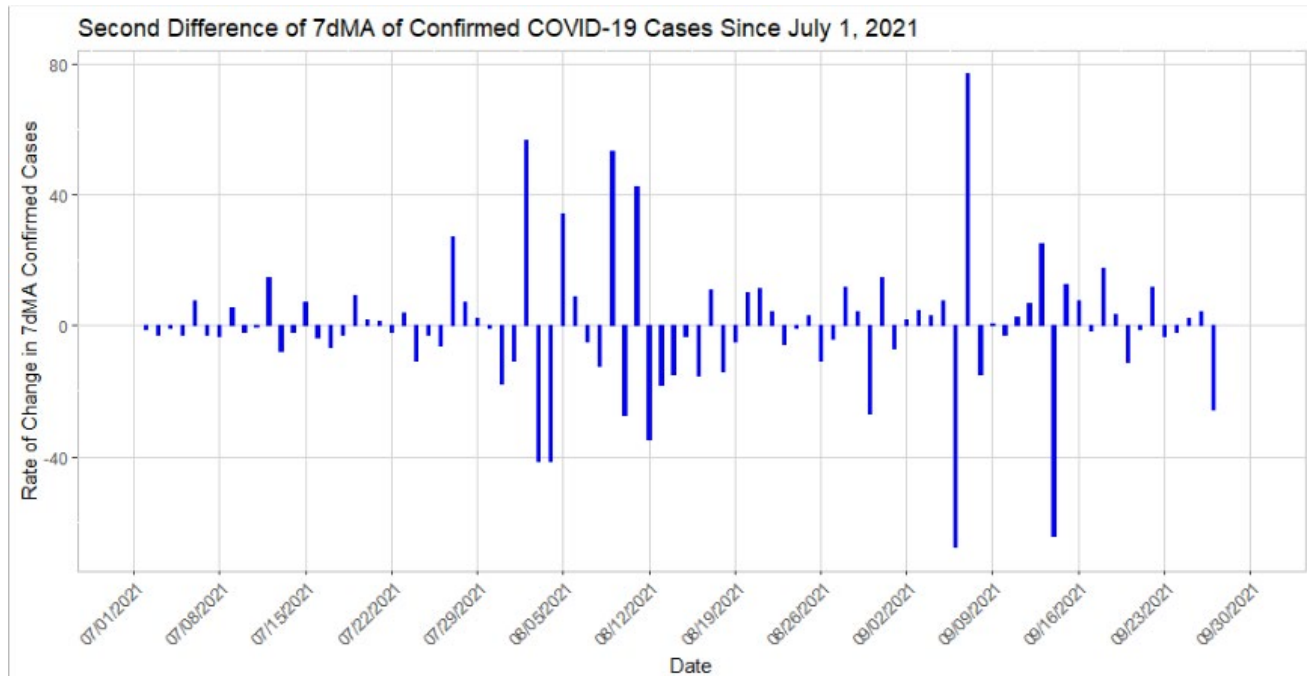
54. These figures reflect the nature of viral activity. It is clear from the figures that the first surge in Puerto Rico occurred in November 2020, with an average 7dMA of 684 cases; this was followed by a second surge in April 2021, with an average 7dMA of 607 cases. The most recent surge in August 2021 had an average 7dMA of 500 cases. These patterns are reflected in the downward spikes on the figure showing first differences, indicating that the most recent wave of infections not only was less severe, but also did not last as long as previous waves. As William Farr noted in 1840, epidemics follow a natural bell-shaped curve, reaching a maximum and slowly declining; any interventions will only delay the inevitable rise and subsequent fall of cases.^{34, 35, 36} The pattern in cases and deaths over the past year have followed such curves, with each observed surge shorter in duration than the previous.

³⁴ Brownlee, John (1915). "Historical note on Farr's theory of the epidemic". *The British Medical Journal*, Part 2. 2 (2850): 250–252. doi:10.1136/bmj.2.2850.250. PMC 2302838. PMID 20767766

³⁵ Oxford Reference. *Farr's Laws*. Accessed September 30, 2021. Available: <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095811145>

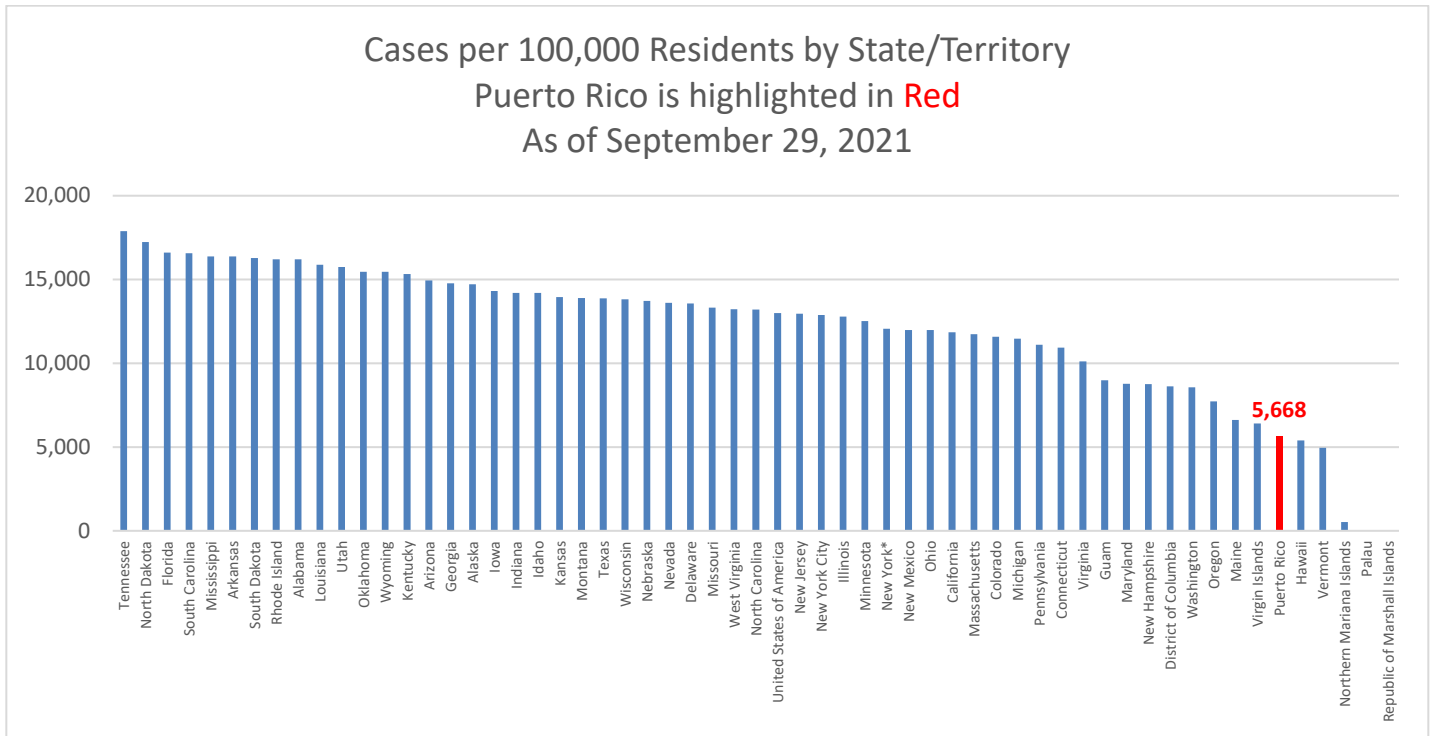
³⁶ Trillian Health. *Farr's Law: It's Happening*. October 1, 2020. Accessed September 30, 2021. Available: <https://blog.trillianhealth.com/farrs-law-its-happening>

55. More compelling is the fact that the daily rate of change has been *decelerating*, that is, slowing down, since July 1, 2021, a full 6 weeks before Executive Order No. 2021–058 (“Vaccine Mandate”) was put in place; this is calculated by taking the second difference of the 7dMA of confirmed cases, which indicates that the average change during this time period is -0.37, the negative sign indicating a *slowdown* in daily cases:



56. According to the CDC, as of September 29, 2021, Puerto Rico ranks 54th in the United States for COVID-19 cases per 100,000 residents, as shown in the figure below:³⁷

³⁷ Centers for Disease Control and Prevention. COVID-19 Data Tracker. Accessed on September 29, 2021. Available: https://covid.cdc.gov/covid-data-tracker/#cases_casesper100k



57. Yet despite the far lower case rates in Puerto Rico compared to other areas of the United States, the CDC ranks Puerto Rico as “Level 4: Very High Level of COVID-19 in Puerto Rico”, which is nonsense since there are no such restrictions for travel to the United States as a whole, or even to specific states.³⁸ If the CDC were actually consistent in their severity rating, then travel would be prohibited to every state in the Figure above that has high numbers of new cases per 100,000 residents. According to the CDC, “Very High” is defined as more than 500 new cases in the past 28 days per 100,000 residents.³⁹ But such a metric is meaningless when accounting for the testing biases I describe in Section V, and in light of the high vaccination rates in Puerto Rico. Cases counts are even more suspect due to the Puerto Rico Department of Health’s case-accounting of probable vs. confirmed cases, as described in the paragraphs below.

³⁸ Centers for Disease Control and Prevention. COVID-19 Travel Recommendations by Destination. Accessed September 19, 2021. Available: <https://www.cdc.gov/coronavirus/2019-ncov/travelers/map-and-travel-notices.html#travel-1>

³⁹ Centers for Disease Control and Prevention. How CDC Determines the Level for COVID-19 Travel Health Notices. Accessed September 19, 2021. Available: <https://www.cdc.gov/coronavirus/2019-ncov/travelers/how-level-is-determined.html>

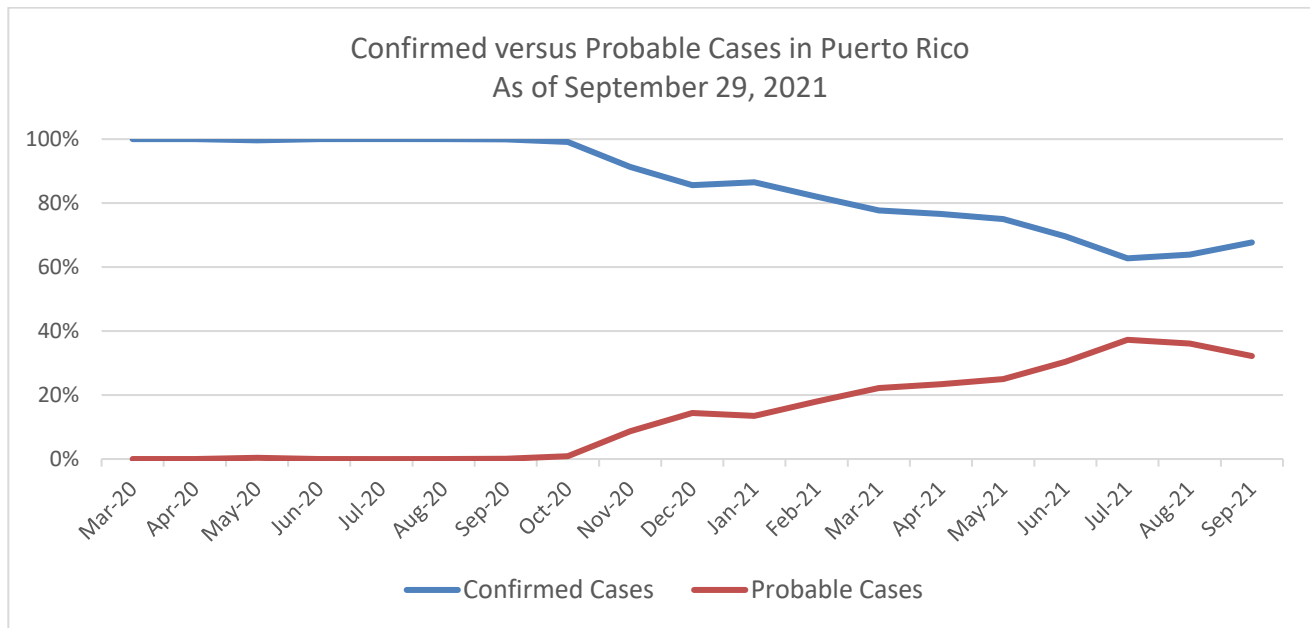
58. It is evident that documentation and reporting processes for COVID-19 cases have changed over time. According to the data from the Puerto Rico Department of Health, the number of *probable* COVID-19 cases has increased at a higher rate than the number of confirmed COVID-19 since the pandemic has started in March 2020. According to the Puerto Rico Department of Health, confirmed cases were identified using PCR testing, whereas probable cases were identified with antigen testing. The number of probable cases is an unreliable measure for transmission of COVID-19 because antigen testing has poor accuracy for detecting true COVID-19 cases.^{40,41,42} Further, antigen testing cannot distinguish between live virus, vaccine-mediated immunity, and natural immunity due to previous infection. Therefore, probable cases can be due to other respiratory illnesses or underlying health conditions. The practice of considering patient-reported symptoms as “cases” of COVID-19 is not scientifically valid but will result in falsely inflated case numbers.

59. The figure below illustrates that a greater proportion of total COVID-19 cases has become probable cases over time. Between July 1 and September 29, 2021, nearly 40% of total COVID-19 cases were probable cases, despite greater availability of COVID-19 testing than before. This suggests inconsistency in documentation and reporting of COVID-19 cases. This also implies that cases are increasingly being recorded as COVID-19, even without documented proof.

⁴⁰ Ford L, Lee C, Pray IW, et al. Epidemiologic Characteristics Associated With Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Antigen-Based Test Results, Real-Time Reverse Transcription Polymerase Chain Reaction (rRT-PCR) Cycle Threshold Values, Subgenomic RNA, and Viral Culture Results From University Testing. Clin Infect Dis. 2021 Sep 15;73(6):e1348-e1355. doi: 10.1093/cid/ciab303. PMID: 33846714; PMCID: PMC8083323.

⁴¹ Scohy A, Anantharajah A, Bodéus M, Kabamba-Mukadi B, Verroken A, Rodriguez-Villalobos H. Low performance of rapid antigen detection test as frontline testing for COVID-19 diagnosis. Journal of Clinical Virology. 2020;129:104455. doi:10.1016/j.jcv.2020.104455

⁴² Brihn A, Chang J, OYong K, et al. Diagnostic Performance of an Antigen Test with RT-PCR for the Detection of SARS-CoV-2 in a Hospital Setting — Los Angeles County, California, June–August 2020. MMWR Morb Mortal Wkly Rep 2021;70:702–706. DOI: <http://dx.doi.org/10.15585/mmwr.mm7019a3>



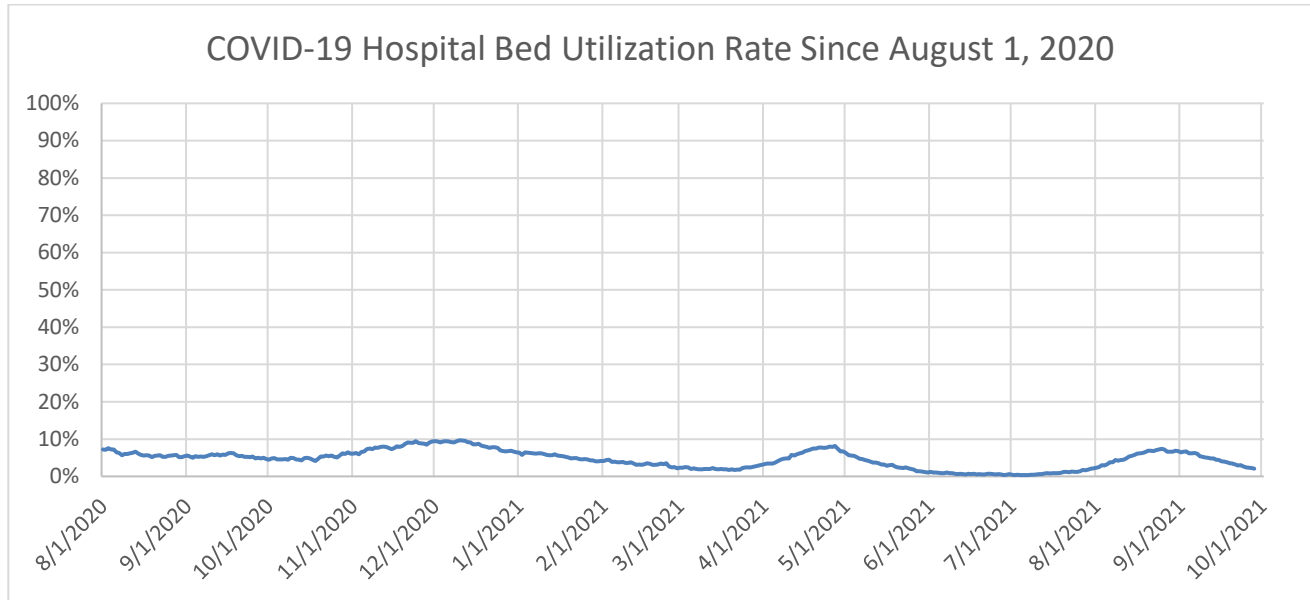
VII. Hospitalization trends throughout the entire pandemic indicate that the healthcare system is in no danger of being overwhelmed.

60. It is clear that there is no danger of overwhelming the healthcare system with COVID-19 patients in Puerto Rico. Since June 15, 2021, the average daily hospital bed utilization rate for COVID-19 patients was approximately 3% (211 beds out of 7053 total beds).⁴³ In the same time frame, the daily ICU bed utilization rate for COVID-19 patients averaged 8.3% (51 ICU beds out of 667 total ICU beds).

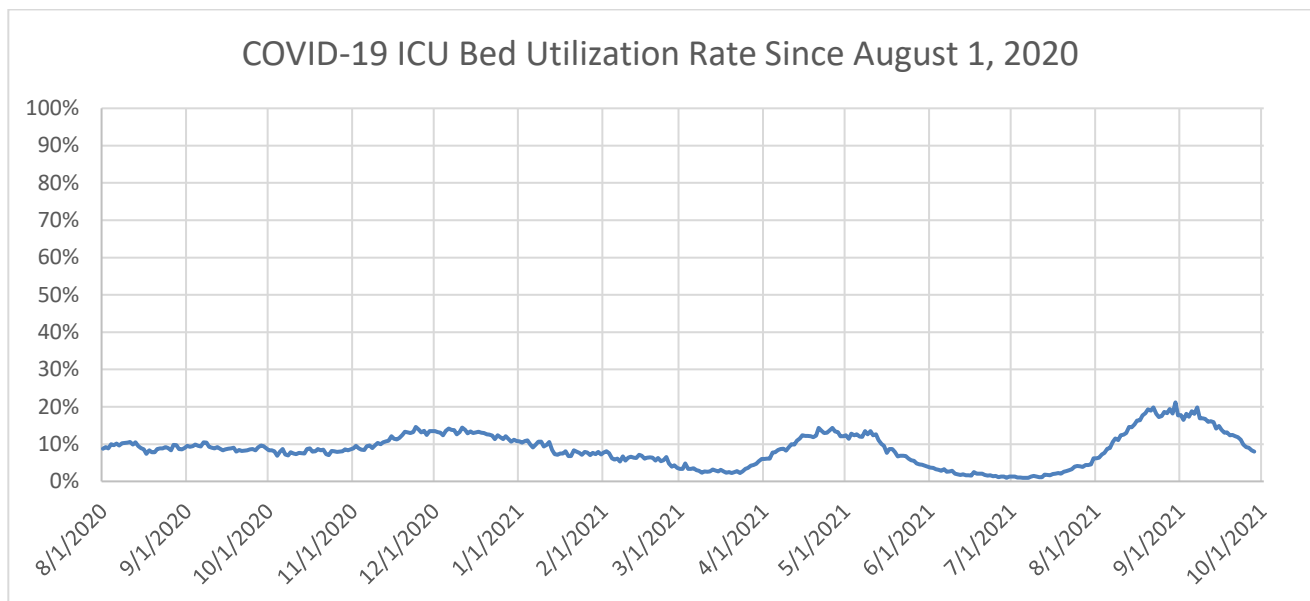
61. In contrast, between August 1, 2020, and May 31, 2021, the average daily hospital bed utilization rate was 5.3% (376 beds), nearly double the current utilization rate. The average daily ICU bed utilization rate was 8.8% (59 ICU beds). Thus, it is evident that the delta variant has not led to an increased burden on hospital resources in Puerto Rico.

⁴³ The Puerto Rico Department of Health. COVID-19 Figures in Puerto Rico. Accessed on September 11, 2021. Available: <https://covid19datos.salud.gov.pr/>

62. Nonetheless, as shown in the figure below, the hospital bed utilization rate for COVID-19 patients has never exceeded 10% since the pandemic has started. In fact, it was only close to 10% in December 2020:

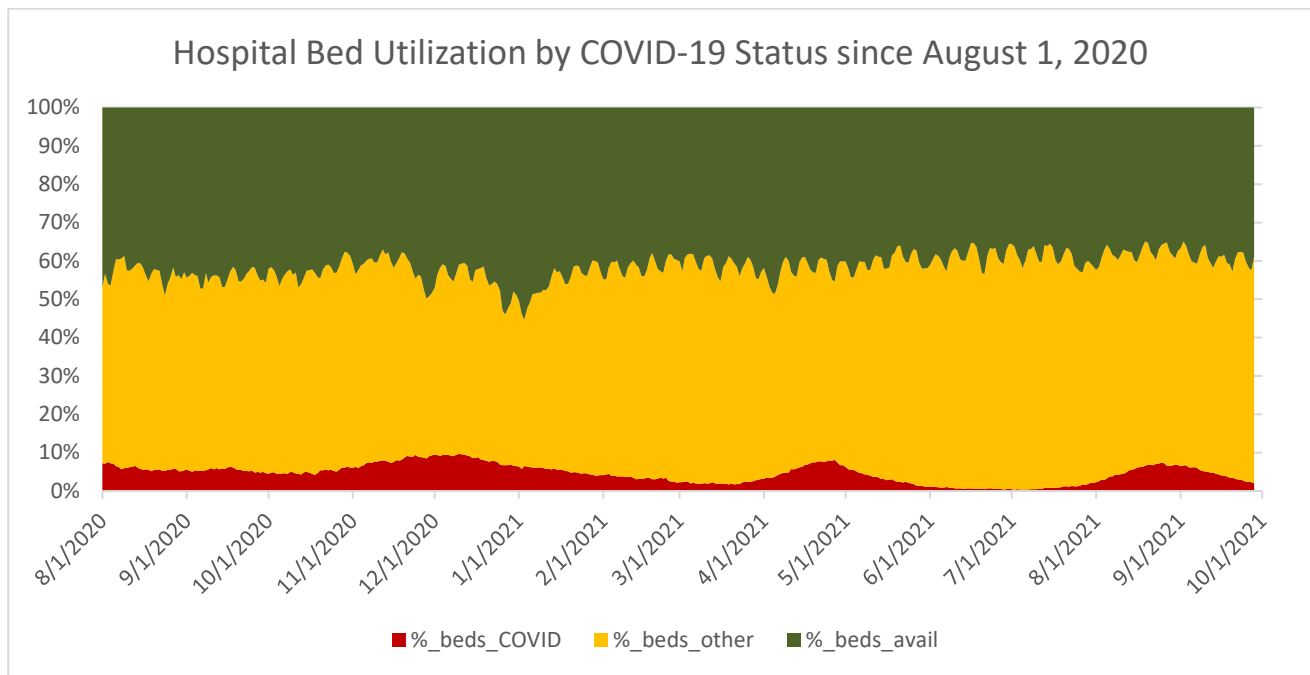


63. Similarly, the utilization rate for ICU beds has never exceeded 20% since the pandemic has started:

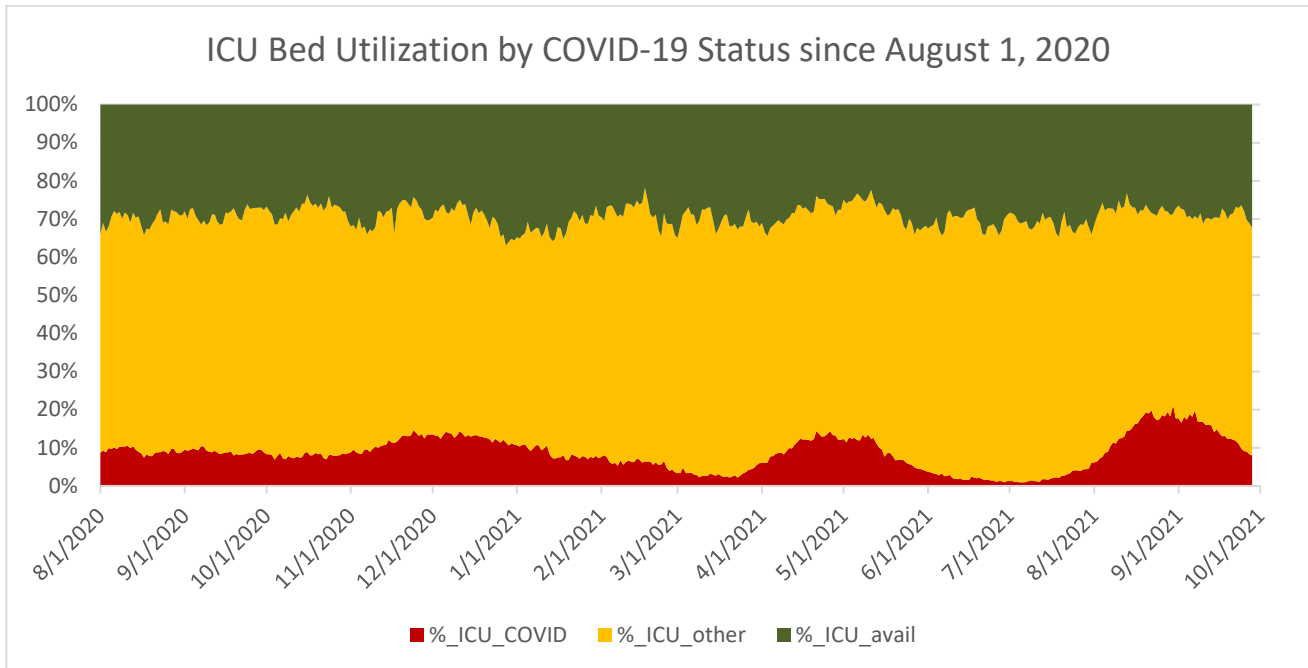


64. The proportion of hospital and ICU beds occupied by COVID-19 patients since August 1, 2020, shows that COVID-19 patients make up just a small fraction of the total inpatient population.

Puerto Rico ranks 2nd in the United States in terms of lowest hospital utilization rates for COVID-19 at just 1.8% for hospital beds and 7.3% ICU, representing just 2.9% of total inpatient utilization.⁴⁴ Overall, nearly 40% of hospital beds have remained available since August 1, 2020, *even in the presence of so-called “waves” of COVID-19 infection* – the number of empty beds does not change even when COVID-19 cases increase. The nearly constant 40% availability of hospital beds implies that as COVID-19 infection increases, occupancy of beds by other diagnoses decreases by a similar magnitude, suggesting that patterns in hospital utilization are related to diagnostic coding practices, rather than true COVID-19 illness. Similarly, nearly 30% of ICU beds have remained available during the same time period. As indicated in the figures below, there is no overwhelming of Puerto Rico’s healthcare system:



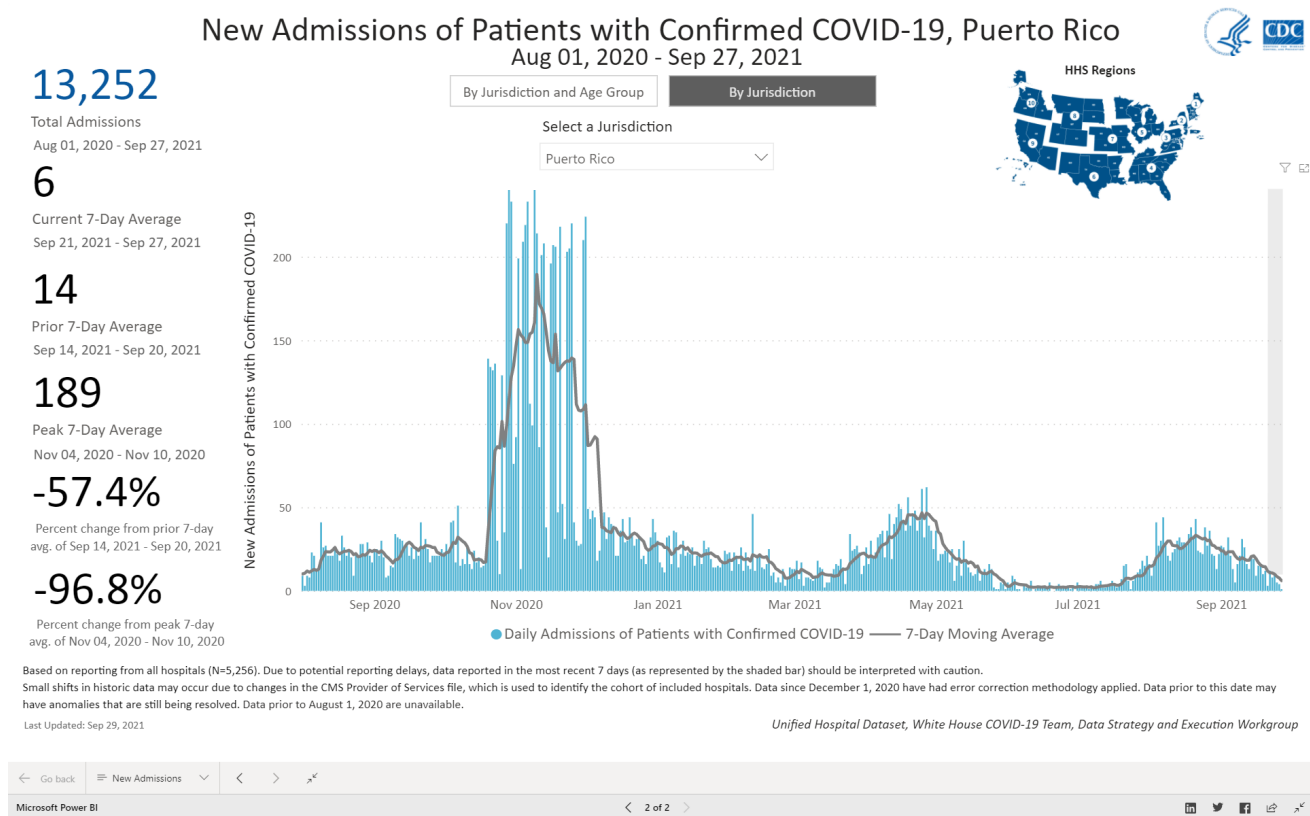
⁴⁴ Reported State Hospital Capacity and COVID19 Patient Impact United States Health and Human Services Protect Public Data Hub. Accessed on September 30, 2021. Available: <https://protect-public.hhs.gov/datasets/be0c321c689f44ac81b4771446b8eefc/explore?location=4.789198%2C-3.419767%2C2.72&showTable=true>



65. Even more compelling is that daily NEW COVID-19 hospitalizations have been trending far lower than the peak of the pandemic. According to the CDC, daily new hospitalizations are at a 7-day average of just 6, significantly lower than 14 in the prior 7 days, and far less than 189 during the peak of the pandemic, or nearly 97% lower.⁴⁵ These data indicate that new daily hospitalizations are decreasing even with the arrival of the Delta-variant, thus precluding any rationale for strict vaccination and testing mandates.

66. Between August 1, 2020, and September 29, 2021, Puerto Rico has had three big waves in the number of hospital admissions in patients with confirmed COVID-19 cases. The figure below from the CDC makes it evident that there is little risk to overwhelming the healthcare system. The number of COVID-19 related hospitalizations peaked in the week of November 4, 2020. As of September 29, 2021, the number of COVID-19 related hospitalization has declined by 96.8% from the peak in November 2020.

⁴⁵ Centers for Disease Control and Prevention. COVID-19 Data Tracker. Accessed on September 29, 2021. Available <https://covid.cdc.gov/covid-data-tracker/#new-hospital-admissions>



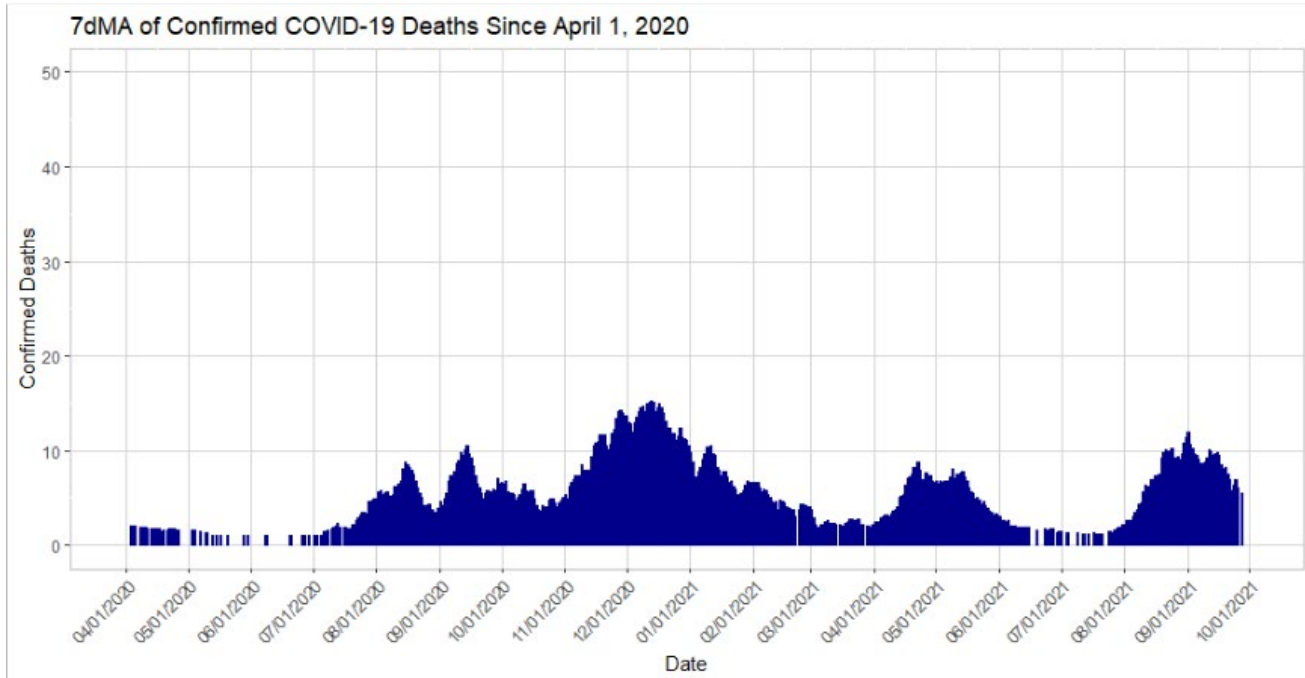
67. These hospitalization data indicate that there has never been a risk of overwhelming Puerto Rico’s healthcare system, even at the height of the pandemic, and that any such “risk” is clearly nonexistent.

68. Even more importantly however, is that these hospitalization data do not differentiate between hospitalization **DUE TO** COVID-19, as opposed to hospitalizations **WITH** COVID-19. Thus, it is quite plausible, and in fact likely, that at least 40% of these hospitalizations were for asymptomatic or mildly symptomatic COVID-19, or were completely unrelated to COVID-19, where COVID-19 was only an incidental finding, again negating any argument that COVID-19 hospitalizations are overwhelming the healthcare system in Puerto Rico.⁴⁶

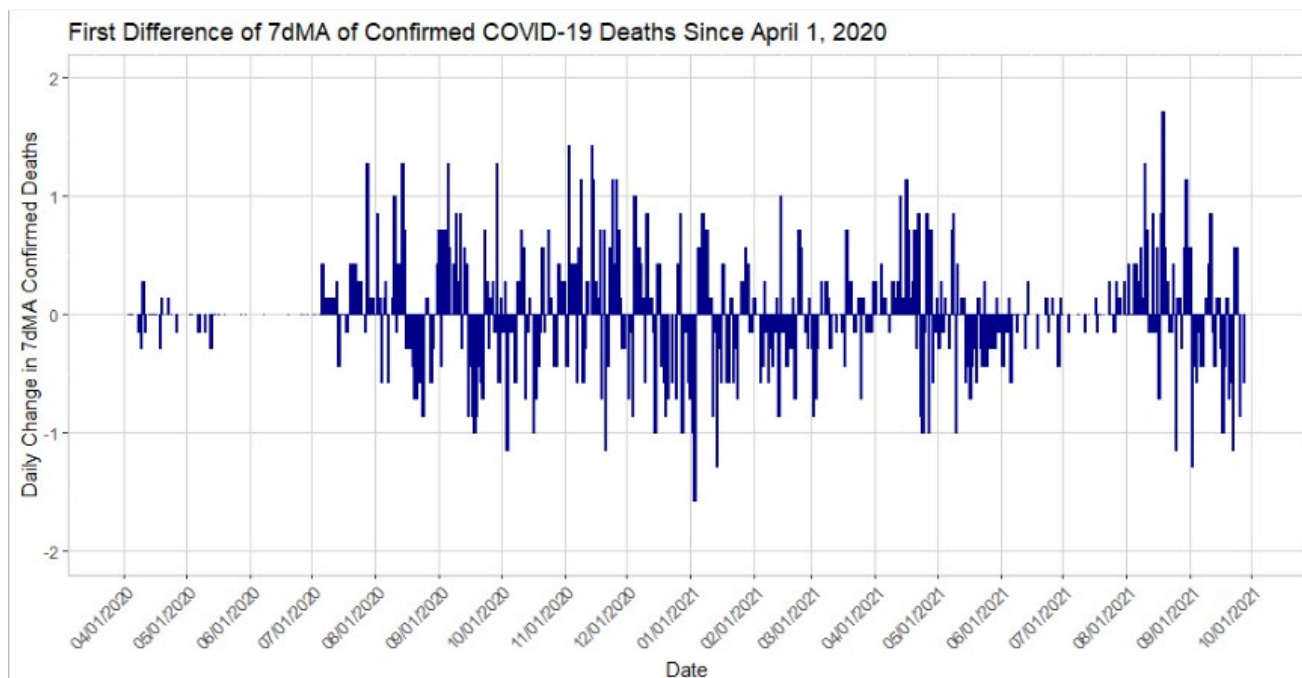
VIII. COVID-19 deaths throughout the pandemic have been minimal in Puerto Rico.

⁴⁶ Fillmore N, La J, Zheng C, Doron S, Do N, Monach P, Branch-Elliman W. The COVID-19 Hospitalization Metric in the Pre- and Post-vaccination Eras as a Measure of Pandemic Severity: A Retrospective, Nationwide Cohort Study. Available: <https://www.researchsquare.com/article/rs-898254/v1>

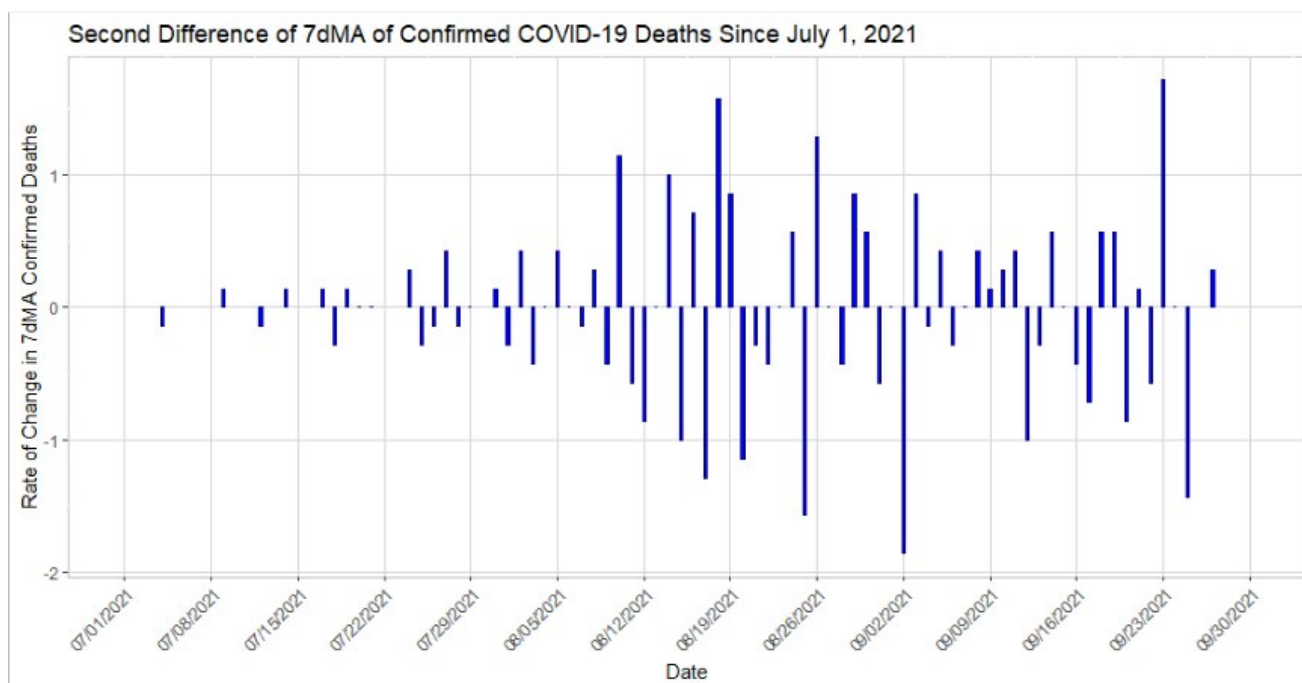
69. COVID-19 deaths have also been minimal. Since April 1, 2020, the 7dMA of *confirmed* COVID-19 deaths has never exceeded ~15 deaths in a single day:



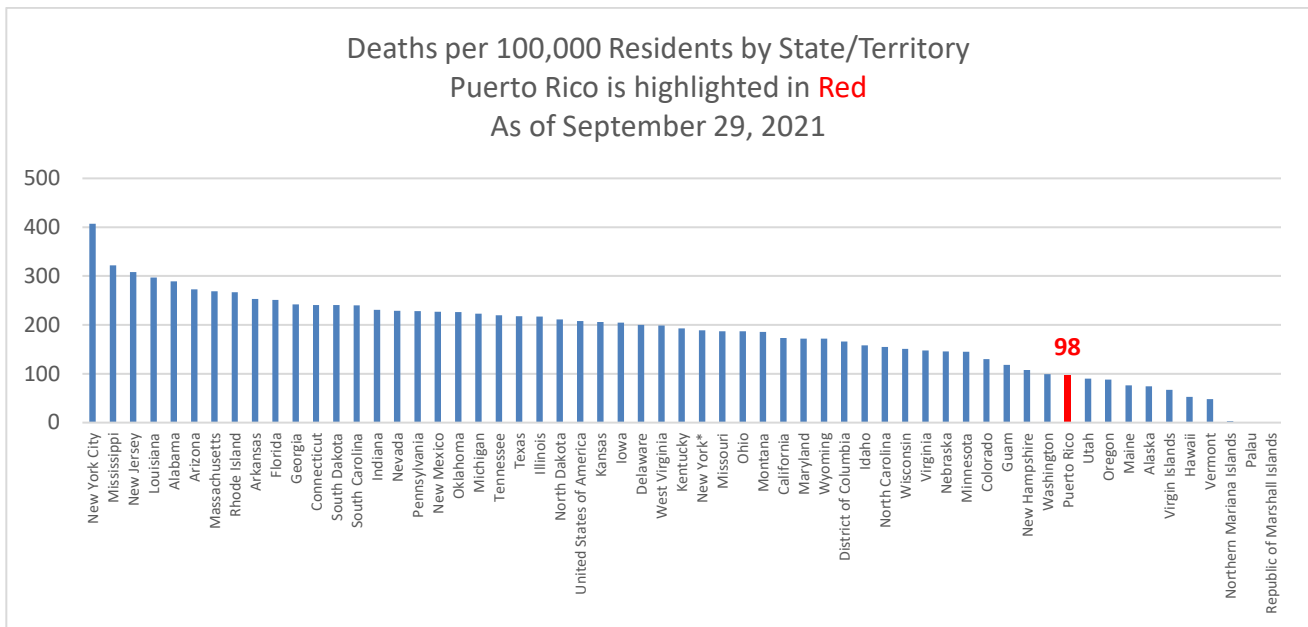
70. When looking at the daily change in the 7dMA of COVID-19 deaths, which provides an indication of whether the virus is killing individuals at a higher rate over time, there is virtually no change over time in the daily rate of change based on 7dMA since April 1, 2020, with the daily change in 7dMA of deaths never exceeding ± 2 at any given point throughout the entire pandemic:



71. In fact, the daily rate of change has been *decelerating*, that is, slowing down, since July 1, 2021, a full 6 weeks before Executive Order No. 2021-058 was put in place; this is calculated by taking the second difference of the 7dMA of confirmed deaths, which indicates that the average change during this time period is -0.01, the negative sign indicating a *slowdown* in daily deaths:

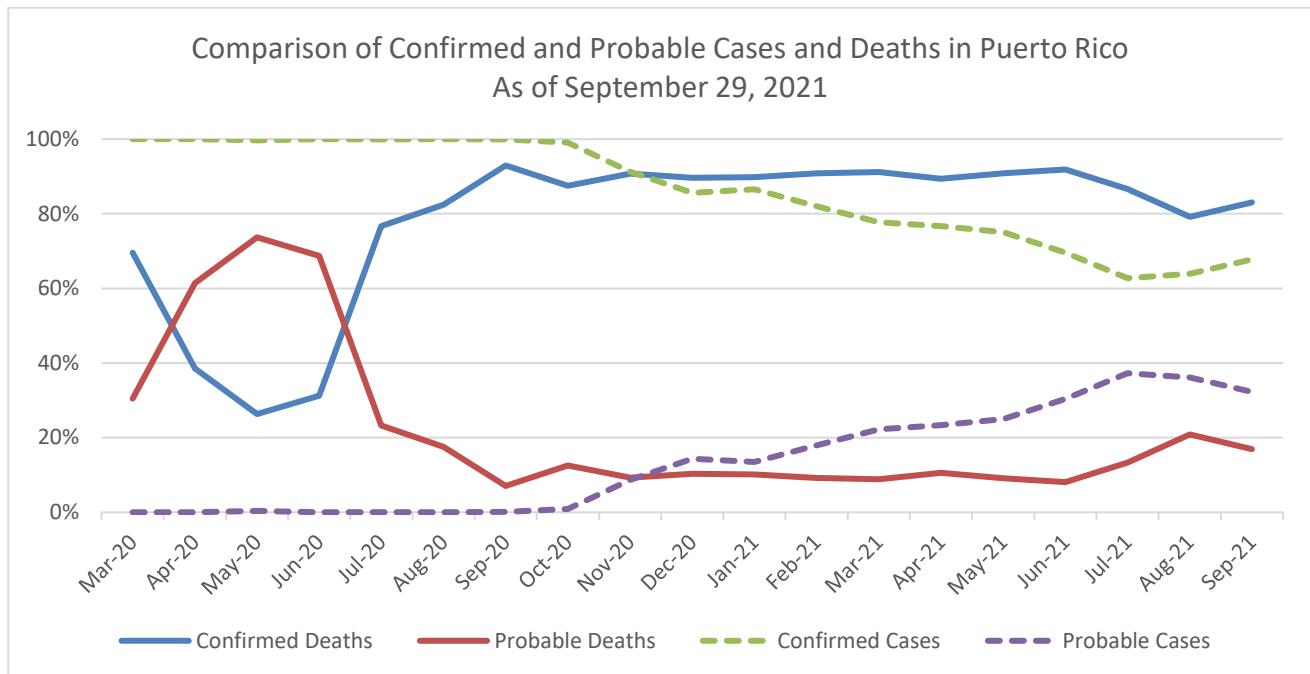


72. According to the CDC, as of September 29, 2021, Puerto Rico ranks 47th for COVID-19 deaths per 100,000 residents in the United States, as shown in the table below:⁴⁷



73. According to data from the Puerto Rico Department of Health, the number of *probable* COVID-19 deaths has decreased over time. Below, I show that 100% of COVID-19 cases were classified as “confirmed” between March and September 2020, yet 40% of all COVID-19 deaths during the same time frame were probable deaths. The reported numbers for COVID-19 cases and deaths from the Puerto Rico Department of Health are contradictory because logically, COVID-19 cases lead to COVID-19 deaths; therefore, confirmed cases can only lead to confirmed, not probable deaths. Inconsistency in documentation and reporting of COVID-19 cases and deaths is abundantly evident in the data from the Puerto Rico Department of Health.

⁴⁷ Centers for Disease Control and Prevention. COVID-19 Data Tracker. Accessed September 11, 2021. Available: https://covid.cdc.gov/covid-data-tracker/#cases_deathsper100k



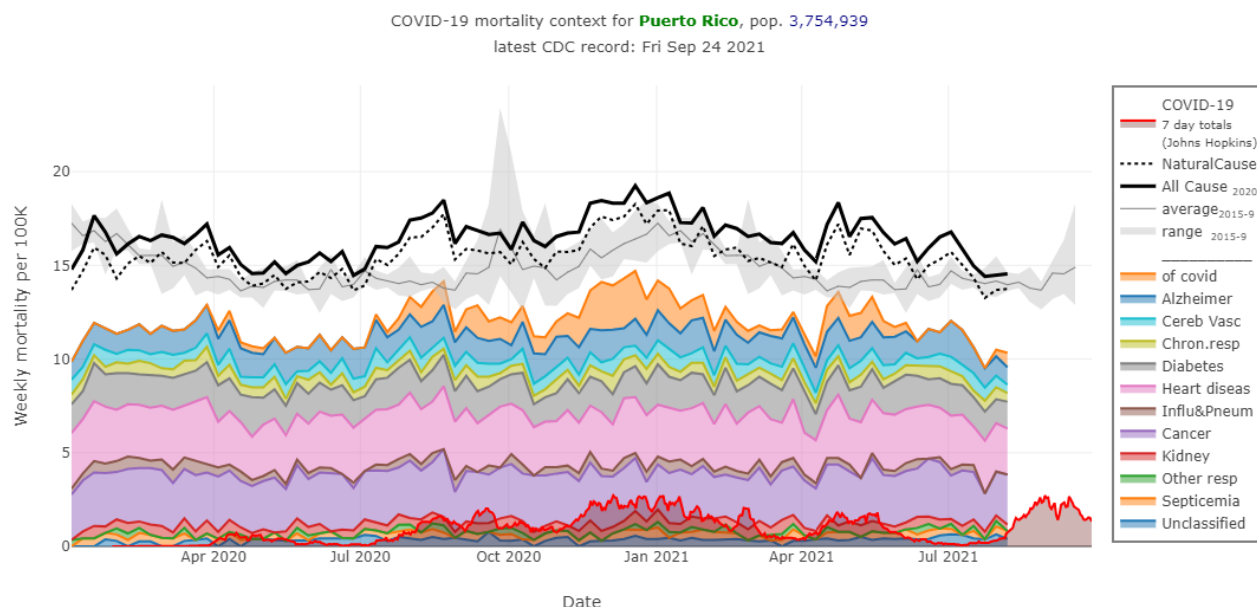
74. Based on the data on COVID-19 cases, hospitalizations, and deaths, it is clear that the presence of the Delta variant has not led to a burden on Puerto Rico's healthcare system nor has it posited a significant burden on population health. In fact, despite the availability of the vaccine, numbers appear to be approaching levels similar to that of PRE-vaccine, suggesting that mandatory vaccination will have no impact whatsoever on curbing the trends seen.

75. Even among pregnant women, who are considered a high-risk group, it was found that of 1,200 pregnant women with COVID-19 who gave birth between March 1 and July 30, 2020, nearly half of the women were asymptomatic, and just four maternal deaths were attributed to COVID-19 (0.33% case-fatality rate).⁴⁸ Unsurprisingly, those women with severe disease were older with elevated BMI and underlying health issues, including asthma, diabetes, hypertension, and liver disease, which are all known risk factors for severe COVID-19 infection.

76. Finally, it is clear that COVID-19 is not a leading cause of death in Puerto Rico. According to the figure below, the leading causes of death are those indicated by the largest shaded

⁴⁸ Media Advisory: Severe COVID-19 in pregnancy associated with preterm birth, other complications. January 28, 2021. Accessed September 30, 2021. Available: <https://www.nichd.nih.gov/newsroom/news/012821-GRAVID>

regions (most notably heart disease, cancer, and diabetes).⁴⁹ While there appears to be a peak in COVID-related deaths in January 2021, subsequent COVID-related deaths have been quite low relative to other causes of death and continue to decline.



IX. The case fatality rate (CFR) by age group follows already-known COVID-19 death trends, and is nearly zero among pediatric age groups.

77. As of September 29, 2021, in Puerto Rico, the case fatality rates per age group are as shown in the table below. The case fatality rate was calculated by dividing the number of deaths by the total number of cases, both probable and confirmed, in each age group.

Age Group	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Total CFR	0.01% ⁵⁰	0.03%	0.08%	0.25%	0.69%	1.81%	3.85%	8.42%	17.47%

⁴⁹ Almeida JS, Shiels M, Bhawsar P, Patel B, Nemeth E, Moffitt R, Closas MG, Freedman N, Berrington A. Mortality Tracker: the COVID-19 case for real time web APIs as epidemiology commons. *Bioinformatics*. 2021 Aug 4;37(14):2073-2074. doi: 10.1093/bioinformatics/btaa933. PMID: 33135727; PMCID: PMC7665316; Mortality Tracker. Accessed September 29, 2021. Available: [https://episphere.github.io/mortalitytracker/#cause=COVID-19%20\(CDC\)&state=Puerto%20Rico](https://episphere.github.io/mortalitytracker/#cause=COVID-19%20(CDC)&state=Puerto%20Rico)

⁵⁰ Due to rounding, this value may be very slightly >0%, but only marginally so.

78. *Notably, the case fatality rate is nearly 0% for those 0-9 years old.*⁵¹ In other words, there have been **nearly ZERO** pediatric deaths in Puerto Rico during the entire pandemic.⁵² Only recently has there been one reported certified death in a 5 year-old that occurred in January 2021.⁵³ The table below confirms that out of a total of 354 all-cause deaths in those aged 0-17 years, there are ≤ 10 total pneumonia (PNA), influenza (FLU), or COVID-19 deaths combined, which means there can only be a maximum of 8 possible COVID-19 pediatric deaths since January 2020, based on the fact that the blank cells indicate that counts between 1-9 and have been suppressed in accordance with NCHS confidentiality standards. Compare this to a total of up to 13 pediatric deaths (up to age 14) in a single year due to traffic fatalities.⁵⁴ Nonetheless, even a maximum estimate of 8 possible COVID-19 deaths is highly conditional on the problems with testing biases and confirmed cases discussed previously.

Cause of Death by Type										
Start Date	End Date	Year	State	Age Group	COVID-19	Total	PNA	PNA and COVID-19	FLU	PNA, FLU, or COVID-19
1/1/2020	12/31/2020	2020	Puerto Rico	0-17 years		218				10
1/1/2021	9/4/2021	2021	Puerto Rico	0-17 years		136			0	

79. Puerto Rico achieved 60% full vaccination rate on June 8, 2021.⁵⁵ According to the data from the Puerto Rico Department of Health, between March 9, 2020, and June 7, 2021, the case fatality rate was 1.8% and the average daily deaths 5.6. Between June 8, 2021, and September 29, 2021, the case fatality rate was 1.4% and the average daily deaths was 5.4. Even with the presence of the Delta

⁵¹ The Puerto Rico Department of Health. COVID-19 Figures in Puerto Rico. Accessed September 11, 2021. Available: <https://covid19datos.salud.gov.pr/>;

⁵² CDC. Provisional COVID-19 Deaths by Sex and Age. Accessed September 12, 2021. Available: <https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-by-Sex-and-Age/9bhg-hcku/data>

⁵³ Una menor de cinco años es la víctima más joven en Puerto Rico del COVID-19. Accessed September 13, 2021. Available: <https://www.elnuevodia.com/noticias/locales/notas/una-menor-de-cinco-anos-es-la-victima-mas-joven-en-puerto-rico-del-covid-19/>

⁵⁴ National Highway Traffic Safety Administration. Data Visualization – Fatality Analysis Reporting System (FARS) . Available: https://explore.dot.gov/views/DV_FARS_CD/Home?iid=1&isGuestRedirectFromVizportal=y&embed=y

⁵⁵ The Puerto Rico Department of Health. COVID-19 Figures in Puerto Rico. Accessed September 11, 2021. Available: <https://covid19datos.salud.gov.pr/#vacunacion>

variant in recent months, there have been fewer daily deaths and a 19% lower case fatality rate. In other words, even with the Delta variant, the case fatality rate and the average daily deaths have decreased.

X. The virus is endemic and impossible to completely eradicate regardless of any measures taken.

80. The public health sphere has made it a goal to eradicate COVID-19, but the virus will not be eradicated. Such a goal has led to prolonged lockdowns and social isolation measures, with costly negative consequences on mental health, education, economic growth, and widening gaps in economic opportunities and health outcomes between privileged and disadvantaged populations.⁵⁶ Not only is the virus endemic in humans, (there are many regions of the globe and population subgroups that will never be vaccinated. Moreover, COVID-19 is endemic in many animal species and can jump back and forth to humans at any time. It is clear that the delta variant specifically emerged in areas with high levels of vaccine coverage, since delta transmission is impervious to vaccines. Further imposing strict measures upon the public without considering the widespread impacts will only serve to exacerbate these negative consequences and lead to devastating societal harm.⁵⁷

81. Further, unvaccinated individuals are not perpetuating the pandemic and endangering the public.⁵⁸ Dr. Fauci himself has stated that the viral load is equivalent among vaccinated and unvaccinated persons.⁵⁹ Even among those who are vaccinated, the virus can still be transmitted; in July 2021, 74% of cases following several public events in Massachusetts were found among vaccinated individuals.⁶⁰ In fact, rapid vaccination campaigns may result in the faster emergence of

⁵⁶ <https://www.cato.org/pandemics-policy/society-will-never-be-free-covid-19-its-time-embrace-harm-reduction>

⁵⁷ Zawadzki RS, Gong CL, Cho SK, Schnitzer J, Zawadzki NK, Hay JW, Drabo EF. Where do we go from here?: A framework for using susceptible-infectious-disease models for policy making in emerging infectious diseases. *Value in Health*. 2021. doi: 10.1016/j.jval.2021.03.005. Epub ahead of print. PMID: PMC8110035

⁵⁸ <https://pecc-il.org/docs/position-paperthe-science-and-the-ethics-regarding-the-risk-posed-by-non-vaccinated-individuals/>

⁵⁹ <https://rumble.com/vlt9b1-dr.-anthony-fauci-fully-vaccinated-people-carry-as-much-virus-as-unvaccinat.html>

⁶⁰ <https://www.cdc.gov/mmwr/volumes/70/wr/mm7031e2.htm>

vaccine-resistant strains.⁶¹ Moreover, individuals who have acquired immunity through natural infection maintain longer lasting and stronger protection against infection, symptomatic disease and hospitalization compared to those who receive vaccine.⁶² Finally, the vaccine does NOT reduce transmission; it is only indicated to prevent severe disease.⁶³ Thus, not only do vaccine mandates impose on personal freedoms and the right of individuals to make an informed decision, but they are also without evidence demonstrating beneficial effect on cases and transmission of COVID-19.

XI. Assumptions and data sources for calculations

82. This report is based primarily on the Puerto Rico Department of Health's COVID-19 dashboard, available online at <https://COVID-1919datos.salud.gov.pr/>. All data on cases, hospitalizations, and deaths were downloaded from the website to create the figures presented in this report on September 29, 2021. For conservative estimation, I assume that all cases and deaths recorded as COVID-19 are in fact caused by COVID-19, and not, as has been reported, instances of individuals dying **with** COVID-19 (as opposed to **from** COVID-19).

83. For **hospitalizations** and bed capacity, it is assumed that a bed can only be considered “available” if there are adequate staff; this explains the daily fluctuations in total bed capacity reported on the Puerto Rico Department of Health Dashboard. According to the Organisation for Economic Co-operation and Development (OECD), a hospital bed is defined as one that is maintained and staffed and immediately available for the care of admitted patients.⁶⁴ This is further supported by the HHS definition of all hospital beds: “Total number of all **staffed** inpatient and outpatient beds in your hospital, including all overflow, observation, and active surge/expansion beds used for inpatients and

⁶¹ Rella, S.A., Kulikova, Y.A., Dermitzakis, E.T. et al. Rates of SARS-CoV-2 transmission and vaccination impact the fate of vaccine-resistant strains. *Sci Rep* 11, 15729 (2021). <https://doi.org/10.1038/s41598-021-95025-3>

⁶² Gazit S, Shlezinger R, Perez G, et al. Comparing SARS-CoV-2 natural immunity to vaccine-induced immunity: reinfections versus breakthrough infections. *medRxiv*. Published online January 1, 2021:2021.08.24.21262415. doi:10.1101/2021.08.24.21262415

⁶³ <https://www.fda.gov/vaccines-blood-biologics/comirnaty>

⁶⁴ OECD Glossary of Statistical Terms. Total Hospital Beds. Accessed September 29, 2021. Available: <https://stats.oecd.org/glossary/detail.asp?ID=7197>

for outpatients (includes all ICU, ED, observation, NICU, PICU, newborn, and nursery)” [emphasis added].⁶⁵ Thus if beds are available, staff are available.

84. As a general matter, I reserve the right to update my opinions if new information is made available to me and, if requested by Counsel, will do so based on this new data as well as additional deposition testimony and discovery documents.

XII. Calculation methodology

85. It is my understanding that one of the alleged purposes of a Vaccine Mandate is to curb COVID-19 cases, hospitalizations, and deaths. This is a valid argument only if these numbers reflect a health threat to the population of Puerto Rico.

86. Due to lags in reporting cases and deaths, I use a rolling 7-day moving average (7dMA) to calculate the daily cases/deaths to adjust for day-of-week reporting lags (i.e. non-reporting on weekends).

87. I calculate the first difference, i.e. the number of cases/deaths at time t minus the number of cases/deaths at time $t-1$, to estimate the instantaneous daily rate of change to determine whether cases/deaths are changing at an accelerating or decelerating rate.

88. 7dMA and first and second differences are presented in figures to illustrate that, since the start of the pandemic, there have been no significant increases in cases/deaths, *even prior to the advent and availability of the vaccine*, to justify any sort of vaccine mandate. While there was an initial increase in confirmed cases since July 1, 2021, 6 full weeks before the Executive Order, this increase is a consequence of the natural course of the virus; nonetheless, the rate of change in cases and deaths was already *decelerating* by July 1, as indicated by the Second Differences figure.

⁶⁵ Department of Health and Human Services. COVID-19 Guidance for Hospital Reporting and FAQs For Hospitals, Hospital Laboratory, and Acute Care Facility Data Reporting. Updated May 26, 2021. Accessed September 29, 2021. Available: <https://www.hhs.gov/sites/default/files/covid-19-faqs-hospitals-hospital-laboratory-acute-care-facility-data-reporting.pdf>

89. I understand that Counsel will be supplying charts providing the summaries and compilations of this data as part of discovery in this case.

XIII. Rebuttal Testimony and Testimony at Trial

90. Should the Court or Jury determine that additional details apply to the relevant calculations, or should the calculations need to be updated to a more recent date, I am prepared to undertake such additional calculations.

91. If asked by Counsel, I intend to present information at trial from this report and prepare rebuttal reports as requested. If called to testify, I would prepare additional trial exhibits based on materials presented in this report. I reserve the right to update, revise, or modify my opinions if new information is made available to me.

I declare under penalty of perjury under the laws of the United States, that the foregoing is true and correct.

Dated: September 30, 2021

By: Joel W. Hay
Joel W. Hay Ph.D.



Leonard D. Schaeffer Center for Health Policy & Economics



CURRICULUM VITAE

10-1-21

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PERSONAL INFORMATION

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EDUCATION

1974	B.A. <i>Summa cum laude</i> , Econ/Math,	Amherst College
1975	M.A.,	Economics, Yale University
1976	M.Phil.	Economics, Yale University
1980	Ph.D.	Economics, Yale University

PROFESSIONAL EXPERIENCE

November 2018 – Present	Director, Clinical Economics Research and Education Program (CEREP). USC School of Pharmacy and Leonard D. Schaeffer Center for Health Policy and Economics
March 2009 – Present	Full Professor (with tenure), Pharmaceutical Economics and Policy; School of Pharmacy Professor (by courtesy), Department of Economics; University of Southern California, Los Angeles, California.
September 2009-Present	Senior Fellow, Leonard D. Schaeffer Center for Health Policy and Economics University of Southern California, Los Angeles, California
1992 – 2009	Associate Professor (with tenure), Pharmaceutical Economics and Policy; School of Pharmacy. Associate Professor (by courtesy), Department of Economics; University of Southern California, Los Angeles, California.
September 1985 - May 1992	Senior Research Fellow, Hoover Institution, Stanford University, Stanford, California.
July 1983 - September 1985	Senior Policy Analyst, Project HOPE, Center for Health Affairs, Millwood, Virginia.
January 1981 - June 1983	Visiting Lecturer, M.P.H. Program, Yale University, Department of Epidemiology and Public Health, and Institution for Social and Policy Studies.
June 1980 - September 1984	Assistant Professor, Department of Behavioral Sciences and Community Health, School of Dental Medicine University Connecticut Health Center, Farmington, Connecticut. Assistant Professor, Department of Economics, UConn Storrs. University of Connecticut Graduate School, Storrs, Connecticut.
June 1978 - June 1980	Assistant Research Professor, Human Resources Research Center, University of Southern California, Los Angeles, California.

ADDITIONAL EXPERIENCE

2019-present	Member, Stakeholder Insight Group; United Kingdom National Institute for Health and Care Excellence (UK NICE).
2018-present	External Consultant, Office of the Attorney General, State of Arizona.
2018-2021	External Consultant, Office of the Attorney General, State of Missouri.
2017-present	External Consultant, Office of the Attorney General, State of California.
2018-present	Distinguished Member, European Union Academy of Sciences.
2016-2017	Conference Co-Chair and Planning Committee, International Academy of Health Preference Research Conference, Boston MA, June 2017.
2016	Invited Participant, AMCP Partnership Forum: FDAMA Section 114—Improving the Exchange of Health Care Economic Data, Academy of Managed Care and Specialty Pharmacy (AMCP).
2016-present	Voting Member, Cochrane Collaboration, www.cochrane.org .
2015	External Reviewer, Italian Ministry of Health, General Direction for Scientific Research and Health Innovation.
2015	Invited Advisor, U.S. Food and Drug Administration Policy on Review of Health Economics Modeling Claims (FDAMA Section 114).
2014-2018	Founder, International Academy of Health Preference Research (iahpr.org).
2013-2015	Extramural Reviewer, Healthcare Systems & Value Research Study Section Review Panel, Agency for Healthcare Research & Quality (AHRQ), U.S. Dept. of Health & Human Services.
2012	External Reviewer, Cochrane Tobacco Addiction Research Group, Cochrane Collaboration, www.cochrane.org .
2012	Health Economics Expert Consultant, State Attorneys General Working Group on Pharmaceutical Benefits Management (PBM) Market Competition Issues.
2011-2013	Extramural Reviewer, Healthcare Systems & Value Research Study Section Review Panel, Agency for Healthcare Research & Quality (AHRQ), U.S. Dept. of Health & Human Services.
2011	Extramural Grant Reviewer, Health Services Research Study Section, Agency for Healthcare Research & Quality, U.S. Dept. of Health & Human Services.
2010	Extramural Grant Reviewer, Health Services Research Study Section, Agency for Healthcare Research & Quality, U.S. Dept. of Health & Human Services.
2010	External Reviewer, Netherlands Organisation for Health Research & Development (ZonMw) Health Technology Assessment Programme.
2010	External Program Contract Reviewer, Agency for Healthcare Research & Quality (AHRQ), U.S. Dept. of Health & Human Services; Developing Evidence to Inform Decisions about Effectiveness-2: The DEcIDE-2 Network.
2007-2013	Leadership Group, International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Disease Management and Prevention Task Force.
2007-2009	Leadership Group, International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Patient Preferences Research Task Force.
2006-2010	Co-Chair, ISPOR Drug Cost Task Force.
2006	Chair, Awards Committee; “The 2006 ISPOR Avedis Donabedian Outcomes Research Lifetime Achievement Award.” Presented to Prof. George Torrance at the 11’t Annual International Meeting, Philadelphia, PA.

2005	External Project Reviewer; “The Uninsured and Access to Prescription Drugs in California. The Petris Center on Health Care Markets & Consumer Welfare, University of California, Berkeley.
2005	External Program Reviewer, Agency for Healthcare Research & Quality, Dept. of Health & Human Services; Developing Evidence to Inform Decisions about Effectiveness: The DECIDE Network.
2004-2010	Health Policy Scientific Council, Intl. Soc. for Pharmacoeconomics & Outcomes Research.
2004-2014	Elected Executive Board Member, American Society of Health Economists (Ashecon.org).
2004-2010	Scientific Advisory Board, Disease Management Association of America.
2002-2003	Institute of Medicine, National Academy of Sciences. Commissioned Author “Vaccine Reimbursement Policy in the US.”
2001-Present	Health Economist, UCLA Center for Vaccine Research, UCLA Harbor Medical Center, Torrance, CA.
2001	Health Plan Reform Consultant, Hong Kong Hospital Authority, Hong Kong.
2000	External Reviewer, National Institute on Aging, NIH Small Grants Program.
1999	External Reviewer, National Institutes of Health, National Institute on Aging,
1999-2011	Co-Investigator, USC Alzheimer Research Centers of California Research Program, California Dept. of Health Services.
1999	Consultant, U. Michigan Survey Research Ctr. ADAMS/HRS Dementia Project.
1999	External Reviewer, National Inst. of Health, National Institute of Digestive Diseases and Nutrition, Hepatitis C Antiviral Long-term Therapy to Prevent Cirrhosis (HALT-C) Ancillary Studies Committee.
1999-2000	Economics Research Consultant, U.S. AHRQ, Southern California Evidence-Based Medicine Practice Project: Deep Vein Thrombosis Treatment in Trauma Surgery Literature Synthesis and Guideline Development.
1999	Member, Long Range Steering Committee Task Force, Harbor-UCLA Medical Center Research and Education Institution, Torrance, CA.
1998-2011	Rand USC Project Coordinator, U.S. Agency for Health Research and Quality, Southern California Evidence-Based Medicine Practice Project.
1998-2002	Founding Editor-In-Chief, Value in Health, Journal of the International Society for Pharmacoeconomics and Outcomes Research.
1998	External Reviewer, Cal Dept of Health Services Alzheimer’s Research Fund.
1998-2008	Member, Pharmacy Practice Research Roundtable.
1998-2007	Member, Intl. Working Group on Alzheimer Disease Pharmacoecon. Research.
1998-2006	Member, Coronary Heart Disease: The Interdisciplinary Council on Reducing Risk; American Heart Association & Bristol-Myers Squibb. Dallas, TX.
1997-98	Co-Chair: ISPOR Pharmacoeconomic Research Guidelines Working Group.
1997-98	External Reviewer. Asset and Health Dynamics among the Oldest Old-Dementia Survey Supplement. University of Michigan Inst. for Social Research, Ann Arbor, MI.
1997-2018	Economic Consultant, Rand Corporation, Health Outcome Research Group, Santa Monica, CA
1996-1998	Co-Chair and Primary Organizer: ISPOR Lipid Pharmacoeconomics Conference. Orlando, FL.

1995-1998	Elected Member, Board of Directors, and Founding Member, International Society for Pharmacoeconomics and Outcomes Research (ISPOR), Philadelphia, PA.
1995-2000	Member, Expert Advisory Panel on Drug Utilization Review, United States Pharmacopoeial Convention, Rockville, MD.
1995-96	Research & Graduate Affairs Cmte., American Assoc. Colleges of Pharmacy, Alexandria, VA.
1994-95	Technical Review Study Section, "HIV Costs and Services Utilization Study (HCSUS)," Agency for Health Care Policy & Research, US Dept. Health & Human Serv., Rockville, MD.
1993-94	Member, Research Advisory Panel for Outcome Studies, Wellpoint Pharmacy Management, Blue Cross of Southern California.
1993-1998	Member, Advis. Cmte., American Soc. Consultant Pharmacists Res. Found.
1993	Member, Planning Committee, American Society of Consultant Pharmacists Foundation Pharmacoeconomics Fellowship in Geriatric Long-Term Care.
1992-1993	Technical Review Panelist, Drug Utilization Review Demonstration Project Contracts, Health Care Financing Administration, Baltimore, MD.
1992	Member, Council of Advisors, Geriatric Drug Therapy Research Inst., Arlington, VA.
1992	Access to Health Care Task Force Member, American Heart Assoc., Washington, D.C.
1992	Judge, Masters of Innovation Software Competition, Zenith Data Systems, Chicago, IL.
1991	Advisor, Hungarian Parliament Health Care Reform, Budapest, Hungary.
1991	Chief U.S. consultant, Hungarian health care reform project, Px Ltd., Budapest, Hungary.
1990-91	Visiting Scholar, Hong Kong Centre for Economic Research, Chinese University of Hong Kong, Shatin, New Territories.
1990	Invited outside reviewer, U.S. Congressional Budget Office Long Term Care Policy Statement.
1990	Invited expert, California AIDS Leadership Commission, Los Angeles, CA.
1989	Proposal Review Consultant, The Smith Richardson Foundation.
1989	Invited outside expert, Select panel on HIV/AIDS estimates and projections. U.S. Public Health Service, Centers for Disease Control.
1989	Consultant, The Henry J. Kaiser Family Foundation, Menlo Park, California.
1988	Consultant, General Assistance Program for the Homeless, Office of the County Counsel, County of Sacramento, CA.
1988	Proposal Reviewer, Special Study Section, National Institutes of Health, U.S. Dept. of Health & Human Services.
1988	Issue Development Participant, "Medication Use in the Elderly," Geriatric Pharmacy Institute, Philadelphia College of Pharmacy and Science.
1988	Consultant, Patient Care/Health Service Delivery Subgroup, Executive Task Force on AIDS, U.S. Public Health Service.
1987	Consultant, Cost-benefit analysis of HIB vaccine, U.S. Food & Drug Admin.
1987	Proposal Reviewer, National Center for Health Services Research, U.S. DHHS.
1986, 1989	Proposal Review Consultant, The Henry J. Kaiser Family Foundation, Menlo Park, California.

1984-1986 Principal Investigator, Robert Wood Johnson Foundation; An Incentive Reimbursement Plan for Medicaid Home Health Care Services.

1985 Technical Consultant, Research Projects Approval Committee-Economics, The World Bank.

1985 Technical Advisory Panelist, HCFA Contract No. 500-84-0033; Market Study for Home Health Care Services, Center for Health Policy Studies.

1984 Technical Review Consultant, National Center for Health Services Research, Hospital Care and Utilization Project.

1984 Consultant, County of San Diego; Member of Proposal Review Committee for County Regional Contracts to Provide Care to Medically Indigent Adults.

1983 Visiting Asst. Prof., Inst. Social Sci., University of Basel, Basel, Switzerland.

1983 Principal Investigator, U.S. Environmental Protection Agency; Mortality and Air Pollution: A Microanalytic Analysis.

1981 – 1982 Principal Investigator, Connecticut Research Found.; Child Health Status & Cognitive Development. University of Connecticut, Storrs, CT.

1981 Visiting Fellow, Yale Institution for Social & Policy Studies, New Haven, CT.

1980 Consultant, National Preventive Dentistry Demonstration Project Evaluation Model, American Fund for Dental Health.

1980 Consultant, National Health Services Personnel Selection, Policy Research Inc.

1979 – 1980 Principal Investigator, Doctoral Research Grant, National Center for Health Services Research.

1979 – 1980 Consultant, Cost Benefit Analysis of Outpatient Treatment for Patients from the Psychiatric Ward of L.A. County/USC Medical Center.

1977 – 1978 Instructor, Department of Economics, Yale University, New Haven, Connecticut.

1976 – 1977 Teaching Assistant, Dept. of Economics, Yale University, New Haven, CT.

1974 – 1976 Research Consultant, National Bureau of Economic Research. New York, NY.

1975 Bibliographical Research Project (Russian Language) on Works of Academic Leo Kantorovich for Professor Tjalling Koopmans prior to their joint Nobel Prize Award in Economics.

1970-1974 Graduated *Summa cum Laude* from Amherst College (third highest cumulative GPA in Amherst Class of '74).

1970 Catlin Gable High School, ***"Sportsman of the Year."***

1966-70 Teammate (fullback, striker) on the Catlin Gabel High School varsity soccer team, all four years of high school. Catlin's men's soccer team was ***Oregon State Soccer Champions*** all four years.

HONORS AND DISTINCTIONS

Crawford SA, Gong CL, Randolph LM, Yieh L, **Hay JW (faculty mentor)**. Diagnosing Newborns with Suspected Severe Mitochondrial Disorders: A Cost-Effectiveness Study Comparing Early Whole Exome Sequencing to Standard of Care. Western Pharmacoeconomics and Outcomes Research Conference (WPEC), Virtual, April 2021 *Best poster presentation winner, Room 2

Zheng H, Gong CL, Chapman R, Yieh L, **Hay JW (faculty mentor)**. Cost-Effectiveness of The Duration of Neonatal Extracorporeal Membrane Oxygenation for Newborns with Severe Congenital Diaphragmatic Hernia in the United States. PAS Annual Meeting, Virtual, May 2021 *Highlighted e-poster

In 2019, *Value in Health*, the journal that Joel Hay developed and named in 1998 while a founding ISPOR Board member and became founding Scientific Editor-in-Chief, was ranked #3 among all scientific journals in health services research, health policy, health economics, pharmacoeconomics and outcomes research. Also, in 2019, 20 years from its founding, *Value in Health* was ranked higher in scientific impact factor than any other peer-reviewed economics journal except the *Quarterly Journal of Economics*, which was founded in 1886 and is the oldest scientific journal in Economics.

2019 Behavioral Science and Policy Association (BSPA) Publication Award for Innovation in Behavioral Policy “Best Paper of 2016-2018;” **Meeker D, Linder JA, Fox CR, Friedberg MW, Perselle SD, Goldstein NJ, Knight TK, Hay JW, Doctor JN. Behavioral Interventions to Decrease the Inappropriate Use of Antibiotics: A Multicenter Cluster Randomized Trial. JAMA 2016. 315(6):562-570. <http://dx.doi.org/10.1001/jama.2016.0275>**

This award recognizes research that advances rigorous application and development of behavioral/ social science to policy and practice in public, private and non-profit sectors. Its goal is to encourage work that has potential to improve the quality of life of individuals and/or organizations. The selection committee considered all research published between 2016-2018 in journals or as books. The committee included: Brian Gill (Mathematica), Rick Larrick (Duke University), Anita McGahan (U of Toronto), Dick Nisbett (U of Michigan) and Peter Ubel (Duke University). There were 35 nominations. Each nominee was rated independently by three committee members without COI. Top candidates were then rated by all committee members without COIs to determine the winner.

“Reconstruction after Salvage Total Laryngectomy: A Cost-effectiveness analysis.”

Joseph R Acevedo; Jeffery C Yu; Brian Cameron; Margaret Nurimba, Joel W Hay; Neils C Kokot **3rd Place, 2019 Resident Research Symposium**. USC Caruso Department of Otolaryngology, Head and Neck Surgery.

One of two (out of 1,400 reviews) to receive a *perfect editorial review score* (review done with Xiaohan Hu, PhD Cand.). Journal of Allergy and Clinical Immunology: JACI In Practice. 2019. <https://www.jaci-inpractice.org/>

Distinguished Member (by invitation), European Union Academy of Sciences. January 2018 – present.

“Top Performing Reviewer,” Journal of Managed Care and Specialty Pharmacy. 2017.

Western Pharmacoeconomics & Outcomes Research Conference: **Best Student Poster Award 2017**; Lam J, **Hay JW**, Kenyon N. Cost-effectiveness Analysis of Reslizumab in Patients with Poorly Controlled Eosinophilic Asthma. Invited Poster Presentation, University of New Mexico, October 4, 2017, Albuquerque, NM. (Joel Hay faculty mentor).

Western Pharmacoeconomics & Outcomes Research Conference: **Best Student Poster Award 2017**; Salcedo J, **Hay JW**. Cost-Effectiveness of Rivaroxaban Versus Warfarin for Treatment of Nonvalvular Atrial Fibrillation in Patients with On-Treatment Worsening Renal Function. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: **Best Student Poster Award 2016**; Nikhil Bhagvandas. Bhagvandas Nikhil, Hay Joel W. Cost Effectiveness of Lurasidone, Quetiapine, and Olanzapine Monotherapy in the Treatment of Bipolar I Disorder Depression. Poster PMH39. ISPOR 21st Annual International Meeting, May 21-25, 2016; Washington, DC. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: **Best Student Podium Presentation Award 2016**; Yifan Xu. Xu, Yifan; Barzi, Afsaneh; Hay Joel W. Comparative Effectiveness of Panitumumab Versus Cetuximab in Patients with Chemo-Refractory Wild-Type Kras Metastatic Colorectal Cancer. Oral Presentation PCN108. ISPOR 21st Annual International Meeting, May 21-25, 2016; Washington, DC. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: **Best Student Poster Award Finalist**; Shraddha Chaugule, 2015: “Exploring heterogeneity in attribute processing strategies: Use of hybrid random utility maximization-random regret minimization models in a Discrete Choice Experiment.” S. Chaugule and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: **Best Student Poster Award Finalist**; Emmanuel Drabo, 2014: “A Cost-effectiveness analysis of pre-exposure prophylaxis (PrEP) for the prevention of HIV among the MSM population of Los Angeles County.” (Joel Hay faculty mentor).

Academy of Managed Care Pharmacy Research Mentor, **Best Student Poster Award**; Kai Yeung, 2011. Yeung K, **Hay JW**. Cost-Utility Analysis of Romiplostim Versus Splenectomy in the Treatment of Chronic Refractory Immune Thrombocytopenic Purpura. Poster presentation at the Academy of Managed Care Pharmacy 23rd Annual Meeting, March 29, 2011 Minneapolis, MN. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research: **Best New Investigator Podium Presentation Award 2010** to Dr. Haesun Suh. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research: **Distinguished Service Award, 2009**.

International Society for Pharmacoeconomics and Outcomes Research: ***Outstanding Student Chapter of the Year, Joel Hay Student Chapter Faculty Advisor, 2009.***

Joel Hay was ***Founding Editor-in-Chief of Value in Health*** the peer-reviewed scientific journal of the International Society for Pharmacoeconomics and Outcomes Research until 2003. This journal, started in 1998, became Medline-listed in 2002. In its first impact factor, Value in Health was ranked #1 in two categories for the year 2004, by the ISI Journal Citation Reports® (JCR) with an impact factor of 3.657. ***Value in Health led all other journals listed both in the Health Care Sciences and Services category in the JCR Science Edition and in the Health Policy & Services category in the JCR Social Sciences Edition.***

Gu NY, Gai Y, **Hay JW**. "The effect of pharmacist consultation on patient medication adherence: an instrumental variable approach." The 2nd Western Pharmacoeconomics Conference, Salt Lake City, Utah March 2007 [Poster: ***Best Student Poster Award***]. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Danielle Zammit, 2004: "Preliminary Economic Analysis of The American Cancer Society Guidelines for Mammography Screening in Average-Risk Women Under 70 Years of Age." D. Zammit and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Danielle Zammit, 2003: "Economic Analysis of The Use of Angiotensin Converting Enzyme Inhibitors in Patients with Diabetes Mellitus." D. Zammit and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research: ***Distinguished Service Award, 2002.***

Founding Member, American Society for Health Economics, San Diego, CA, 2002.

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Eric Wu, 2001: "Survival & Nursing Home Free Survival (NHFS) of Alzheimer's Disease Patients." E. Wu and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Jinmei Li, 2000: "Cost Effectiveness of Retinopathy Screening in Pediatric Patients with Type 1 Diabetes Mellitus." J. Li and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Nishan Sengupta, 2000: "Cost Effectiveness Analysis of Tamoxifen in Breast Cancer Risk Reduction." N. Sengupta and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research Mentor: ***Best Student Poster Award***; Michelle Luo, 1999: "Cost Effectiveness Analysis of Genetic Testing for Breast Cancer." M. Luo and J. Hay. (Joel Hay faculty mentor).

International Society for Pharmacoeconomics and Outcomes Research: ***Health Economics and Outcomes Research Excellence - Methodology Award 1999***

Wallace Lectureship. Idaho State University College of Pharmacy, 1999

International Society for Pharmacoeconomics & Outcomes Research ***Executive Board Recognition Award; 1998***

International Society for Pharmacoeconomics and Outcomes ***Distinguished Service Award; 1998***

Outstanding Speaker Award, American Association for Clinical Chemistry 1996

Founding Member, International Society for Pharmacoeconomics and Outcomes Research (ISPOR), Philadelphia, PA, 1995.

USC School of Pharmacy ***QSAD Centurion Professorship:*** 1993-1999

USC School of Pharmacy ***Founding Chair,*** Dept. of Pharmaceutical Economics & Policy, 1992

Reviewer, National Science Foundation, 1982: Economics Section, 1987: Economics Section, 1989: Economics Section

Yale University PhD Fellowship, 1974 - 1978

W.T. Akery Prize for Undergraduate Thesis in Economics, 1974

Elected Phi Beta Kappa, 1974

LANGUAGES

French (reading), Russian (reading),
APL, PL/1, FORTRAN, IBM 370 JCL, TSP, SAS, SPSS/X, STATA, LIMDEP, NLOGIT,
QUAIL, BMDP, MS DOS, LOTUS 123, SPSS/PC, RATS, SST, VAX/VM.

FIELDS OF GRADUATE TRAINING

Econometrics, Money, Labor

RESEARCH INTERESTS

Pharmacoeconomics, Outcomes Research, Pharmaceutical Care, Health Economics, Econometrics

PROFESSIONAL SOCIETIES

Academy of Managed Care Pharmacy
American Association of Colleges of Pharmacy
American Economic Association
American Public Health Association
American Society of Health Economists
Disease Management Association of America
Eastern Economic Association
Econometrics Society
International Academy of Health Preferences Research
International Health Economics Association
International Society for Pharmacoeconomics and Outcomes Research
International Society for Quality of Life Research
International Society of Technology Assessment in Health Care
Southern Economic Association
Western Economic Association

TEACHING

1976 – 1977	Teaching Assistant, Department of Economics, Yale University, New Haven, Connecticut.
1977 – 1978	Instructor, Department of Economics, Yale University, New Haven, Connecticut.
September - November 1980	Health Economics at the Waterbury Hospital Pediatric Residency Program.
September - November 1980	Social and Behavioral Sciences Seminar "Cost of Illness and Related Topics," Medical/Dental student; Required curriculum, University of Connecticut Health Center.
September 1980 – December 1982	Social and Behavioral Sciences Lecturer "Issues in Health Care Financing and Delivery," Medical/Dental student required curriculum, University of Connecticut Health Center.
September - November 1981	Social and Behavioral Sciences Seminar "Competition in the Health Care Delivery System," Medical/Dental student required curriculum, University of Connecticut Health Center.
September - November 1982	Social and Behavioral Sciences Seminar "HMOs and the Market for Health Care," Medical/Dental Student required curriculum, Univ. of Connecticut Health Center.
December 1980 – January 1983	Introductory Biostatistics Instructor, Medical/Dental student required curriculum, University of Connecticut Health Center.
January 1981 - June 1983	Health Economics, M.P.H. Program, Yale University, Department of Epidemiology and Public Health, and Institution for Social and Policy Studies.
Fall Semester 1982	Graduate Independent Studies Course, Department of Economics, University of Connecticut.
Spring Semester 1982	Undergraduate Health Economics, University of Connecticut, Department of Economics.
Spring Semester 1983	Undergraduate Independent Studies Course, Department of Economics, University of Connecticut.

Fall Semester 1992	The Costs of Drug Abuse, Health Behavior (PSC 439); Economic Assessment of Pharmaceuticals, Contemporary Issues (PSC 551); Health Care Organization in the U.S., Public Health and Social Pharmacy (PSC 437); Department of Pharmaceutical Economics and Policy, USC
Spring Semester 1993	Biostatistics and Literature Evaluation (PSC 331): Co-taught with Prof. McCombs; Department of Pharmaceutical Economics and Policy, USC
Fall Semester 1993	The Costs of Drug Abuse, Health Behavior (PSC 439); Health-related Quality of Life Assessment, Contemporary Issues (PSC 551); U.S. Health Care Finance and Reform, Public Health and Social Pharmacy (PSC 437); Department of Pharmaceutical Economics and Policy, USC
Spring Semester 1994	Biostatistics and Literature Evaluation (PSC 331): Cotaught with Prof. McCombs; Department of Pharmaceutical Economics and Policy, USC
Summer, 1994	Introductory Undergraduate Health Economics (Econ 194BB), University of California, Santa Barbara, Summer Session
Fall Semester 1994	Health Status/Quality of Life Assessment Health Behavior (PSC 439); Contemporary Issues (PSC 551); U.S. Health Care Finance and Reform, Public Health and Social Pharmacy (PSC 437); Department of Pharmaceutical Economics and Policy, USC
Spring Semester 1995	Biostatistics and Literature Evaluation (PSC 331)
Spring Semester 1996	Biostatistics and Literature Evaluation (PSC 331)
Spring Semester 1996	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)
Summer Semester 1996	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)
Spring Semester 1997	Statistics Computer Laboratory (Phar 366)
Summer Semester 1997	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)
Spring Semester 1998	Statistics Computer Laboratory (Phar 366)
Summer Semester 1998	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)
Spring Semester 1999	Statistics Computer Laboratory (Phar 366)
Summer Semester 1999	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)

Spring Semester 2000	Statistics Computer Laboratory (Phar 366)
Spring Semester 2000	Pharmacy Level III Elective: Disease State Management. Pharmacoeconomics (1 Lecture) (Phar 571)
Fall Semester 2000	Pharmacoeconomics Unit on Decision Analysis (Phar 553)
Summer Semester 2000	Pharmacoeconomics: Introductory Graduate Course (PMEP 538)
Fall Semester 2001	Pharmacoeconomics Unit on Decision Analysis (Phar 553)
Spring Semester 2001	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Summer Semester 2001	Pharmacoeconomics: Graduate Course (PMEP 538)
Fall Semester 2002	Pharmacoeconomics Unit on Decision Analysis (Phar 553)
Spring Semester 2002	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Summer Semester 2002	Pharmacoeconomics: Graduate Course (PMEP 538)
Spring Semester 2002	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Spring Semester 2003	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Summer Semester 2003	Pharmacoeconomics: Graduate Course (PMEP 538)
Fall Semester 2003	Pharmacoeconomics Unit on Decision Analysis (PHRD 553)
Fall Semester 2003	Health Care Policy (PHRD 507)
Spring Semester 2004	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Fall Semester 2004	Health Care Policy (PHRD 507)
Fall Semester 2004	Pharmacoeconomics Unit on Decision Analysis (PHRD 614)
Summer Semester 2005	Pharmacoeconomics: Graduate Course (PMEP 538)
Fall Semester 2005	Health Care Policy (PHRD 507)
Spring Semester 2006	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Fall Semester 2006	Health Care Policy (PHRD 507)
Fall Semester 2006	Research Design – Applied Cost Effectiveness Analysis (PMEP 509)

Summer Semester 2007	Pharmacoeconomics: Graduate Course (PMEP 538)
Fall Semester 2007	Health Care Policy (PHRD 507)
Fall Semester 2007	Research Design – Applied Cost Effectiveness Analysis (PMEP 509)
Spring Semester 2008	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Fall Semester 2008	Health Care Policy (PHRD 507)
Fall Semester 2008	Research Design – Applied Cost Effectiveness Analysis (PMEP 509)
Fall Semester 2008 698)	Pharmaceutical Economics and Policy Graduate Seminar (PMEP 698)
Spring Semester 2009 698)	Pharmaceutical Economics and Policy Graduate Seminar (PMEP 698)
Summer Semester 2009	Pharmacoeconomics: Graduate Course (PMEP 538)
Fall Semester 2009	Health Care Policy (PHRD 507)
Fall Semester 2009	Industrial Systems Engineering Lecturer (ISE 599)
Spring Semester 2010	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Summer Semester 2011	Pharmacoeconomics: Graduate Course (PMEP 538)
Spring Semester 2012	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Spring Semester 2012 590)	Health Economics Lecture: Social Work Graduate Course (SOWK 590)
Summer Semester 2013	Pharmacoeconomics: Graduate Course (PMEP 538)
Spring Semester 2014	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Summer Semester 2015	Pharmacoeconomics: Graduate Course (PMEP 538)
Spring Semester 2016	Pharmaceutical Econometrics: Graduate Course (PMEP 549)
Spring Semester 2017	Economic Analysis of Health Care I: Graduate Course (PMEP 525)
Summer Semester 2017	Economic Analysis of Health Care II: Graduate Course (PMEP 526)
Fall Semester 2017	Economic Analysis of Health Care III: Graduate Course (PMEP 527)
Spring Semester 2019	Economic Analysis of Health Care I: Graduate Course (PMEP 525)

Summer Semester 2019	Economic Analysis of Health Care II: Graduate Course (PMEP 526)
Fall Semester 2019	Economic Analysis of Health Care III: Graduate Course (PMEP 527)
Spring Semester 2021	Economic Analysis of Health Care I: Graduate Course (PMEP 525)
Summer Semester 2021	Economic Analysis of Health Care II: Graduate Course (PMEP 526)

USC UNIVERSITY SERVICE

2019 - Present	Director, Clinical Economics Research and Education Program (CEREP).
2018 - Present	Curriculum Committee, School of Pharmacy
2018	American Association of Pharmaceutical Scientists - USC Chapter, Moving Targets Faculty Reviewer
2016	Admissions Committee Evaluation Retreat, School of Pharmacy
2015- 2016	Faculty Position Search Committee, Dept. of Pharmaceutical and Health Economics, School of Pharmacy
2013 – Present	Member, Appointments & Promotions Task Force, School of Pharmacy
2011	External Reviewer, Sol Price School of Public Policy
2009	Chair, Faculty Position Search Committee, Dept. of Clinical Pharmacy, Pharmaceutical Economics and Policy, School of Pharmacy
2006 - Present	Faculty Merit Review Coordinating Committee, School of Pharmacy
2004-2005	Chair, Faculty Position Search Committee, Dept. of Pharmaceutical Economics and Policy, School of Pharmacy
2003 - 2014	Admissions Committee, School of Pharmacy
2003-2006	Chair, Advanced Technology Committee, School of Pharmacy
2002-2004	New Curriculum Development: Course Coordinator, Phar 507: Health Policy for Pharmacists, School of Pharmacy
2002 - 2011	Advanced Technology Committee, School of Pharmacy
2002	Human Subjects Review Policy, USC Faculty Senate Retreat
2000-2001	Computer Committee, School of Pharmacy
2001	Graduate Teaching Assistantship Program Evaluation Committee
2000 – Present	Faculty Advisor, USC ISPOR Student Chapter
1994 - Present	Pharmacy Student Applicant Interview Committee
1992 - 1997	Founding Chair, Dept. of Pharmaceutical Economics & Policy, School of Pharmacy
1993 - 1995	Member, Pharmacy Dean's Search Committee, Office of the Provost.
1992 - 1997	Member, Dean's Executive Committee, School of Pharmacy
1992 - 1997	Member, Appointments & Promotions Committee, Schl of Pharmacy
1993 - 1995	Economic Advisor, East Los Angeles/USC Project on Managed Care for the Medically Indigent; Pacific Center for Health Policy & Ethics
1995 - 1997	Member, Quality/Outcomes Group USC Physicians; Office of Clinical Services
1994 - 1997	Member, Ph.D. Pharmaceutical Economics and Policy Admissions Committee
1994 - 1997	Member, M.S. Pharmaceutical Economics and Policy Admissions Committee
1993 - 1997	Member, University Graduate Studies Advisory Committee, USC Graduate School
1993	Developed Ph.D. Program in Pharmaceutical Economics (Graduate School Approved for Fall 1994)
1993	Proposal Reviewer, Zumberge Research & Innovation Fund Awards

1993-present	Pharm.D. Candidate Admissions Interviewer, School of Pharmacy
1993	Chair, Graduate Ph.D. Program in Pharmaceutical Economics Curriculum Development, School of Pharmacy
1992/1993	Chair, Junior Faculty Position Search Committee, Dept. of Pharmaceutical Economics and Policy, School of Pharmacy
1994/1995	Chair, Junior Faculty Position Search Committee, Dept. of Pharmaceutical Economics and Policy, School of Pharmacy

OTHER UNIVERSITY SERVICE

2021	External Referee, Tenure and Promotions Committee, Health Services Research Division, College of Pharmacy, University of Iowa, Iowa City, IA.
2019	External Referee, Promotion and Tenure Committee, Faculty of Medicine, School of Population and Public Health, University of British Columbia, Vancouver, BC, Canada
2019	External Referee, Promotion and Tenure Committee, School of Public Health and Tropical Medicine, Tulane University, New Orleans, LA.
2018	External Referee, Promotion and Tenure Committee, Arnold School of Public Health, University of South Carolina, Columbia, SC.
2018	External Referee, Promotion and Tenure Committee, Department of Medicine, University of Illinois College of Medicine, Peoria, IL.
2016	External Referee, Tenure and Promotions Committee, Department of Pharmacy Practices and Administration, Western Univ of the Health Sciences, Pomona, CA.
2016	External Examiner, Doctoral Thesis Committee, Department of Economics, University of Calgary, Calgary, Alberta, Canada.
2016	External Referee, Tenure and Promotions Committee, Health Services Research Division, College of Pharmacy, University of Iowa, Iowa City, IA.
2016	External Reviewer, School of Pharmacy, Chinese University of Hong Kong, Hong Kong SAR, China.
2015	External Reviewer, School of Medicine, Pennsylvania State University, Hershey, PA.
2015	External Reviewer, Faculty of Pharmacy, University of Toronto, Toronto, Canada.

2014-15	External Reviewer, Pharmacy School, Tianjin University, Tianjin, China.
2014-15	External Reviewer, National University of Singapore, Singapore.
2014	External Reviewer, Faculty of Pharmacy, University of Maryland School of Pharmacy, Baltimore, MD.
2014	External Reviewer, Faculty of Pharmacy, University of Toronto, Toronto, Canada.
2013	External Reviewer, Department of Pediatrics, Harbor-UCLA Medical Center, Los Angeles, CA.
2013	External Reviewer, Dept. of Health Policy and Management, Texas A&M Health Sciences Center, College Station, TX.
2013	External Reviewer, Department of Pediatrics, Division of Neonatology, David Geffen School of Medicine at UCLA, Los Angeles, CA.
2013	External Reviewer, Dept. of Social Pharmacy, College of Pharmacy, Ewha Womans University, Seoul, Korea.
2013	External Reviewer, Department of Pediatrics, Division of Neonatology, David Geffen School of Medicine at UCLA, Los Angeles, CA.
2012	External Referee, School of Nursing, University of Michigan, Ann Arbor, MI.
2011	External Referee, School of Pharmacy, University of Colorado Anschutz Medical Campus, Aurora, CO.
2011	External Referee, University of Wisconsin School of Medicine and Public Health, Department of Population Health Sciences, Madison, WI.
2010	External Referee, Virginia Commonwealth University, School of Pharmacy, Department of Pharmacotherapy and Outcomes Sciences, Richmond, VA.
2010	External Referee, Nelson Mandela Metropolitan University, Faculty of Health Sciences, Port Elizabeth, South Africa.
2010	Outside Examiner, Doctoral Dissertation Committee, College of Pharmaceutical Sciences, Andhra University, Andhra Pradesh, India.

2009	External Referee, Tenure and Promotions Committee, Department of Pharmacy Practice and Science, University of Iowa, Iowa City, IA.
2009	External Referee, Tenure and Promotions Committee, Department of Pharmaceutical Sciences, Oregon State University, Corvallis, OR.
2008	External Referee, Appointments and Promotions Committee, Division of Pharmacy Practice and Administration, College of Pharmacy, Ohio State University, Columbus, OH.
2006	External Referee, Appointments and Promotions Committee, Department of Medicine, Brigham and Women's Hospital; Harvard Medical School, Boston, MA.
2004	External Referee, Appointments and Promotions Committee, Dept. Pediatrics, Harbor-UCLA Medical Center, UCLA School of Medicine, Los Angeles, CA.
2002	External Examiner, Chinese University of Hong Kong Graduate School. Shatin, Hong Kong
2001	External Referee, Appointments and Promotions Committee, College of Pharmacy, University of Iowa, Iowa City, IA.
2000	External Referee, Appointments and Promotions Committee, Department of Pediatrics, Harbor-UCLA Med Center, UCLA Schl of Medicine, Los Angeles, CA.
2000	External Referee, Appointments and Promotions Committee, Department of Economics, Rice University, Houston, TX.
1997	External Referee, Appointments and Promotions Committee, School of Dentistry, University of Connecticut, Farmington, CT.
1993	External Referee, Promotions Committee, Department of Medicine, Baylor College of Medicine, Houston, TX.
1993	External Referee, Promotions Committee, Department of Medicine, University of California, San Diego, CA.
1993	External Referee, Promotions Committee, School of Nursing, University of California, San Francisco, CA.
1993	External Referee, Promotions Committee, Department of Economics, University of Hong Kong, Hong Kong.
1992	External Referee, Promotions Committee, School of Nursing,

University of California, San Francisco, CA.

1988

External Referee, Tenure and Promotions Committee, Dept. of
Economics, Univ. of North Carolina at Chapel Hill, NC.

PENDING GRANT RESEARCH

Cost Effectiveness of Screening and Treating Familial Hypercholesterolemia

Use of Inotropes in Stage D Heart Failure

Cost Effectiveness of FT in Treating Benign Prostatic Hyperplasia

Cost Effectiveness of Colorectal Cancer Screening Techniques

ONGOING GRANT RESEARCH**EQ-84-2020-RA****Ning Yan Gu (PI)****4/1/2020 – 9/30/2021****Award Amount: €24,480****EuroQol Foundation**

Assessing the impact of COVID-19 on population health using the longitudinal panel surveys in the US, Sweden and Norway

The COVID-19 global pandemic has affected various aspects of life worldwide, in an unprecedented way. As of 3rd April 2020, there are over 1 million affected lives globally; almost 250,000 cases in the US; over 6000 cases in Sweden and over 5000 cases in Norway. COVID-19 has hit hard on global economy. Fear of COVID-19 resulted in massive panic and behaviour under uncertainty by the general public, which imposes significant impact socially, economically, as well as on their health. The primary objective of this time sensitive study is to conduct longitudinal panel surveys to assess the impact of COVID-19 on population health in the US, Sweden, and Norway using the EQ-5D-5L.

Role: Co-Investigator**EQ-246-2020-RA****Ning Yan Gu (PI)****4/1/2020 – 3/30/2021****Award Amount: €29,840****EuroQol Foundation**

Assessing the impact of COVID-19 population health over time: a cross-country comparison between US, Sweden and Norway using the EQ-5D-5L repeated measures

The COVID-19 global pandemic has affected various aspects of life worldwide, in an unprecedented way. As of 3rd April 2020, there are over 1 million affected lives globally; almost 250,000 cases in the US; over 6000 cases in Sweden and over 5000 cases in Norway. COVID-19 has hit hard on global economy. Fear of COVID-19 resulted in massive panic and behavior under uncertainty by the general public, which imposes significant impact socially, economically, as well as on their health. The primary objective of this time sensitive study is to conduct longitudinal panel surveys to assess the impact of COVID-19 on population health in the US, Sweden, and Norway using the EQ-5D-5L.

Role: Co-Investigator**Grant No. (PI): EQ 140-2020RA (NK Zawadzki) Dates of Award: July 2020 – July 2021****Agency: EuroQol Research Foundation Total Direct Costs: €30,740**

Title: Assessing regional variations in the impact of COVID-19 on quality of life as a function of regional social isolation controls in the U.S.

Role: Project Mentor/Supervisor

Sponsor: National Institute on Aging (NIA) Grant #: 1R24AG063718-01

PI: Van Park, PhD J Hay Role: USC Site PI 07/1/2019-06/30/2022

Title: Collaborative Approach for Asian Americans and Pacific Islanders Research and Education (**CARE**) in Alzheimer's Disease and Related Dementias (ADRD)

Amount: Total Direct Costs (Y1)- \$749,994

The goal of the proposed project, **CARE**, is to reduce disparities in ADRD research participation among Asian Americans and Pacific Islanders (AAPI) through the creation of a registry of AAPI who are interested in participating in various types of ADRD research.

Sponsor: Agency for Healthcare Research and Quality (AHRQ)

PI: Mendel, Peter James, PhD

J Hay Role: Co-I Health Economist

Title: Implementation and Evaluation of a Video-based Prospective Feedback Intervention to Improve Antimicrobial Stewardship in Neonatal Intensive Care Units

Grant #: 1 R18 HS026168-01A1

Amount: Total Costs (Y1-Y4)- \$1,924,910

Dates: 10/1/2019-06/30/2022

The application proposes to “test the feasibility, acceptability, and clinical and cost-effectiveness of a video-based telehealth learning platform to provide antimicrobial stewardship expertise to front-line providers in real time.” We propose to evaluate an innovative, scalable antimicrobial stewardship intervention called ECHO- ASP in NICUs participating in the largest statewide perinatal QI collaborative in the US. The Specific Aims of the project are to: 1) Evaluate the implementation of the ECHO-ASP intervention including barriers and facilitators to implementation, site participation in video-based prospective feedback and audit sessions, dissemination of session results to other local NICU prescribers, perceived acceptability and durability of the intervention, and practice consensus on antibiotic prescribing; 2) Evaluate the effectiveness of the ECHO ASP intervention on patient care outcomes, including antibiotic use, drug-related adverse events, and other clinical complications; 3) Evaluate the cost implications of the ECHO ASP intervention, including implementation costs and effects on costs of care.

Sponsor: National Institute of Dental and Craniofacial Research

PI: Sharon Cermak, PhD

J Hay Role: Health Economist

Title: Sensory Adapted Dental Environments to Enhance Oral Care for Children (1 U01 DE024978-01)

Amount: \$381,201 (First Year Directs)

Dates: 4/01/15-3/31/22

Sponsor: National Institute of Dental and Craniofacial Research

PI: Steve Yen, DMD

J Hay Role: Health Economist

Title: Clinical Effectiveness of Late Maxillary Protraction for Cleft Lip and Palate (U01 DE22937-01A1)

Amount: \$3,250,000

Dates: 9/1/13 – 8/31/21

Sponsor: National Institute of Child Health and Human Development T32 HD064578PI:

Florence Clark, PhD

J Hay Role: Co-Investigator

Title: TREET: Training in Rehabilitation Efficacy and Effectiveness

Amount: \$102,692

Dates: 04/01/11 - 03/31/22

COMPLETED GRANT RESEARCH (WHILE AT USC)

Sponsor: Agency for Healthcare Research and Quality, US DHHS

PI: Ken Zangwill, MD

J Hay Role: Health Economist

Title: Evaluation and Management of the Young Febrile Infant and Related Healthcare Costs and Morbidities (1 R03 HS024146-01)

Amount: \$100,000

Dates: 7/01/15-6/30/16

Sponsor: Baxter International

PI: Joel W. Hay PhD

Title: Economic Evaluation of Hemophilia Inhibitor Bypass Agent Treatment: On Demand Versus Prophylaxis

Amount: \$99,000

Dates: 1/1/14 – 12/31/15

Sponsor: Children's Hospital, Los Angeles

PI: Guy Young, MD

J Hay Role: Co-Investigator

Title: Economic Evaluation of Hemophilia Inhibitor Treatments

Amount: \$95,000

Dates: 8/1/13 – 7/31/15

Sponsor: Agency for Healthcare Research and Quality, U.S. DHHS

PI: Joel W. Hay PhD

Title: American Society of Health Economists Conference Grant

Amount: \$35,000

Dates: 1/1/14 – 2/31/15

Sponsor: US Dept. of Health and Human Services/Asst. Secretary for Policy and Evaluation (DHHS/ASPE)

PI: Shinyi Wu, PhD

J Hay Role: Co-Investigator

Title: Care Management Technology to Facilitate Depression Care in Safety Net Diabetes Clinics

Amount: \$1,977,461

Dates: 9/1/10 – 8/31/14

Sponsor: National Institutes of Health (trans agency)

PI: Jason Doctor, PhD

J Hay Role: Co-Investigator

Title: Use of Behavioral Economics to Improve Treatment of Acute Respiratory Infections

Amount: \$8,353,371

Dates: 9/1/2010 – 8/31/2014

Sponsor: NIH, National Institute of Aging
PI: Florence Clark, PhD
J Hay Role: Co-Investigator
Title: Lifestyle Redesign for Pressure Ulcer Prevention in Spinal Cord Injury
Amount: \$2,111,000
Dates: 9/08 – 8/14

Sponsor: EconoMedRx
PI: Joel W. Hay PhD
Title: Economic Evaluation of the Market for Pediatric Antidepressants
Amount: \$99,000
Dates: 8/1/12 – 7/31/14

Sponsor: Baxter International
PI: Joel W. Hay PhD
Title: Economic Evaluation of Hemophilia Inhibitor Bypass Agent Testing Assay
Amount: \$99,000
Dates: 8/1/12 – 6/31/13

Sponsor: Auxillium Pharmaceuticals
PI: Joel W. Hay PhD
Title: Economic Evaluation of Dupuytren's Contracture Therapy
Amount: \$165,000
Dates: 1/1/11 – 12/31/12

Sponsor: Sunovion Pharmaceuticals
PI: Joel W. Hay PhD
Title: Costs of COPD Treatments
Amount: \$85,000
Dates: 3/10 – 8/11

Sponsor: Baxter Pharmaceuticals
PI: Joel W. Hay PhD
Title: Meta-analysis of Hemophilia Patient Inhibitor Therapy Efficacy
Amount: \$85,000
Dates: 3/10 – 8/11

Sponsor: Baxter Pharmaceuticals
PI: Joel W. Hay PhD
Title: Economic Evaluation of Hemophilia Patient Inhibitor Therapy
Amount: \$80,000
Dates: 9/08 – 8/10

Sponsor: Prolacta Biosciences
PI: Joel W. Hay PhD
Title: Economic Evaluation of Human Milk Fortifier in Necrotizing Enterocolitis
Amount: \$80,000
Dates: 9/08 – 8/10

Sponsor: NIH, National Institute of Mental Health
PI: Kathy Ell, PhD
J Hay Role: Co-Investigator
Title: Major Depression in Diabetes Patients
Amount: \$678,000
Dates: 9/04 – 8/10

Sponsor: NIH, National Institute of Mental Health
PI: Megan Dwight-Johnson, MD
J Hay Role: Co-Investigator
Title: Patient Centered Care in the Public Sector
Amount: \$2,642,000
Dates: 7/04 – 6/08

Sponsor: California Dept. of Health Services
PI: Lon Schneider, MD
J Hay Role: Economist
Title: Alzheimer Disease Costs, Quality of Life and Disease Burden
Amount: \$600,000
Dates: 1/01 – 12/04

Sponsor: US Centers for Disease Control and Prevention, NIH
PI: Ken Zangwill, MD
J Hay Role: Sub-grant PI
Title: Economic Assessment of Rotavirus Burden of Illness in the Kaiser Southern California Health Plan
Amount: \$260,000
Dates: 11/97 – 12/03

Sponsor: US Alzheimer Association, Merck Foundation, Janssen Pharmaceutica
PI: Joel W. Hay PhD
J Hay Role: Economist
Title: Alzheimer Disease Global Burden of Illness
Amount: \$200,000
Dates: 6/99 – 12/01

Sponsor: US National Institute on Aging
PI: Florence Clark, PhD
J Hay Role: Project Economist
Title: Well Elderly Occupational Therapy Demonstration Project
Amount: \$1.3 million
Dates: 1/96 – 6/98

Sponsor: US PHS Agency for Health Care Policy Research
PI: Paul Schekelle, MD
J Hay Role: USC Project Coordinator
Title: Southern California Evidenced-Based Practice Center
Amount: \$420,000
Dates: 3/98 – 9/99

Sponsor: Parke-Davis
PI: Joel W. Hay PhD
J Hay Role: Economist
Title: Economic Assessment of Epilepsy Disease Management Intervention
Amount: \$60,000
Dates: 6/95 9/98

Sponsor: US NIH, National Institute on Aging
PI: Mary Mittelman, PhD
J Hay Role: Sub-Grant Co-PI
Title: Economic Evaluation of Alzheimer Disease Caregiver Support Intervention
Amount: \$190,000
Dates: 1/96 – 7/98

Sponsor: Bristol Myers Squibb
PI: Joel W. Hay PhD
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Fellowship
Amount: \$30,000
Dates: 6/96

Sponsor: Bristol Myers Squibb
PI: Joel W. Hay PhD
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Training
Amount: \$60,000
Dates: 6/96

Sponsor: Parke-Davis
PI: Joel W. Hay PhD
J Hay Role: Economist
Title: Cognitive Function and the Costs of Alzheimer's Disease
Amount: \$90,000
Dates: 6/94 8/96

Sponsor: Astra-Merck
PI: Phil Rappa
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Training
Amount: \$90,000
Dates: 8/94

Sponsor: Allergan
PI: Phil Rappa
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Training
Amount: \$20,000
Dates: 8/95

Sponsor: Amgen
PI: Phil Rappa
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Training
Amount: \$30,000
Dates: 7/94

Sponsor: Glaxo-Wellcome Pharmaceuticals
PI: Phil Rappa
J Hay Role: USC Project Coordinator
Title: Pharmacoeconomics Training
Amount: \$140,000
Dates: 3/93, 3/94

Sponsor: Miles Pharmaceuticals
PI: Joel W. Hay PhD
J Hay Role: Economist
Title: Economic Assessment of Anti-TNF in Treatment of Septic Shock
Amount: \$130,000
Dates: 4/94 – 3/95

Sponsor: Kaiser Permanente Southern California Health Care Plan
PI: Jeff McCombs, PhD
J Hay Role: Project Economist
Title: The Kaiser/USC Pharmaceutical Care Demonstration Project
Amount: \$860,000
Dates: 3/93 – 9/97

Sponsor: Syntex Roche Pharmaceuticals
PI: Joel W. Hay PhD
J Hay Role: Project Coordinator
Title: Pharmacoeconomics Graduate program development
Amount: \$120,000
Dates: 6/92 – 5/93

PEER-REVIEWED PUBLICATIONS

Joel W Hay H-Index: 54

11,800+ citations of JW Hay peer-reviewed articles in the scientific literature.

<https://scholar.google.com/citations?user=vKK2BxEAAAJ&hl=en>

1. **Hay JW.** "Public Service Delivery in Chicopee, Massachusetts," in *Student Originated Studies Conference Proceedings*, National Science Foundation, 1973, NSF No. 74-33.
2. **Hay JW.** Occupational Choice and Occupational Earnings: Selectivity Bias in a Simultaneous Logit-OLS Model, Ph.D. dissertation, Yale University, New Haven, 1980, published by the *National Technical Information Service*, Rockville, Maryland.
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4. Yett D, Der W, Ernst R, **Hay JW.** "Blue Shield Plan Physician Participation." *Health Care Financing Review*, June 1981 pp. 9-24.
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17. Yett D, Der W, Ernst R, **Hay JW**. "Fee Schedule Reimbursement and Physician Fee Inflation," *Journal of Human Resources* 20(2), (Spring, 1985), pp. 278-291.
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30. Etemad LR, **Hay JW**. Cost-Effectiveness Analysis of Pharmaceutical Care in a Medicare Drug Benefit Program. 7th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2002.
31. Patel BV, **Hay JW**. Colorectal Cancer Screening: A Cost-Effectiveness Model Comparing Virtual Colonoscopy and Conventional Colonoscopy. 7th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2002.

32. Park J, **Hay JW**. Cost-Effectiveness Analysis of Graftskin (Apligraf) and Becaplermin (Regranex) in Diabetic Neuropathic Foot Ulcers. 8th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2003.
33. Zammit DC, **Hay JW**. Meta-Analysis of the Effectiveness of Mammography Screening for Breast Cancer. 8th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2003.
34. Zammit DC, **Hay JW**. Economic Analysis of The Use of Angiotensin Converting Enzyme Inhibitors in Patients with Diabetes Mellitus. 8th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2003.
35. Yu YF, **Hay JW**, Yu AP. Cost-Effectiveness Analysis of Long-Term Hormone Replacement Therapy (Estrogen Plus Progestin) in Healthy Postmenopausal Women for Osteoporosis Prevention. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
36. Yu AP, **Hay JW**. Cost-Effectiveness Analysis of Dose-Dense Chemotherapy with Filgrastim as Postoperative Adjuvant Treatment of Breast Cancer. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
37. Setyawan J, **Hay JW**, Nichol MB. Cost-Effectiveness of Interventions to Improve Patient Medication Compliance in Major Depressive Disorder. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
38. Spalding JR, **Hay JW**. Cost-Effectiveness of Tumor Necrosis Factor Alpha (TNF-ALPHA) Inhibitors as First-Line Agents in Rheumatoid Arthritis. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
39. Barlev A, **Hay JW**. Cost-Utility of Cochlear Implants a Societal Perspective Analysis. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
40. Tonnu IQ, **Hay JW**. The Cost-Effectiveness Analysis Recombinant Human Erythropoietin Growth Factors vs. Transfusion in Chemotherapy Cancer Patients. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
41. Patel V, **Hay JW**. Cost-Effectiveness of Treatment Strategies for Rheumatoid Arthritis Patients with Inadequate Response to Methotrexate. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.

42. Zhang L, **Hay JW**. Cost-Effectiveness Analysis of Rizatriptan and Sumatriptan versus Cafegot in the Acute Treatment of Migraine. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
43. Narayan S, **Hay JW**. Cost-Effectiveness of Ratalin® versus Adderall® for First-Line Treatment of Attention Deficit/Hyperactivity Disorder (ADHD) in Children. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
44. Zammit DC, **Hay JW**. Preliminary Economic Analysis of The American Cancer Society Guidelines for Mammography Screening in Average-Risk Women under 70 Years of Age. 9th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2004.
45. El Ouagari K, Botteman M, Aapro M, **Hay JW**, Stephens J, Brandman JP. Cost-effectiveness of zoledronic acid vs. other bisphosphonate agents for the prevention of bone complications in breast cancer: an application to Canada. EJC Supplements, 2005; 3(2):117-117.
46. Tencer T, **Hay JW**. The Cost-Effectiveness of Prostate-Specific Antigen Screening for Prostate Cancer Detection. 10th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Washington, May 2005.
47. Kawatkar AA, **Hay JW**. Cost-Effectiveness of Taxanes as Second Line Agents in Treatment of Metastatic Breast Cancer. 11th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Philadelphia, May 2006.
48. Vo P, **Hay JW**. Cost-Effectiveness Analysis for Treatments in Ankylosing Spondylitis. 11th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Philadelphia, May 2006.
49. Suh HS, **Hay JW**. Cost-Effectiveness of Immunization Strategies for the Control of Meningococcal Infectious disease. 12th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2007.
50. Gu NY, **Hay JW**, Gai YW. Effect of Pharmacist Consultation on Patient Medication Adherence Using Instrumental Variables. 12th Annual International Meeting, International Society for Pharmacoeconomics and Outcomes Research, Pentagon City VA, May 2007.

51. Yuan Y, Iloeje U, Parry D, **Hay JW**, Zammit D. Using Decision Simulation Model to Evaluate the Cost Effectiveness of Entecavir Compared to Adefovir Therapy in Lamivudine Refractory Chronic Hepatitis B (CHB) Patients: Analyses from a US Payer Perspective Abstract and poster presentation at the 12th ISPOR Annual International Meeting, Pentagon City VA, May 2007.
52. Zammit DC, **Hay JW**, Globe DR, Sugar CA, Gauderman WJ Adjusting for Trial Quality in a Meta-Analysis. Poster presentation at the 10th ISPOR Annual European Congress, Dublin Ireland, October 2007.
53. Zammit DC, **Hay JW**, Globe DR, Sugar CA, Gauderman WJ Framework for The Cost-Effectiveness Analysis of Mammography Screening For Breast Cancer. Poster presentation at the 10th ISPOR Annual European Congress, Dublin Ireland, October 2007.
54. Ejzykiewicz F, **Hay JW**. Cost-Effectiveness Analysis of Lapatinib Plus Capecitabine Vs Capecitabine Alone in the Second Line Treatment for Breast Cancer. Poster PCM 23, 13th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Toronto, Canada, 2008.
55. An JJ, **Hay JW**. Cost-Effectiveness of Erythropoiesis Stimulating Agent Therapy by Hemoglobin Targets in Chronic Kidney Disease. Poster PSY 15, 13th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Toronto, Canada, 2008.
56. Ganapathy V, **Hay JW**. Cost-Effectiveness of Once-Daily Stimulant, Non-Stimulant & Combined Stimulant/Behavioral Therapy Interventions in the Treatment of ADHD in Children. Poster PMH 28, 13th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Toronto, Canada, 2008.
57. Le QA and **Hay JW**. Cost-utility Analysis of Lapatinib (Tykerb®) in 2nd-Line Treatment of HER2-Positive Metastatic Breast Cancer. Poster PCN18, American Society of Clinical Oncology, San Diego, CA 2008.
58. Turpcu A and **Hay JW**. The Cost-Effectiveness of Ranibizumab (Lucentis®) in Treating Patients with Predominantly Classic, Minimally Classic, and Occult Neovascular Age-Related Macular Degeneration (AMD). Poster PSS 15, 13th Annual Meeting, International Society for Pharmacoeconomics and Outcomes Research, Toronto, Canada, 2008.
59. Lescrauwaet B, Nevens F, Zammit D, Yuan Y, **Hay JW**. Modeling Long-Term Mortality and Morbidity with Entecavir Treatment in Chronic Hepatitis B Patients in Belgium. Podium presentation, ISPOR European Conference, Athens, Greece, November 2008.
60. Zammit D, Yuan Y, Intorcchia M, **Hay JW**. Using a Decision Simulation Model to Evaluate the Cost-Effectiveness of the Treatment of Nucleoside-Naïve HBe-Antigen Negative CHB Patients in Italy with Entecavir and Tenofovir Abstract and poster presentation at the 11th ISPOR Annual European Congress, Athens, Greece, November 2008.

61. **Hay JW**, Jhaveri M, Tangirala M, Kaliner M. Costs and Resource Utilization Comparisons of Second-Generation Antihistamines vs Montelukast in Treatment of Allergic Rhinitis: Retrospective Analysis of a Large National Insurance Claims Database. American Academy of Allergy, Asthma and Immunology Annual Meeting, March 2009, Washington, DC.
62. Le QA, **Hay JW**. Comparison Between Propensity-Score & Traditional Covariate Adjustment with Logistic Regression Models in Estimating Average Treatment Effects (ATES): Monte Carlo Simulation Results. Poster Session I [PMC10], ISPOR 14th Annual International Conference, May 2009, Orlando, FL.
63. Mark TL, Joish VN, **Hay JW**, Sheehan D, Johnston S, Cao Z. Unintended Consequences of Geriatric Antidepressant Use: Side-Effects, Adherence and Costs. ISPOR 14th Annual American Association of Psychiatry Conference, May 2009, Orlando, FL.
64. Mark TL, Joish VN, **Hay JW**, Sheehan D, Choi JC, Johnston S, Cao Z. Unintended Consequences of Current Antidepressant Use in A Geriatric Population: Drug-Drug Interactions and Their Implications for Adherence. ISPOR 14th Annual American Association of Geriatric Psychiatry Conference, May 2009, Orlando, FL. Am J Geriatr Psychiatry 2009;17(3), Supplement 1:A98.
65. Skrepnek G, Seal B, Tangirala M, **Hay JW**. Adverse Dental Outcomes Associated with Intravenous Versus Oral Bisphosphonate Use in Patients with Osteoporosis. 7th International Symposium on Osteoporosis, April 2009, Washington, DC.
66. Skrepnek G, Seal B, Tangirala M, **Hay JW**. The Association Between Adverse Dental Outcomes and Intravenous Versus Oral Bisphosphonates Within Cancer Patients. European Calcified Tissue Society ECTS 2009, Vienna, Austria, 23-27 May 2009
67. **Hay JW**, Zhou ZY. "APCC Versus RFVIIA in Treatment of Hemophilia Patients with Inhibitors: A Structured Review of The Pharmacoeconomic Literature" abstract N° 846 - XXII Congress of the International Society on Thrombosis and Haemostasis, Boston, MA, July 11-16 2009.
68. **Hay JW**, Zhou ZY, Young G. "Economic Comparison of APCC Vs RFVIIA For Mild-To-Moderate Bleeding Episodes in Hemophilia Patients with Inhibitors" abstract N° 836 - XXII Congress of the International Society on Thrombosis and Haemostasis, Boston, MA, July 11-16 2009.
69. Tangirala M, Jhaveri M, **Hay JW**. "Resource Use in Patients with Allergic Rhinitis (AR) Comorbidities: Oral Second Generation Antihistamines (SGAs) versus Montelukast (MTLK)" Annual Meeting of the American College of Allergy, Asthma & Immunology, Nov. 5-10 2009, Miami Beach, Florida.
70. Colayco D, **Hay JW**. Cost-Effectiveness of Serotonin-Type 3 Receptor Antagonists For Chemotherapy-Induced Emesis in Non-Small Cell Lung Cancer Patients Receiving Cisplatin-Based Chemotherapy. Poster PCN95. ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.

71. Suh H, **Hay JW**. Dealing with Selection Bias in Nonlinear Settings: A Case of Comparative Effectiveness of Statin Plus Fibrate Combination Therapy Versus Statin Monotherapy in Type II Diabetes. Podium SB4. ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
72. Shin J, **Hay JW**. The Cost-Effectiveness of Isotretinoin in Patients with Moderate-To-Severe Acne Vulgaris. Poster PSS6, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
73. Ganapathy V, **Hay JW**. Analysis of Necrotizing Enterocolitis Costs Among Extremely Preterm Infants Fed Exclusively Human-Milk Based Diet Vs. Human-Milk Fortified with Bovine-Milk Based Supplements. Poster PIH18, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
74. Tran JN, **Hay JW**. Obesity and Health Care Costs and Utilization in the Veteran Affairs Population. Poster PSY34, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
75. Soo In Bang, JW Hay. Cost-Effectiveness Analysis of Dutasteride, Tamsulosin and Combination Therapy in the Treatment of Benign Prostatic Hyperplasia. Poster PUK 11, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
76. Chu K, **Hay JW**. Economic Analysis of Endovascular Stenting for Peripheral Arterial Disease in Long Lesions of the Superficial Femoral Artery. Poster PCV 83, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
77. Ding Y, **Hay JW**. Cost-effectiveness analysis of multimodal screening for ovarian cancer. Poster PCN 73, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
78. Schwartz E, **Hay JW**. Cost-Effectiveness Analysis in treating Overactive Bladder with Urge Incontinence in Women: A comparison between Oxybutynin and Tolterodine with exploratory analysis of Fesoterodine. Poster PUK 16, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
79. Rashid N, **Hay JW**. Cost Effectiveness Analysis of Managing Chronic Gout with Febuxostat (Uloric) versus Allopurinol (Zyloprim). Poster PMS 20, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
80. Suh JK, **Hay JW**. Evaluation of Cost-Effectiveness of Chronic Hepatitis B Treatments: Entecavir and Telbivudine. Poster PGI 22, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
81. Poon JL, **Hay JW**. Cost Effectiveness Analysis of Breast Cancer Risk Reduction Therapy: Comparing Tamoxifen and Raloxifene. Poster PCN 71, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.

82. Wiegand PW, **Hay JW**. Cost-Effectiveness of Statin Therapy for the Primary Prevention of Cardiovascular Events Predicted by the Reynolds Risk Score in Healthy Men and Women Aged 40 to 80 Years of Age. Poster PCV 74, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
83. Chang J, **Hay JW**. Cost Effectiveness Analysis of Anti-Epidermal Growth Factor Receptor (Anti-EGFR) Agents for Treatment Refractory Metastatic Colorectal Cancer (mCRC). Poster PCN 84, ISPOR 15th Annual International Conference, May 2010, Atlanta, GA.
84. **Hay JW**, Katon WJ, Ell K, Lee P-J, Guterman JJ. Cost Effectiveness Analysis of Collaborative Care Management of Major Depression among Low-Income, Predominantly Hispanics with Diabetes. Poster presentation at the ICMPE 10th Workshop on Costs and Assessment in Psychiatry "Mental Health Policy and Economics " March 2011, Venice, Italy.
85. Unützer J, Dwight-Johnson, M, Apesoa-Varano C, **Hay JW**, Hinton L: Older men's preferences for depression care: Preliminary comparison of conjoint survey and qualitative interviews. American Association of Geriatric Psychiatry, March 18-21, 2011, San Antonio TX.
86. Yeung K, **Hay JW**. Cost-Utility Analysis of Romiplostim Versus Splenectomy in The Treatment of Chronic Refractory Immune Thrombocytopenic Purpura. Poster presentation at the Academy of Managed Care Pharmacy 23rd Annual Meeting, March 29, 2011 Minneapolis, MN.
87. Ejzykowicz F, **Hay JW**, Sarocco P, Karafilidis J, Walsh J. Hospitalizations, medical management and switch therapy patterns in the COPD Medicare population. Poster PRS 36, ISPOR 16th Annual International Conference, May 2011, Baltimore, MD.
88. Ding Y, **Hay JW**, Zangwill KM, Allred N, Yeh SH. Cost-benefit analysis of postpartum vaccination of birth mothers with influenza vaccine. Poster PIN 19, ISPOR 16th Annual International Conference, May 2011, Baltimore, MD.
89. Zhou Z-Y, **Hay JW**. A systematic review and meta-analysis comparing the efficacy of bypassing agents in hemophilia patients with inhibitors. XXIII Congress of the International Society on Thrombosis and Hemostasis, July 2011, Kyoto, Japan.
90. Ejzykowicz F, Rajagopalan K, Karafilidis J, **Hay JW**. Health Care Costs in a Medicare Population of COPD Patients Treated with Beta-Agonists. American Society of Health System Pharmacists Midyear Meeting, December 2011, New Orleans, LA.
91. Niu, X, **Hay JW**. Cost-Effectiveness Analysis of Nilotinib Versus Dasatinib in Patients with Imatinib-Resistant or Imatinib-Intolerant Chronic Myeloid Leukemia (CML). Poster PCN13, ISPOR 17th Annual International Conference, June 2012, Washington, DC.

92. Villacorta, R, **Hay JW**, Messali A. Cost Effectiveness of Treatment with Etanercept or Ustekinumab For Moderate To Severe Psoriasis. Poster PSY27, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
93. Messali A, **Hay JW**, Villacorta, R. Cost-Effectiveness of Temozolomide in the Adjuvant Treatment of Newly Diagnosed Glioblastoma in the United States. Poster PCN78, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
94. Chaugule S, **Hay JW**. Cost Effectiveness of Cetuximab Plus Best Supportive Care (BSC) Versus BSC Alone in Last Line For Kras Wild Type Metastatic Colorectal Cancer Patient Population. Poster PCN64, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
95. Jiang Y, **Hay JW**. Cost-Effectiveness of Denosumab v Alendronate for Prevention of Osteoporotic Fractures in the U.S. Poster PMS27, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
96. Blaylock B, **Hay JW**, Zarchy T. Cost-Effectiveness of Diagnostic Sigmoidoscopy Before Colonoscopy in 40-49 Year-Old Symptomatic Patients. Poster PMD29, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
97. Chaugule S, **Hay JW**. Bypass Therapy Assay Testing as a Strategy to Reduce Treatment Costs for Hemophilia Patients with Inhibitors. Poster PMD18, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
98. Matsuda T, **Hay JW**. Cost-Effectiveness of Bariatric Surgery: Laparoscopic Gastric Bypass and Banding. Poster PSU24, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
99. Ganapathy V, **Hay JW**, Smoot, KJ, Lawler, E, Weber, HC, Grotzinger, KM. Resource Utilization in Thrombocytopenia of Chronic Liver Diseases in the Veterans Affairs Population. Poster PGI14, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
100. Ding Y, **Hay JW**, Zangwill K, Yeh S. Cost-Benefit Analysis of Hospital Based Postpartum Vaccination with Combined Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccine (Tdap). Poster PMD18, ISPOR 17th Annual International Conference, June 2012, Washington, DC.
101. Chaugule S, **Hay JW**, Young G. Bypass Therapy Assay Testing as a Strategy to Reduce Treatment Costs For Hemophilia Patients with Inhibitors. World Federation of Hemophilia, 2012 World Congress, June 2012, Paris, France.
102. Ding, Y, **Hay JW**, Zangwill, K, Yeh, S. Cost-Benefit Analysis of Hospital Based Postpartum Vaccination with Combined Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccine (TDAP). Western Pharmacoeconomics Conference, June 2012, Austin, TX.

103. Messali A, **Hay JW**, Villacorta, R. Probabilistic Sensitivity Analysis of the Cost-Effectiveness of Temozolomide in the Adjuvant Treatment of Newly Diagnosed Glioblastoma. Western Pharmacoeconomics Conference, June 2012, Austin, TX.
104. **Hay JW**. Cost Effectiveness Analysis With and Without Stochastic Uncertainty,” American Society for Health Economics 4’t Biennial Conference, June 2012, Minneapolis, MN.
105. Ejzykowicz F, Rajagopalan K, Bollu V, Karafilidis J, **Hay JW**. Effect of Long Acting Beta Agonist Therapy on Risk of Hospitalization in New Start COPD Patients. Abstract 265134. American Public Health Association 140’t Annual Meeting and Expo, October 29, 2012, San Francisco, CA.
106. Ni W, **Hay JW**, Zangwill K. Potential U.S. medical cost savings associated with routine hospital-based use of a rapid diagnostic tool for bloodstream infection. ISPOR 18th Annual International Conference, May 2013, New Orleans, LA.
107. Schwartz E, **Hay JW**. Modeling Diabetes Costs: a comparison of econometric methods using simulated error distributions. ISPOR 18th Annual International Conference, May 2013, New Orleans, LA.
108. Gu NY, Gai Y, Wu J, Raisch DW, **Hay JW**. Predicting healthcare costs in asthma using the EQ-5D health-related quality-of-life (HRQoL) index score with and without adjusting non-random positive spending using a US national representative population. 2nd International Allergen Symposium on Asthma & Economics, July 2013, Sydney, Australia.
109. **Hay JW**, Strylewicz G, Rothfeld A, Chesler R, Doctor J. Provider Preferences for Interventions for Reducing Inappropriate Antibiotic Prescribing. Accepted Podium Presentation, Health Care Applications: Sawtooth Software Conference, October 2013, Dana Point, CA.
110. Gu NY, Gai Y, Wu J, Raisch DW, **Hay JW**. Predicting Health Care Costs in Asthma Using The EQ-5D Index Score. ISPOR 16th Annual European Congress, 2-6 November 2013, Dublin, Ireland.
111. **Hay JW**, Oladapo AO, Epstein JD, Novack AR. Estimating the Potential Cost of Bypassing Agent Prophylaxis Relative to the Cost of rFVIIa On-Demand Using Actual rFVIIa Doses From the UK NHD Registry. 7th Annual Congress of the European Association for Haemophilia and Allied Disorders, February 2014, Brussels, Belgium.
112. Linder JA, Meeker D, Friedberg MW, Persell SD, Fox CR, Goldstein NJ, Alan Rothfeld, **Hay JW**, Doctor JN. Improving Antibiotic Prescribing for Acute Respiratory Infections using Behavioral Economic Principles: A Cluster Randomized Trial. Society for General Internal Medicine 37’t Annual Meeting, April 2014, San Diego, CA.

113. Grosse SD, Chaugule S, **Hay JW**. Preference-based Measures of Health-related Quality of Life for Adults with Severe Hemophilia: Implications for the Cost-effectiveness of Prophylaxis. World Federation of Hemophilia 2014 World Congress, May 2014, Melbourne, Australia.
114. Chaugule S, Young G, **Hay JW**. Understanding how patients, physicians and the general population value different types of hemophilia therapies and their willingness-to-pay for such therapies: a discrete choice experiment from the US perspective. World Federation of Hemophilia 2014 World Congress, May 2014, Melbourne, Australia.
115. **Hay JW**, Oladapo AO, Epstein JD, Novack AR. Understanding how patients, physicians and the general population value different types of hemophilia therapies: a discrete choice experiment from the US perspective. World Federation of Hemophilia 2014 World Congress, May 2014, Melbourne, Australia.
116. **Hay JW**, Oladapo AO, Epstein JD, Novack AR, Neufeld EJ. Estimating the potential cost of bypassing agent prophylaxis relative to the cost of rFVIIa on-demand using actual rFVIIa doses from multiple US registries. World Federation of Hemophilia 2014 World Congress, May 2014, Melbourne, Australia.
117. McGinnis JJ, **Hay JW**. Cost-Effectiveness of Hepatitis C Treatments in Treatment Naïve Genotype 1 Patients. ISPOR 19th Ann. Intl. Conf., May 2014, Montreal, Quebec, Canada.
118. Patel N, **Hay JW**. Management of Spinal Cord Injury-Associated Neuropathic Pain With Pregabalin is Cost-Effective Over Gabapentin. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
119. Gong C, **Hay JW**. Cost-Effectiveness Analysis of Abiraterone and Sipuleucel-T in Metastatic Castration-Resistant Prostate Cancer. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
120. Chaugule S, **Hay JW**. Understanding What Patients Value and Their Willingness-To-Pay (WTP) For Hemophilia Therapies: A Discrete Choice Experiment. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
121. Ding Yao, **Hay JW**. Economic Burden Associated with Patients Diagnosed with Peyronie's Disease in the United States. Poster Tuesday morning, PIH21. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
122. Ding Yuchen, **Hay JW**. Cost-Effectiveness Comparison of Denosumab and Zoledronic Acid in the Treatment of Postmenopausal Osteoporosis. Poster Monday morning, PMS36. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
123. Drabo E, **Hay JW**, Vardavas R, Wagner ZR, Sood N. A Cost-Effectiveness Analysis of Pre-Exposure Prophylaxis (Prep) for the Prevention of HIV in the Los Angeles MSM Population. Poster, Wednesday morning, PIN43. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.

124. Chen C, **Hay JW**. Cost-Effectiveness Analysis of Alternative Screening and Treatment Strategies for Familial Hypercholesterolemia in the United States. Poster Monday afternoon, PCV70. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
125. Chu LH, **Hay JW**, Cohen DJ. A Hybrid Comparison of Cost-Effectiveness of Transcatheter Aortic Valve Replacement Between Randomized Clinical Trials and Real World Practice in Treating Patients with Severe Aortic Stenosis, Poster PCV69. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
126. Jiao X, **Hay JW**. Cost-Effectiveness of Breast MRI and Mammography for Screening High Risk Populations. Poster Tuesday morning, PHS55. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
127. Lin CW, **Hay JW**. Cost Utility Analysis of Aflibercept, Ranibizumab, and Bevacizumab for the Treatment of Neovascular Age-related Macular Degeneration. Poster Wednesday morning, PSS23. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
128. Massachi S, **Hay JW**. Cost-Effectiveness of Various Clostridium Difficile Infection (CDI) Treatments in Patients with Recurrent Infections. Poster Wednesday morning, PIN50. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
129. Mehta D, **Hay JW**. Cost-Effectiveness of Adding Bevacizumab to First Line Therapy for Patients with Advanced Ovarian Cancer. ISPOR 19th Annual International Conf., May 2014, Montreal, Quebec, Canada.
130. Ni W, **Hay JW**, Zangwill K. Economics Analysis of Diagnostic Methods for Clostridium Difficile Infection. Poster, Wednesday morning, PIN58. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
131. Ning N, **Hay JW**. The Cost-Effectiveness of Liraglutide Vs Exenatide for the Treatment of Type 2 Diabetes in The United States. Poster, Wednesday morning, PDB78. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
132. Thompson CA, **Hay JW**. Evaluating the Impact of Cannabis Use on Metabolic Syndrome Using Data From the Continuous National Health and Nutrition Examination Survey, Poster Tuesday afternoon, PMH13. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.
133. Zhang X, **Hay JW**. Cost-Effectiveness of Fingolimod, Teriflunomide, Dimethyl Fumarate and Intramuscular Interferon Beta-1a in Relapsing-Remitting Multiple Sclerosis. Poster, Monday Morning, PND20. ISPOR 19th Annual International Conference, May 2014, Montreal, Quebec, Canada.

134. Jiao X, **Hay JW**. Cost-Effectiveness of Breast MRI and Mammography for Screening High Risk Populations. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
135. Ding Yuchen, **Hay JW**. Cost-effectiveness Comparison between Generic zoledronic acid and denosumab (Prolia®) in the treatment of Postmenopausal Osteoporosis. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
136. **Hay JW**. Behavioral Economics Interventions to Reduce Antibiotic Overprescribing. Organized Session, American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
137. **Hay JW**, Strylewicz G, Rothfeld A, Doctor J. Provider Preferences for Interventions for Reducing Inappropriate Antibiotic Prescribing. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
138. Doctor J, Meeker D, **Hay JW**. Nudging guideline uptake: A randomized trial of physician public commitments. American Soc. for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
139. Meeker D, Doctor J, **Hay JW**. A Behavioral Economics Multi-site Randomized Trial to Reduce Provider Antibiotic Overprescribing. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
140. Gong C, **Hay JW**. Cost-Effectiveness Analysis of Abiraterone and Sipuleucel-T in Metastatic Castration-Resistant Prostate Cancer. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
141. Thompson C, **Hay JW**. Evaluating the Impact of Marijuana Use on Metabolic Syndrome Using Data from the Continuous National Health and Nutrition Examination Survey. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
142. Patel N, **Hay JW**. Pregabalin (Lyrica®) is cost-effective over Gabapentin (Neurontin®) as a First-Line Treatment for Neuropathic Pain (NeP) Management after Spinal Cord Injury (SCI). American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
143. Zhang X, **Hay JW**, Nu X. Cost-Effectiveness of Fingolimod, Teriflunomide, Dimethyl Fumarate and Intramuscular Interferon Beta-1a in Relapsing-Remitting Multiple Sclerosis. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
144. Chen CX, **Hay JW**. The Cost-Effectiveness of Screening and Management Strategies for Familial Hypercholesterolemia in the United States: A Markov Model Analysis. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.

145. Mehta D, **Hay JW**. Cost-Effectiveness of Adding Bevacizumab to First Line Therapy for Patients with Advanced Ovarian Cancer. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
146. Drabo E, **Hay JW**, Sood N, Wagner Z. A Cost-Effectiveness Analysis of Pre-Exposure Prophylaxis (PREP) for the Prevention of HIV in the Los Angeles County MSM Population. American Society for Health Economics 5'th Biennial Conference, June 2014, Los Angeles, CA.
147. Ding Yao, **Hay JW**. Impact of Maternal Education on Child Immunization Propensity in China. ISPOR Asia Conference, September 2014, Beijing, China.
148. Cheetham C, Yong Y, Niu F, Kalsekar A, Hechter R, Chiang K, **Hay JW**, Nyberg L. Characterization of Hepatitis C Patients who fail to Achieve Sustained Virologic Response with Triple Therapy (Peg-Interferon alfa and Ribavirin with Boceprevir or Telaprevir). The Liver Meeting, November 2014, Boston, MA.
149. Chaugule S, **Hay JW**. Impact of differential framing of opt-out alternatives: Comparison of utility maximization vs. regret minimization models in a hemophilia therapy preferences study. Inaugural meeting of the International Academy of Health Preference Research, November 2014, Amsterdam, Netherlands, EU.
150. Thompson C, **Hay JW**. Role of Behavioral Confounding in the Association Between Marijuana Use and BMI in US Adults. Poster PSY12 Wednesday, May 20, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.
151. Drabo E, **Hay JW**. Rolling Out Oral Pre-Exposure Prophylaxis (Prep) is a Cost-Effective HIV Prevention Strategy Among Los Angeles County (LAC) Men Who Have Sex with Men (MSM). Poster PIN54 Tuesday, May 19, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.
152. McGinnis JJ, **Hay JW**. The Cost Effectiveness of a Novel High-Priced Combination Therapy for Hepatitis C in Treatment Naïve Genotype 1 Infected Patients. Poster PIN65 Tuesday, May 19, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.
153. Han X, **Hay JW**. Cost-Effectiveness Analysis of Certolizumab, Etanercept, Golimumab and Tofacitinib for the Treatment of Moderately to Severely Active Rheumatoid Arthritis. Poster PMS52 Tuesday, May 19, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.
154. Chaugule S, **Hay JW**. Does Differential Framing of Opt-Out Alternatives in Discrete Choice Experiments (DCES) Matter? Comparison of Random Utility Maximization (RUM) and Random Regret Minimization (RRM) Models. Poster PRM85 Monday, May 18, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.

155. Chaugule S, **Hay JW**. Exploring Heterogeneity in Attribute Processing Strategies: Use of Hybrid Random Utility Maximization-Random Regret Minimization (RUM-RRM) Models in a Discrete Choice Experiment (DCE). Poster PRM140 Monday, May 18, 2015. ISPOR 20th Annual International Meeting, May 16-20, 2015; Philadelphia, PA.
156. Mehta DA, **Hay JW**. Systematic Literature Review of Economics Analyses Comparing aPCC and rFVIIa Across On-Demand, Prophylaxis and Surgery. Poster International Society of Thrombosis and Hemostasis 2015 Congress, June 23, 2015; Toronto, Canada.
157. Cheetham C, Yong Y, Niu F, Kalsekar A, Hechter R, Chiang K, **Hay JW**, Nyberg L. Characterization of Hepatitis C Patients who fail to Achieve Sustained Virologic Response with Triple Therapy (Peg-Interferon Alfa and Ribavirin with Boceprevir or Telaprevir). XXIII Congresso Brasileiro de Hepatologia, September 2015; Sao Paulo, Brazil.
158. Chaugule S, **Hay JW**. Advances in Willingness-to-Pay Estimation Methods for More Informed Decision Making. 2nd Meeting of the International Academy of Health Preference Research, October 2015, Brisbane, Australia.
159. Xu Y, Barzi A, **Hay JW**. Comparative Effectiveness of Panitumumab (P) and Cetuximab (C) in Metastatic Colorectal Cancer (mCRC) with Wild-Type KRAS (WTKRAS). American Society of Clinical Oncology 2016 Gastrointestinal Cancers Symposium, (January 21-23, 2016) San Francisco, CA.
160. Cheng W, Sadeghi S, Lenz H-J, **Hay JW**, Barzi A. Comparative-Effectiveness of FOLFIRINOX (FOL) versus Gemcitabine and nab-Paclitaxel (GNP) for the First-Line Treatment of Metastatic Pancreatic Cancer. American Society of Clinical Oncology 2016 Gastrointestinal Cancers Symposium, (January 21-23, 2016) San Francisco, CA.
161. Thompson C, **Hay JW**, Doctor J. “Does marijuana use lead to weight loss? Exploring the role of effect moderation in the association between marijuana use and BMI and waist circumference in US adults.” Scientific Poster Session, Marijuana and Cannabinoids: A Neuroscience Research Summit sponsored by the National Institutes of Health (March 22-23) Bethesda, MD.
162. Gong C, **Hay JW**, Meeker D, Doctor J. “Use of behavioral economics and social psychology to improve treatment of acute respiratory infections (BEARI): A Discrete Choice Experiment.” Scientific Podium Presentation, 2016 AMCP Managed Care & Specialty Pharmacy Annual Meeting; April 21-22, San Francisco, CA.
163. Henkhaus L, **Hay JW**. Cost Effectiveness of Empagliflozin/Linagliptin as 2nd-Line Therapy for Adults with Type 2 Diabetes. Poster PDB35. ISPOR 21st Annual International Meeting, May 21-25 2016, Washington, DC.
164. Priyadarshini M, **Hay JW**. Cost-Effectiveness Analysis of Lurasidone and Olanzapine in the Treatment of Schizophrenia. Poster PMH40. ISPOR 21st Annual International Meeting, May 21-25 2016, Washington, DC.

165. Bhagvandas N, **Hay JW**. Cost Effectiveness of Lurasidone, Quetiapine, and Olanzapine Monotherapy in the Treatment of Bipolar I Disorder Depression. Poster PMH39. ISPOR 21'st Annual International Meeting, May 21-25 2016, Washington, DC.
166. Nguyen A, **Hay JW**. Cost-Effectiveness of Trastuzumab in Adult Metastatic Gastric Cancer Patients with an Overexpression of HER2. Poster PCN109. ISPOR 21'st Annual International Meeting, May 21-25 2016, Washington, DC.
167. Lu T, **Hay JW**. Cost Effectiveness of Pembrolizumab and Ipilimumab in Advanced Melanoma. Poster PCN86. ISPOR 21'st Annual International Meeting, May 21-25 2016, Washington, DC.
168. Cheng W-H, **Hay JW**. Cost-Effectiveness Analysis Comparing Folfirinox and Nab-Paclitaxel (Abaraxane) Plus Gemcitabine for First-Line Treatment of Patients with Metastatic Pancreatic Cancer from the US Societal Perspective. Poster PCN108. ISPOR 21'st Annual International Meeting, May 21-25 2016, Washington, DC.
169. Xu Y, Barzi A, **Hay JW**. Comparative Effectiveness of Panitumumab Versus Cetuximab in Patients with Chemo-Refractory Wild-Type Kras Metastatic Colorectal Cancer. Oral Presentation PCN108. ISPOR 21'st Annual International Meeting, May 21-25 2016, Washington, DC.
170. Drabo E, **Hay JW**. Nudging vaccination with a 'no-fault' insurance: A discrete choice experiment. Oral presentation at the 5'th Meeting of the International Academy of Health Preference Research, September 2 2016, Singapore.
171. Linder JA, Meeker D, Fox CR, Friedberg MW, Persell SD, Goldstein NJ, Knight TK, **Hay JW**, Doctor JN. Durability of benefits of behavioral interventions on inappropriate antibiotic prescribing in primary care: follow-up from a cluster RCT. Oral presentation, IDWeek, October 27, 2016. New Orleans, LA.
172. Drabo E, Sood N, **Hay JW**, Doctor JN. Nudging vaccination with a no-fault insurance, Oral presentation, INFORMS Annual Meeting, November 6, 2016; Nashville. TN.
173. Gong C, **Hay JW**, Zangwill K, Meeker D, Doctor JN. The Use of Behavioral Economics and Social Psychology to Improve Treatment of Acute Respiratory Infections (BEARI): A Cost-Effectiveness Analysis. Poster PRS24. ISPOR 22'st Annual International Meeting, May 20-24, 2017, Boston, MA.
174. Cohen B, **Hay JW**, Barzi A, Cost-Effectiveness of Short-Course vs. Long-Course Treatment for Stage III Rectal Cancer. Invited Podium Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
175. Aliyev E, **Hay JW**. Cost-effectiveness of ustekinumab in adult patients with moderate-severe Crohn's disease (conventional therapy failure and tumor necrosis factor naïve population). Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.

176. Kim J, **Hay JW**. Cost-Effectiveness Analysis of Regorafenib in Patients with Advanced Hepatocellular Carcinoma. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
177. Lam J, **Hay JW**, Kenyon N. Cost-effectiveness Analysis of Reslizumab in Patients with Poorly Controlled Eosinophilic Asthma. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
178. Salcedo J, **Hay JW**. Cost-Effectiveness of Rivaroxaban Versus Warfarin for Treatment of Nonvalvular Atrial Fibrillation in Patients with On-Treatment Worsening Renal Function. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
179. Cho S, **Hay JW**. Cost-Effectiveness of Stivarga (Regorafenib) vs. Lonsurf (Trifluridine/Tipiracil) in Refractory Metastatic Colorectal Cancer. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
180. Xuan S, Zangwill K, **Hay JW**. Cost-Effectiveness Analysis of Alternative Diagnostic Methods for Clostridium difficile Infection. Invited Podium Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
181. Bae Y, **Hay JW**. The cost effectiveness analysis of pd-1 and pd-11 agents compared with docetaxel for second-line treatment of advanced non-small cell lung cancer. Invited Poster Presentation, Western Pharmacoeconomics & Outcomes Research Conference, University of New Mexico, October 4, 2017, Albuquerque, NM.
182. **Hay JW**, Le Q, Wang Y. Cost-Effectiveness of Abaloparatide vs. Teriparatide for Prevention of Osteoporosis-related Fracture: a US Payer Perspective. Invited Poster Presentation AMCP Nexus Conference, October 16-19, Dallas, TX.
183. Mahajerin A, Formica M, **Hay JW**. Cost Analyses of Pediatric Thrombophilia Testing: A report from the Children's Hospital-Acquired Thrombosis Registry. Thrombosis and Hemostasis Societies of North America 4th Biennial Summit, March 8-10, 2018, San Diego, CA.
184. Aliyev E, **Hay JW**, Hwang C. The Cost-Effectiveness of Ustekinumab Compared to Infliximab and Adalimumab in Adult Patients with Moderate-Severe Crohn's Disease (TNF Naïve Population). Research Poster Presentations - Session IV, PGI17: Gastrointestinal Disorders Tuesday, May 22, 2018. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.

185. Bae Y, **Hay JW**. The Cost Effectiveness Analysis of PD-1 and PD-L1 Agents Compared with Docetaxel for Second-Line Treatment of Advanced Non-Small Cell Lung Cancer. Research Poster Presentations - Session IV, PCN114 Cancer, Tuesday, May 22, 2018. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
186. Kim J, **Hay JW**. Cost-Effectiveness Analysis of Regorafenib for Advanced Hepatocellular Carcinoma. Research Poster Presentations - Session IV, PCN107 Cancer, Tuesday, May 22, 2018. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
187. Lam J, **Hay JW**, Salcedo J, Kenyon NJ. An Evaluation of the Cost-Effectiveness of Reslizumab in Poorly Controlled Eosinophilic Asthma. Research Poster Presentations - Session II, PRS29: Respiratory-Related Disorders Monday, May 21, 2018 3:30 PM - 7:30 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
188. Salcedo J, **Hay JW**, Lam J. Cost-Effectiveness of Rivaroxaban Versus Warfarin for Treatment of Nonvalvular Atrial Fibrillation in Patients with Worsening Renal Function. Research Poster Presentations - Session I, PCV49: Cardiovascular Disorders Monday, May 21, 2018 8:30 AM - 2:00 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
189. Innis B, **Hay JW**. Cost Effectiveness Analysis of Evolocumab, a PCSK9 Inhibitor, From the US Societal Perspective. Research Poster Presentations - Session I, PCV46: Cardiovascular Disorders Monday, May 21, 2018 8:30 AM - 2:00 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
190. Cho S, **Hay JW**, Barzi A. Cost-Effectiveness Analysis of Regorafenib and TAS-102 in Refractory Metastatic Colorectal Cancer. Podium Presentation Breakout Session P1: Cost-Effectiveness Studies Monday, May 21, 2018 11:00 AM - 12:00 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
191. Cohen B, **Hay JW**, Barzi A. Cost-Effectiveness of Short-Course Radiotherapy Compared to Long-Course Chemoradiotherapy in the Treatment of Stage III Rectal Cancer Patients from the US Societal Perspective. Research Poster Presentations - SESSION IV PCN129: Cancer Tuesday, May 22, 2018 3:30 PM - 7:30 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
192. Le QA, **Hay JW**, Becker R, Wang Y. Economic Analysis of Abaloparatide in High-Risk Postmenopausal Women with Osteoporosis in the United States - A Discrete-Event Simulation Model. Research Poster Presentations - Session I PMS35: Muscular-Skeletal Disorders Monday, May 21, 2018 8:30 AM - 2:00 PM. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.
193. Gong C, Dasgupta-Tsinikas S, Zangwill K, Bolaris M, **Hay JW**. Risk-Based Management of Newborns Exposed to Maternal Intrapartum Fever: A Cost Benefit Analysis. ISPOR 23rd Annual International Meeting, May 19-23, 2018, Baltimore, MD.

194. Barzi A, Jiao X, **Hay JW**, Sadeghi S. Outcomes and utilization of adjuvant chemotherapy (AT) for stage II colon cancer (CC-II) in elderly population. 2019 Gastrointestinal Cancers Symposium (January 17-19, 2019), San Francisco, CA.
195. Salcedo J, Schmaltz C, **Hay JW**, Summers L. The Case for The Inclusion of Human Milk into Georgia State's Medicaid Reimbursement Structure: A Budget Impact Analysis. Poster PIH27: Individual's Health, Monday, May 20, 2019 3:30 PM - 7:00 PM. ISPOR 24th Annual International Meeting, May 21-23, 2019, New Orleans, LA.
196. Zawadzki NK, **Hay JW**, Ahmed CD, Myers K, Gidding S. Cost-Effectiveness of Screening and Management Strategies for Familial Hypercholesterolemia in the United States: An Update. Poster PPM3, Session V PPM: Personalized & Precision Medicine, Wednesday, May 22, 2019 9:30 AM - 2:00 PM. ISPOR 24th Annual International Meeting, May 21-23, 2019, New Orleans, LA.
197. Yu A, **Hay JW**, Zangwill KM. Post-Operative Antibiotic Cost Project: Discontinuation of Antimicrobial Prophylaxis After Surgical Incision Closure. Poster PIN40: Infectious Diseases Tuesday, May 21, 2019 10:30 AM - 2:00 PM. ISPOR 24th Annual International Meeting, May 21-23, 2019, New Orleans, LA.
199. Cho SK, Barzi A, **Hay JW**, Lenz H-J, Ou F-S, Grothey A, Bekaii-Saab TS. Cost-effectiveness of Regorafenib Dose Optimization Schedule in Metastatic Colorectal Cancer. Abstract #269045. ASCO Annual Meeting, June 1-4, 2019, Chicago, IL.
200. Barzi A, Jiao X, **Hay JW**, Sadeghi S. Total cost of care for patients (pts) with stage II colon cancer (CC-II): a SEER-Medicare analysis. Abstract #272093. ASCO Annual Meeting, June 1-4, 2019, Chicago, IL.
201. Acevedo JR, Cameron B, Nurimba M, Yu JC, **Hay JW**, Kokot NC. Reconstructing Salvage Total Laryngectomy: A Cost Effectiveness Analysis. American Academy of Otolaryngology-Head and Neck Surgery 2019 Annual Conference, September 15th-18th, 2019; New Orleans, LA.
202. Ta Park, V.M., Meyer, O., Grill, J.D., Vuong, Q., Bang, J., Kanaya, A., Lau, D., **Hay JW**, Gong, C., Gallagher-Thompson, D., & Hinton, L. 2019 Advancing Health and Wellness with Cultural Humility in Asian and Asian American Communities Conference. Paving the way for the Meaningful Inclusion of Asian Americans and Pacific Islanders (AAPI) in Alzheimer's Disease and Related Dementias (ADRD) Clinical and Caregiving Research. Advancing Health and Wellness with Cultural Humility in Asian and Asian American Communities Conference (October 17, 2019) San Francisco, CA.
203. **Hay JW**, Gong CL, Jiao X, Zawadzki NK, Pickard AS, Xie F, Crawford SA, Gu NY. Assessing the Impact of Covid-19 on US Population Health Using the First Wave of a Panel Survey. *EuroQol Research Foundation Virtual Plenary Meeting, Chicago, Illinois, September 2020 [virtual presentation due to COVID-19 pandemic]*.

204. Crawford SA, Gong CL, Randolph LM, Yieh L, **Hay JW**. Diagnosing Newborns with Suspected Severe Mitochondrial Disorders: A Cost-Effectiveness Study Comparing Early Whole Exome Sequencing to Standard of Care. ISPOR International Meeting, Orlando, Florida, May 2020 [cancelled due to COVID-19 pandemic]
205. Yu JC, Gong CL, Zahoor H, **Hay JW**. Cost-Effectiveness of Pembrolizumab/Axitinib and Nivolumab/Ipilimumab Versus Sunitinib As Treatment for Advanced Renal Cell Carcinoma in The United States. ISPOR International Meeting, Orlando, Florida, May 2020 [cancelled due to COVID-19 pandemic]
206. Chen J, Gong CL, Hitchcock MM, Holubar M, Deresinski S, **Hay JW**. Cost-Effectiveness of Bezlotoxumab and Fidaxomicin for Recurrent C. difficile Infection. ISPOR International Meeting, Orlando, Florida, May 2020 [cancelled due to COVID-19 pandemic]
207. Zheng H, Gong CL, Chapman R, Yieh L, **Hay JW**. Cost-Effectiveness of The Duration of Neonatal Extracorporeal Membrane Oxygenation for Newborns with Severe Congenital Diaphragmatic Hernia in The United States. ISPOR International Meeting, Orlando, Florida, May 2020 [cancelled due to COVID-19 pandemic]
208. Chen J, Zawadzki NK, Gong CL, **Hay JW**, Gu NY. Comparing the Impact of COVID-19 on the United States, Swedish and Norwegian Population Health-related Quality of Life. 5th EuroQol Academy Meeting 2021 – A Virtual Meeting, March 2021
209. Crawford SA, Gong CL, Randolph LM, Yieh L, **Hay JW**. Diagnosing Newborns with Suspected Severe Mitochondrial Disorders: A Cost-Effectiveness Study Comparing Early Whole Exome Sequencing to Standard of Care. Western Pharmacoeconomics and Outcomes Research Conference (WPEC), Virtual, April 2021 *Best poster presentation winner, Room 2
210. Zheng H, Gong CL, Chapman R, Yieh L, **Hay JW**. Cost-Effectiveness of The Duration of Neonatal Extracorporeal Membrane Oxygenation for Newborns with Severe Congenital Diaphragmatic Hernia in The United States. PAS Annual Meeting, Virtual, May 2021 *Highlighted e-poster
211. Crawford SA, Gong CL, Randolph LM, Yieh L, **Hay JW**. Diagnosing Newborns with Suspected Severe Mitochondrial Disorders: A Cost-Effectiveness Study Comparing Early Whole Exome Sequencing to Standard of Care. PAS Annual Meeting, Virtual, May 2021

OP-EDS, MEDIA POSTS, LETTERS, ETC.

Hay JW. "Vouchers Take the Catastrophe out of Catastrophic Care," Editorial Page, Camden Courier, May 1, 1987.

Hay JW. "Time to Try to Bridge Gaps in Health Care for the Elderly," Editorial Page, Hartford Courant, May 13, 1987.

Bernstam, M., **Hay JW.** and Swan, P. "Minimum Wage: Bulwark of the Privileged," Editorial Page, Wall Street Journal, June 15, 1987.

Hay JW. and Bernstam, M. "Raising Minimum Wage Hurts Teens, Minorities," Point of View, San Francisco Chronicle, August 17, 1987.

Bernstam, M. and **Hay JW.** "At the Minimum, Wage Law Will Reduce Jobs for Youth," Editorial Page, Orange County Register, December 23, 1987.

Bernstam, M. and **Hay JW.** "California Panel Opens a Pandora's Box on Minimum Wage," Editorial Page, San Diego Union, February 14, 1988.

Hay JW. "Trojan Horse: Dukakis' Health Plan is a Disaster," Editorial Page, San Jose Mercury News, August 11, 1988.

Hay JW. "The 'Dream' That Will Break Massachusetts: Dukakis' Health-Care Plan No Way to Help the Poor," Editorial Page, Los Angeles Herald Examiner, August 28, 1988.

Hay JW. and Ricardo-Campbell, R. "A Health Plan to Make Business Sick," Editorial Page, Hartford Courant, October 30, 1988.

Hay JW. "Let's Not Exaggerate the Costs of AIDS," Editorial Page, Newsday, February 9, 1989.

Hay JW. "AIDS Won't Break the Health-Care System," Editorial Page, Omaha World-Herald, February 12, 1989.

Hay JW. "AIDS Isn't Bankrupting our Health-care System," Editorial Page, Sacramento Bee, February 13, 1989.

Hay JW. "AIDS Costs Will Not Sink Health Budget," Editorial Page, San Jose Mercury News, March 8, 1989.

Hay JW. "The Battle Against AIDS: Some of the Earlier Assumptions are Overdue for Reexamination," Editorial Page, San Diego Union, April 9, 1989.

Hay JW. "The Good News About AIDS," Viewpoints, New York Newsday, May 18, 1989.

Hay JW. "AIDS Infection Data Difficult to Refute," Letters to the Editor, Wall Street Journal, June 28, 1989.

Hay JW. "Is Too Much Being Spent on AIDS?" Editorial Page, Wall Street Journal, October 3, 1989.

Hay JW. "AIDS Epidemic: Falling Short of Projections?" Editorial, Texas Tribune, Austin, TX, November 9, 1989.

Hay JW. "Crossings Dangerous," Letters to the Editor, Peninsula TimesTribune, December 3, 1989.

Hay JW. "American Medicine: Should We Save Lives or Dollars?" The Commonwealth, The Weekly Newsletter of the Commonwealth Club of California, April 2, 1990; pp. 186-189.

Hay JW. "Healthcare Policy Directions," The Executive Speaker, Vol. 11, No. 8 (August 1990); pg. 2.

Hay JW. "Is Hong Kong Ready for Free Market Health Care?" HKCER Letters, Hong Kong Center for Economic Research, (November 1990), pp. 1-4.

Hay JW. "Cocaine Abuse is Not a Victimless Crime," Editorial, The Los Angeles Daily Journal, Los Angeles, CA, and The San Francisco Daily Journal, San Francisco, CA, January 8, 1991.

Hay JW. "Commentary: Cost-Effectiveness of Strategies for Detecting Diabetic Retinopathy," Diabetes Spectrum, Vol 5(2), March/April 1992, pp. 109-110.

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Hay JW. "Allergy Drug-Cost Fight Carries Potential Risks," Letter to the Editor, Wall Street Journal, May 23, 2003.

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Hay JW. “If you've got Obamacare, higher pay doesn't pay,” Editorial, Orange County Register, February 11, 2013.
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Hay JW. "Thank You for Smoking," Editorial, Orange County Register, August 23, 2013.
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William S. Comanor and 50 Years of Pharmaceutical Economics	2014-2015

JOURNAL REFEREE

Advances in Therapy, AIDS, American Journal of Cardiology, American Economic Review, American Heart Journal, American Journal of Health Economics, American Journal of Managed Care, American Journal of Managed Care and Specialty Pharmacy, American Journal of Public Health, Annals of Pharmacotherapy, Annals of the Rheumatic Diseases, Applied Health Economics and Health Policy, Archives of Pediatrics and Adolescent Medicine, BioDrugs, Blood, BMC Medicine, BMC Health Services Research, BMJ, Breastfeeding Medicine, Canadian Journal of Diabetes, Cancer, Cardiovascular Drugs and Therapy, Chest, Clinical Drug Investigation, Clinical Pharmacokinetics, Clinical Therapeutics, ClinicoEconomics and Outcomes Research, CNS Drugs, Consultant, Critical Care, Current Medical Research and Opinion, Drugs and Aging, Eastern Economic Journal, Econometric Reviews, Epilepsia, European Journal of Health Economics, Evaluation and Expert Opinion on Pharmacotherapy, Expert Opinion on Therapeutic Patents, Expert Review of Pharmacoeconomics and Outcomes Research, Farneconomia: Health Economics and Therapeutic Pathways, Gerontology, Health Affairs, Health Care Financing Review, Health Economics, Health Professions, Health and Quality of Life Outcomes, International Journal of the Economics of Business, International Journal of Health and Policy Management, JAMA, Journal of Adolescent Health, Journal of Affective Disorders, Journal of Alzheimer Disease, Journal of the American Statistical Association, Journal of Applied Econometrics, Journal of Cardiovascular Pharmacology and Therapeutics, Journal of Chemotherapy, Journal of Clinical and Experimental Oncology, Journal of Clinical Medicine, Journal of Econometrics, Journal of Environmental Management, Journal of Epidemiology and Community Health, Journal of General Internal Medicine, Journal of Gerontology: Social Sciences, Journal of Health Care for the Poor and Underserved, Journal of Health Politics, Policy and Law, Journal of Human Resources, Journal of Managed Care Pharmacy, Journal of Managed Care and Specialty Pharmacy, Journal of Medical Economics, Journal of Medical Education, Journal of Medical Internet Research, Journal of Pain Research, Journal of Perinatology, Journal of Public Economics, Journal of Public Health Dentistry, Medical Care, Medical Decision Making, Milbank Memorial Fund Quarterly, Nature Reviews Drug Discovery, New England Journal of Medicine, Obstetrics & Gynecology, Pediatric Drugs, Pediatrics, PharmacoEconomics, Priorities, Research in Population Economics, Research in Social and Administrative Pharmacy, Review of Economics and Statistics, Social Science and Medicine, SciTechnol, Social Science Journal, Southern Economic Journal, Statistica Sinica, Topics in Hospital Pharmacy Management, Vaccine, Value in Health.

BOOK MANUSCRIPT REFEREE:

2006 Lisa Gordon
 Editorial Assistant
 Jones and Bartlett Publishers

SCIENTIFIC CONFERENCE ORGANIZATION AND DEVELOPMENT

- 1996-1998 Co-Chair and Primary Organizer: ISPOR Lipid Pharmacoeconomics Conference. Orlando, FL.
- 2001-2003 International Health Economics Association 4th World Congress, San Francisco; Local Organizing Committee Member
- 2004-2005 Scientific Track Evaluation Panel; Disease Management Association of America Annual Conference. Orlando, FL.
- 2005 Scientific Advisory Committee, Third NIMH Pharmacoeconomics Workshop: MMA03 and Psychotropic Medications
- 2007 American Society of Health Economics Meeting Organizer, Duke University, Durham, NC.
- 2009 Western Pharmacoeconomics Conference: Decision Tools for the Health Care Puzzle, Co-Chair and Meeting Organizer; Pasadena CA.
- 2014 American Society of Health Economists: 4th Biannual Conference, USC, Los Angeles, CA.
- 2015 Conference on a Half-Century of Pharmaceutical Economics, University of British Columbia, Vancouver, BC, Canada.
- 2016-17 Conference Co-Chair, International Academy of Health Preference Research (iahpr.org) North American Conference, Boston, MA.

MEDIA APPEARANCES

- October 1989 Time Magazine: "A Recount of AIDS Carriers." Article about J Hay's back calculation model for estimating the number of people infected with HIV/AIDS. October 9, 1989; pg. 103.
- June 1992 "Should Marijuana Be Legalized for Medicinal Purposes?" The Dr. Dean Show, NBC, San Francisco.
- November 1992 "Prescription Drug Price Inflation: What Should Be Done?" Seniors Speak Out, KPBS, San Diego.
- September 1993 "Health Care Reform: Access and Cost" syndicated Public Television show.
- June 1994 "Heterosexual AIDS," Diane Crowe/Chuck Whitten Show, KAVL, Lancaster, CA.
- September 1994 "Heterosexual AIDS," The Dennis Praeger TV Show, Los Angeles, CA.
- October 1994 "Bias in Official Government Projections of HIV/AIDS," FOX Television News Service, New York, NY.
- January-March 1995 "Clinicoeconomics" Annenberg Center at Eisenhower Three Part Television Series written by and featuring Joel W. Hay Ph.D., Producer, Chuck Cox. Part 1: Principles of Clinicoeconomics; Part 2: The Outcomes Revolution-- Measuring Health Related Quality of Life; Part 3: Practice Variation and Medical Guidelines Development. Rancho Mirage, CA.
- September 2000 "Cost Effectiveness of Statins." International Task Force for Prevention of Coronary Heart Disease. Consensus on Statins Conference Webcast: www.chd-taskforce.com
- May 2001 "Economic Considerations in Moving Second-generation Antihistamines from Prescription to OTC Status," CNN Headline News interview.
- May 2001 "Economics of RU-481." Los Angeles Times interview.
- April 2002 "Pharmacy Workforce Effects of Converting from the California to the National Pharmacy Licensure Examination." San Jose Mercury News interview.
- December 2002 "National Issues Briefing To Examine Rising Hospital Costs," Washington Press Club Seminar covered by CSPAN
<http://www.kaisernetwork.org/healthcast/usnews/bcbs/02dec2002> .
- October 2005 "Drug Safety in the Aftermath of Vioxx." Investor's Business Daily interview.

- January 2007 “Democratic Medicare drug plan poised to pass House,” McClatchy Newspapers,
<http://www.mercurynews.com/mld/mercurynews/news/politics/16393085.htm>.
- January 2007 “House Passes Bill to Require Medicare Part D Price Negotiations”. Lou Dobbs Show, CNN.
- January 2007 “House Passes Bill to Require Medicare Part D Price Negotiations”. Business & Media Institute
(<http://www.businessandmedia.org/articles/2007/20070112164308.aspx>).
- January 2007 “Pharmaceutical Industry Profitability,” Investor’s Business Daily interview.
- April 2008 “Merck, Schering Keep Taking Heat for Vytorin Flub.” Investor’s Business Daily interview.
- November 2008 “Impact of CVS Generic Drug Pricing Plan.” NBC Today Show.
- November 2008 “Generic Drug Price Competition.” KNBC Evening News.
- November 2008 “Gains by Democrats Put Pharma On Edge” Investor’s Business Daily interview.
- March 2009 J Hay quotations in “Can Marijuana Help Rescue California's Economy?” By Alison Stateman Time Online, March 13, 2009;
<http://www.time.com/time/nation/article/0,8599,1884956,00.html>
- July 2009 J Hay interview with Marc Brown on legalizing marijuana KABC TV Channel 7 Evening News. July 28 and July 29, 2009.
- July 2009 J Hay interview with Nicole Busch on value of health co-op plans in the health insurance reform legislation. Fox News, July 31, 2009.
- August 2009 J Hay interview on KCBS radio newsmaker show: Why marijuana shouldn’t be legalized. KCBS August 2.
- August 2009 J Hay interview on KNBC-TV Sunday LA, August 2. Why marijuana shouldn’t be legalized.
- August 2009 J Hay interview on Montel Williams Across America, August 5. Why marijuana shouldn’t be legalized.
- August 2009 J Hay interview on KCBS Radio news: Should new federal laws be passed to protect pharmacy prescription information from commercial data vendors? August 19.
- October 2009 J Hay interview on KCBS Radio news: Medical Marijuana Dispensaries. October 19.

- October 2009 Panel discussion on Medical Marijuana and Marijuana Legalization. The Michael Krazny Show, KQED Radio, October 20.
- December 2009 J Hay interview on KCBS Radio news: Marijuana Legalization in California, December 18.
- December 2009 J Hay interview by Reuters News: Marijuana Legalization in California, December 18.
- January 2010 "Recent Advances in Otolaryngology," (www.audio-digest.org).
- February 2010 J Hay interview on University of California media release on medical marijuana studies. February 18.
<http://www.webmd.com/pain-management/news/20100218/medical-marijuana-has-merit-research-shows?page=2>
- March 2010 J Hay interview on Federal Restrictions on Cost Effectiveness Analysis, NPR's Marketplace; <http://marketplace.publicradio.org/display/web/2010/03/16/pm-health-care-costs/#>
- March 2010 "Orphan Drug Market Catches Pharma's Eye." Investor's Business Daily quotes from J Hay.
- July 2010 "Bright Future Seen For Vaccine Research." Investor's Business Daily quotes from J Hay.
- August 2010 "Walgreen's Flu Vaccine Gift Cards Don't Make Sense," Interview on KCBS Radio, San Francisco, CA 8/17/10.
- September 2010 "Will Drugmakers' Fight To Defer Generics Hit Supreme Court?" Investor's Business Daily quotes from J Hay.
- November 2010 "Genentech Catching Some Heat For Pushing Expensive Eye Drug," Investor's Business Daily quotes from J Hay.
- March 2011 "Medical Marijuana Deters Legitimate Medical Cannabinoids" March 13, 2011 Felice J. Freyer, Rhode Island News.
http://www.projo.com/news/content/THC_03-13-11_RMMUHVQ_v16.15cf632.html#
- April 2011 "Medicare on the table." Marketplace show, NPR 4-13-11, Gregory Warner, <http://marketplace.publicradio.org/display/web/2011/04/13/pm-medicare-on-the-table/>
- June 2011 "World Have Your Say: What would the world look like if all drugs were legalised?" BBC World Service, <http://www.bbc.co.uk/programmes/p00gx5gq>

- August 2011 “Expert Discussion: Prescription For Pot—A Debate on the Merits of Medical Marijuana,” MD Magazine: Peers & Perspectives: The Physician's Authority for Debate & Exchange. Podcast.
- December 2011 “Lipitor's patent loss is consumers' gain,” quotes from J Hay. Los Angeles Times, December 1, 2011.
- January 2012 “Excedrin, Gas-X and other Novartis drugs recalled,” radio quotes from J Hay. Marketplace Morning Report, American Public Media, January 9, 2012. <http://www.marketplace.org/topics/business/health-care/excedrin-gas-x-and-other-novartis-drugs-recalled>
- January 2012 “FDA: Novartis Recall May Also Affect Painkillers,” video quotes from J Hay. AP Video, January 9, 2012. http://youtu.be/dttrjWA_Sn0
- March 2012 “Individual mandate under review in Supreme Court,” Marketplace show, NPR 3-27-12, Amy Scott, <http://www.marketplace.org/topics/economy/health-care/individual-mandate-under-review-supreme-court>
- June 2012 “Health care reform trajectory won't be stopped by Supreme Court ruling,” Southern California Public Radio 6-7-12. <http://www.scpr.org/news/2012/06/07/32713/health-care-reform-trajectory-wont-be-stopped/>
- August 2012 Comment on “As circumcision declines, health costs will go up, study projects,” Los Angeles Times, August 21, 2012. <http://www.latimes.com/news/science/la-sci-circumcision-health-costs-20120821,0,6266293,print.story>
- August 2012 Comment on “Study claims decline in circumcision will lead to increase in STDs.” Larry Mantle Airtalk, Southern California Public Radio 8-21-12. <http://www.scpr.org/programs/airtalk/2012/08/21/27999/study-circumcisions-numbers-drop-std-increase-sex/>
- August 2012 Comment on “Walmart arms itself with vaccines,” NPR Marketplace Morning Report. 8-23-12. <http://www.marketplace.org/topics/business/health-care/walmart-arms-itself-vaccines>
- April 2013 Comment on “Students discuss usefulness of marijuana legalization,” USC Daily Trojan, April 9, 2013. <http://dailytrojan.com/2013/04/09/students-discuss-usefulness-of-marijuana-legalization/>
- November 2013 Comment on “Widespread confusion over flu shot insurance benefits,” Los Angeles Times, November 7, 2013. <http://www.latimes.com/business/la-fi-lazarus-20131101,0,1800506,full.column#axzz2jPZ7iJpn>

- July 2014 Comment on “Does neurology need a faster FDA?” Lancet Neurology, Vol 13 August 2014; pp. 760-61. www.thelancet.com/neurology
- October 2014 Comment on “Why there is no ebola vaccine,” NPR Marketplace, October 1, 2014. <http://www.marketplace.org/topics/health-care/why-there-no-ebola-vaccine>
- October 2014 Comment on “Economics of Ebola Vaccine,” NPR Marketplace, October 22, 2014. <http://www.marketplace.org/topics/health-care/economics-behind-rush-ebola-vaccine>
- October 2014 Comment on “Big pharma collaborates on Ebola vaccine,” Australian Broadcast Company radio interview, October 24, 2014. <http://www.abc.net.au/am/content/2014/s4113595.htm>
- May 2015 Comment on “CVS seeks to buy Omnicare,” Marketplace, American Public Media and National Public Radio May 21, 2015. <http://www.marketplace.org/topics/business/cvs-seeks-buy-omnicare>
- September 2015 Comment on “Doctor's attempt to bring lower-price diabetes drug to market thwarted,” Los Angeles Times, September 4, 2015. <http://www.latimes.com/business/la-fi-lazarus-20150904-column.html>
- September 2015 “Daraprim Drug Price Hike,” Top of Mind with Julie Rose, BYU Radio, September 24, 2015. <http://www.byuradio.org/show/e9a84fc9-4bb1-476f-bd5d-0e907b754af8/top-of-mind-with-julie-rose>; <http://www.byuradio.org/episode/5f014c3f-9e8e-452d-8c30-ba3100d70490?playhead=65&autoplay=true>
- December 2015 “Drug Pricing and Pharmacies,” Top of Mind with Julie Rose, BYU Radio, December 16, 2015. <http://www.byuradio.org/episode/80489567-65f0-4c8e-a6b1-bff75c6f2e3f?playhead=63&autoplay=true>
- January 2016 Comment on “Afrezza patients worry they'll lose access to their insulin,” Los Angeles Times, January 8, 2016. <http://www.latimes.com/business/la-fi-afrezza-patients-20160108-story.html>
- January 2016 Comment on “The obscurity of drug spending in Medi-Cal: What do you want to know about State spending on high-cost drugs?” Pauline Bartalone, www.calmatters.org. <https://medium.com/california-s-legal-drug-dilemma/the-obscurity-of-drug-spending-in-medi-cal-4ccf1df97392#.v1rgwujib>
- February 2016 Comment on “The other ‘high-cost’ drugs: What specialty drugs mean for California.” Pauline Bartalone, www.calmatters.org. <https://medium.com/california-s-legal-drug-dilemma/the-other-high-cost-drugs-what-specialty-drugs-mean-for-california-df18ddf1e632#.ydyg7zybx>

- February 2016 Comment on “High Costs For Drugs Used By A Few Are Starting To Add Up,” Shots: NPR Health News, <http://www.npr.org/sections/health-shots/2016/02/05/465699654/high-costs-for-drugs-used-by-a-few-are-starting-to-add-up>
- March 2016 Comment on “Voter anger over surging prescription drug costs has generated a campaign issue,” Los Angeles Times, March 11, 2016. <http://www.latimes.com/politics/la-na-florida-campaign-drug-prices-20160311-story.html>
- April 2016 Comment on “What's California's prescription for rising drug costs?” Pauline Bartalone, www.calmatters.org. <https://calmatters.org/articles/california-takes-measures-to-control-drug-spending-but-costs-soar/>
- May 2016 Comment on “How Big Pharma Uses Charity Programs to Cover for Drug Price Hikes,” Benjamin Elgin, Robert Langreth, Bloomberg Business Week, May 21, 2016. <http://www.bloomberg.com/news/articles/2016-05-19/the-real-reason-big-pharma-wants-to-help-pay-for-your-prescription>
- June 2016 Comment on “U.S. regulator says too many drugmakers chasing same cancer strategy,” Reuters, June 14, 2016. <http://finance.yahoo.com/news/u-regulator-says-too-many-204549726.html>
- June 2016 Comment on “Pharma: an industry shaped by shareholder value,” Marketplace, American Public Media, June 15, 2016. <http://www.marketplace.org/2016/06/08/world/profit-pharma>
- June 2016 Comment on “Medi-Cal To Spend Nearly \$1 Billion On Hepatitis C Drugs Next Year,” California Healthline, California Healthcare Foundation, June 21, 2016. <http://californiahealthline.org/news/medi-cal-to-spend-nearly-1-billion-on-hepatitis-c-drugs-next-year/>
- September 2016 Comment on “MannKind developing inhalable epinephrine to challenge Mylan's EpiPen,” Los Angeles Times, September 6, 2016. <http://www.latimes.com/business/la-fi-mannkind-epipen-20160901-snap-story.html>
- November 2016 Comment on “Soon adults in California could get a joint delivered faster than a pizza,” CBC World November 12, 2016. <http://www.cbc.ca/news/world/soon-adults-in-california-could-get-a-joint-delivered-faster-than-a-pizza-1.3848121>
- November 2016. Comment on “Impacts of Marijuana Legalization for Recreational Purposes in California,” The Larry Fedoruk Show, CKTB Radio, November 14, 2016. <http://www.iheartradio.ca/610cktb/shows/the-larry-fedoruk-show-1.1816268>

- February 2017 Comment on “Drug Firm Payouts Under Scrutiny,” Boston Herald, February 12, 2017.
http://www.bostonherald.com/business/business_markets/2017/02/drug_firm_payouts_under_scrutiny
- March 2017 Comment on “Pompe Drug Lauded by Trump Costs \$300,000 a Year,” New York Times, March 1, 2017.
https://www.nytimes.com/reuters/2017/03/01/world/europe/01reuters-usa-trump-drugpricing.html?_r=2
- March 2017 Comment on “Patient advocacy groups raking in pharmaceutical dollars, USA Today, March 1, 2017.
<http://www.usatoday.com/story/news/2017/03/01/patient-advocacy-groups-pharmaceutical-dollars/98593458/>
- April 2017 Discussion of Joel Hay’s Health Reform Proposal “Grasping For The Middle Ground On Obamacare.” California Healthline, California Health Care Foundation, April 14, 2017. <http://californiahealthline.org/news/grasping-for-the-middle-ground-on-obamacare/>
- May 2017 Comment on “Amazon would be a disruptor if it sold prescriptions,” NPR Marketplace, American Public Media, May 17, 2017.
<https://www.marketplace.org/2017/05/17/business/amazon-would-be-disruptor-if-it-sold-prescriptions>
- August 2017 Comment on “If Trump wanted, he could take steps to lower soaring drug prices.” David Lazarus, Los Angeles Times, August 1, 2017.
<http://www.latimes.com/business/lazarus/la-fi-lazarus-drug-price-caps-20170801-story.html>
- December 2017 Comment on “Less choice, higher prices feared in CVS' takeover of health insurer Aetna.” David Lazarus, Los Angeles Times, December 4, 2017.
<http://www.latimes.com/business/lazarus/la-fi-lazarus-phone-fees-20171205-story.html>
- February 2018 Comment on “Trump once again vows to lower drug prices, and once again you shouldn't believe him.” David Lazarus, Los Angeles Times, February 1, 2018
<http://www.latimes.com/business/lazarus/la-fi-lazarus-sotu-trump-drug-prices-20180201-story.html>
- March 2018 Documentary contributor, “Do No Harm: The Opioid Epidemic Media Project. Narrated by Ed Harris.” 4-minute promo. <https://vimeo.com/245499897>
Available on Amazon Prime, Google Play, iTunes and Vimeo.
- May 2018 Radio Interview on “California bill to provide MediCal to all adults, regardless of immigration status,” Air Talk with Larry Mantle, KPCC NPR Radio, May 22, 2018. <https://www.scpr.org/programs/airtalk/2018/05/22/63062/california-bill-to-provide-medicare-to-all-adults/>

- May 2018 Comment on “Pfizer Settles Kickback Case Related To Copay Assistance For \$24M,” Kaiser Health News, May 24, 2018. <https://khn.org/news/pfizer-settles-kickback-case-related-to-copay-assistance-for-24m/>
- June 2018 Comment on “The FDA Approves the First Drug Derived from Cannabis,” American Public Media and National Public Radio June 28, 2018. <https://www.marketplace.org/2018/06/25/health-care/fda-considers-approval-drug-cannabis>
- September 2018 Comment on “When your prescription drug is tainted with a chemical 'used to make rocket fuel'.” David Lazarus, Los Angeles Times, September 7, 2018. <http://www.latimes.com/business/lazarus/la-fi-lazarus-contaminated-prescription-drugs-20180907-story.html>
- November 2018 Comment on “Drug giant Pfizer says it will return to 'business as normal,' which means price hikes.” David Lazarus, Los Angeles Times, November 2, 2018. <http://www.latimes.com/business/lazarus/la-fi-lazarus-drug-prices-pfizer-trump-20181102-story.html>
- December 2018 Expert appearance and documentary contributor in “DRUG\$: THE PRICE WE PAY.” Streaming 12/15/18 on Amazon and Youtube. Facebook Trailer: <https://www.facebook.com/foxhoundproductions/videos/377465329490173/> Website - www.drugsthefilm.com
- January 2019 Comment on “For drug companies, making shareholders happy is more important than treating the sick.” David Lazarus, Los Angeles Times, January 8, 2019. <https://www.latimes.com/business/lazarus/la-fi-lazarus-lilly-loxo-drug-prices-20190108-story.html>
- March 2019 Comment on “Lilly unveils a ‘generic’ insulin and shows how broken our healthcare system really is.” David Lazarus, Los Angeles Times, March 6, 2019. <https://www.latimes.com/business/lazarus/la-fi-lazarus-healthcare-lilly-insulin-prices-20190308-story.html>
- October 2019 Comment on “California’s new transparency law shows staggering rise in wholesale drug prices,” KCBS Radio, October 11, 2019. <https://www.latimes.com/business/story/2019-10-11/californias-new-transparency-law-shows-staggering-rise-in-wholesale-drug-prices>

PUBLIC HEARING TESTIMONY & PRESENTATIONS

- December 1985 "The cost implications of adding Ranitidine to the Medi-Cal Drug Formulary," Medi-Cal Drug and Therapeutics Advisory Commission Hearings, California Department of Health Services, Sacramento, CA.
- April 1987 "Cost-Benefit evaluation of Haemophilus influenzae type b capsular polysaccharide vaccine," FDA Workshop on Haemophilus b Polysaccharide Vaccine, US Food and Drug Administration, Rockville, MD.
- January 1990 "AIDS Case Projections for California," California AIDS Leadership Committee, California Department of Health Services, Los Angeles County, CA.
- August 1990 "A Comparative Analysis of CDC and Other HIV/AIDS Projections and Recent (1990) Regional Cost Projections for California," Northern California Integrated Planning Project: HIV Epidemiology Task Force, Sacramento AIDS Foundation, Sacramento, CA.
- September 1991 "Cost-Effectiveness Issues in Cholesterol Treatment of Coronary Artery Disease," Panel on Adult Treatment Guidelines for Established Coronary Artery Disease; the National Institutes of Health, National Heart, Lung and Blood Institute and the American Heart Association, Washington, D.C.
- July 1992 "Research and Demonstration Waiver Request for Kaiser-Permanente Enhanced Pharmacy Services Project," California State Board of Pharmacy, Burlingame, CA.
- January 1994 "The Impact of the Clinton Health Care Reforms on Small Business," Congressional Testimony held at Diamond Bar, California at the invitation of Hon. Jay Kim, U.S. House of Representatives.
- November 1996 "The cost effectiveness of Pravastatin and the Medi-Cal Drug Formulary," Medi-Cal Drug Program, California Department of Health Services, Sacramento, CA.
- May 2001 "Economic Considerations in Moving Second-generation Antihistamines from Prescription to OTC Status," presentation to the US Food and Drug Administration Committee on Non-Prescription Drugs, Gaithersburg, MD.
- March 2002 "Pharmacy Workforce Effects of Converting from the California to the National Pharmacy Licensure Examination." Presentation to the California Assembly on AB 2165, Sacramento, CA.

- February 2010 “Cost-effectiveness of An Exclusively Human-Milk Based Diet Vs. Bovine-Milk Based Diet in the Prevention of Necrotizing Enterocolitis Among Extremely Premature Medicaid Infants (Gestation Age < 28 weeks)”
Presentation to the Texas Medicaid Drug Utilization Review Program, Austin, TX.
- February 2012 “Competition Issues in the Pharmaceutical Benefits Manager (PBM) Market,”
Presentation to the Federal Trade Commission Bureau of Economics and the State Attorneys General Task Force on PBM Market Issues, Washington, DC.

CONFERENCES & PRESENTATIONS SINCE 1997

- February 1998 “Methodological Issues in Conducting Pharmacoeconomic Evaluation—Modeling Studies,” Panel Co-Chair. ISPOR Pharmacoeconomic Guidelines Consensus Development Conference. Crystal City, VA.
- May 1998 “Lipid Therapy Cost Effectiveness: Are All Statins Equivalent?” Invited Plenary Session, Association of Managed Care Pharmacy Annual Meeting, Philadelphia, PA.
- May 1998 “Alzheimer Disease Pharmacoeconomic Issues,” Invited Session, Association of Managed Care Pharmacy Annual Meeting, Philadelphia, PA.
- May 1998 “Hong Kong Health Care Reform,” Harvard School of Public Health, Cambridge, MA.
- June 1998 “Mortality and Hospital Utilization Differences in the Kaiser/USC Pharmaceutical Care Intervention Study,” University of Florida College of Pharmacy, Gainesville, FL.
- July 1998 “Alzheimer Disease Pharmacoeconomics,” Invited Session, First International Conference on Alzheimer Disease Pharmacoeconomics, Amsterdam, Netherlands.
- October 1998 “The Future of Pharmacy,” Pharmacy Practice Research Roundtable Conference, San Diego, CA.
- October 1998 “Lipid Therapy Cost Effectiveness,” Calif. Society Health Systems Pharmacy, Anaheim, CA.
- December 1998 “The US Pharmacoeconomic Methods Consensus Guidelines,” ISPOR First Annual European Conference, Cologne, Germany.
- March 1999 “Lipid Therapy Costs and Outcomes,” New York University Department of Cardiology Grand Rounds, New York, NY.
- April 1999 “Drug Patents and R&D Protection.” The Wallace Lectureship, Idaho State University School of Pharmacy. Pocatello, ID.
- April 1999 “Survival and Hospitalization in the Kaiser/USC Pharmaceutical Care Demonstration Project.” The Wallace Lectureship, Idaho State Univ. School of Pharmacy. Boise, ID.
- May 1999 “Cost Effectiveness Analysis of Occupational Therapy for Independent Living Elderly,” ISPOR Annual Meeting, Podium Presentation. Washington, DC.

- September 1999 “Rotavirus Cost of Illness,” Rotavirus Vaccine Advisory Panel, Wyeth-Ayerst, Radnor, PA.
- October 1999 “The Cost of Lipid Therapy: A Systems Approach,” Interdisciplinary Council on Cardiovascular Risk Reduction, Washington, DC.
- October 1999 “Survival and Hospital Utilization in the Kaiser/USC Pharmaceutical Care Study,” Kaiser Permanente Research and Evaluation Dept Seminar., Pasadena, CA.
- November 1999 “The High Cost of Drugs and What to Do About It,” Univ. of California Riverside Life Society Extension Program, Riverside, CA.
- November 1999 “Pharmacoeconomics of Epilepsy Medications,” American Epilepsy Society, Orlando, FL.
- February 2000 “Rotavirus Costs of Illness,” Vaccine Research Center, Harbor-UCLA Medical Center, Torrance, CA.
- February 2000 “Pharmaceutical Expenditure Growth and Medicare Outpatient Drug Benefits,” Mid-Valley Independent Practice Association, Portland, OR.
- April 2000 “Alzheimer Disease Cognition Measures and Economic Costs,” Invited presentation. 2nd International Alzheimer Disease Pharmacoeconomic Conference, Stockholm, Sweden.
- April 2000 “Pharmacoeconomics of Antibiotic Treatment Strategies,” 10th Congress of the International Society for Infectious Disease, Buenos Aires, Argentina.
- April 2000 “Economic Research Issues in Alzheimer Disease.” State of California Alzheimer Research Centers Site Visit. Los Angeles, CA.
- September 2000 “Cost Effectiveness of Statin Therapy.” International Task Force for Prevention of Coronary Heart Disease. Consensus on Statins Conference. Invited Presentation. Paris, France.
- September 2000 “Cost Effectiveness of Statin Therapy.” Interdisciplinary Council on Coronary Heart Disease. Invited Presentation. New York, NY.
- November 2000 “Pharmacy Retail Price Variation,” Pharmaceutical Economics Seminar, UCLA School of Public Health. Westwood, CA.
- March 2001 “ChoiceCare: A Health Insurance Market Plan for Hong Kong. Invited Seminar, Hong Kong Hospital Authority; Hong Kong.
- May 2001 “Cost Effectiveness Considerations in Adult/Adolescent Pertussis Vaccination Strategies,” Vaccine Health Advisory Group Conference, La Romana, Dominican Republic.

- July 2001 "China's Health Care Reform," International Health Economics Assoc. Meeting, York, UK.
- September 2001 "Cost Effectiveness of Statins: Implications for the National Cholesterol Education Panel Recommendations." Washington, DC.
- November 2001 "Chemotherapy-Induced Neuropathy in Ovarian Cancer Cost Effectiveness." ISPOR European Conference, Cannes, France.
- March 2002 "Conjoint Analysis of Alzheimer Disease Treatment Preferences: Preliminary Results." CCH/HSRC Methods Seminar, UCLA/NPI Center for Community Health and Health Services Research Center, Westwood, CA.
- March 2002 "Ethics and Economics in Health Care Decision-making." USC Health Sciences Campus Seminar on Moral and Spiritual Issues in Health Care, Los Angeles, CA.
- April 2002 "Current Status of Health Economics Checklists and Guidelines." Academy of Managed Care Pharmacy Annual Convention, Podium Presentation, Salt Lake City, UT.
- May 2002 "Quality of life effects of chemotherapy-induced neuropathy in ovarian cancer (Abst 886)." "Neuropathy in Chemotherapy: Results of an Oncology Nurse Survey (Abst 2618)." Poster Presentations, American Society of Clinical Oncology Annual Meeting. Orlando, FL.
- May 2002 "Vaccine Reimbursement Policy in the United States: Issue Development." Institute of Medicine, National Academy of Sciences. Washington, DC.
- September 2002 "Recent Trends in U.S. Lipid Medication Use: 1998-2002. Interdisciplinary Council on Coronary Heart Disease. Invited Presentation. New York, NY.
- September 2002 "Drugbusters: How to Manage your Medicine Cabinet." Invited Roundtable Presentation. Los Angeles Times Festival of Fitness and Health. Los Angeles, CA.
- October 2002 "Recent Drivers of Hospital Inpatient Expenditure Growth." Media presentation sponsored by the Blue Cross Blue Shield Association, Chicago, IL.
- November 2002 "Rising Hospital Costs in California." Panel Discussion sponsored by Blue Shield of California, Univ. of California, Berkeley, CA.
- December 2002 "National Issues Briefing to Examine Rising Hospital Costs," Panel Discussion sponsored by U.S. News & World Report. Washington, DC.

January 2003	"What's Behind the Rise in Health Care Costs." Invited Keynote Presentation, Washington Business Group on Health Employer Summit, New York, NY.
March 2003	"High Tide for Benefits Budgets: Rising Healthcare Costs." Invited Keynote Presentation, Illinois BlueCross BlueShield Natl Accounts Conf, San Diego, CA.
April 2003	"Current trends and future directions of Health-Systems in the US," Health Economics and Outcomes Research Invited Presentation, Abbott Laboratories, Evanston, IL.
May 2003	"U.S. Health Care Expenditure Growth: Issues and Solutions." St. Louis Civic Entrepreneurs Organization, St. Louis, MO.
June 2003	"U.S. Pharmaceutical Expenditure Growth:1999-2002." Paper presented at the Intl Health Economics Association 4'th World Congress, San Francisco, CA.
June 2003	"Medical Market Failures and Intellectual Property." Paper presented at the Intl Health Economics Association 4'th World Congress, San Francisco, CA.
August 2003	"Determinants of Survival and Nursing Home Placement for AD Patients." Paper presented at the International Psychogeriatrics Association Annual Meetings, Chicago, IL.
December 2003	"Claritan's Shift to OTC Status: A Lesson for the HMOs." Paper presented at Pharmaceutical Economics and Policy Seminar, UCLA Schl of Public Health, Westwood, CA.
April 2004	"Pharmacoeconomics & Biotech." Invited presentation at PDL Biopharma, Fremont, CA.
July 2004	"Cost Effectiveness of Pertussis Vaccine in Adults and Adolescents." Invited presentation, Pediatric Vaccine Workshop, New York, NY.
November 2004	"Vaccine Costs and Benefits." Invited presentation, GSK Pediatric Vaccine Advisory Board., Scottsdale, AZ.
February 2005	"Patents, Drug R&D and Protection of Intellectual Property," Invited Panel Presentation: International Trade in Pharmaceuticals, The International Law Society Meetings, Costa Mesa, CA.
May 2005	"Dually Eligible Mentally Ill Population" Session Chair; Third NIMH Pharmacoeconomics Workshop: MMA03 and Psychotropic Medications, NIMH, Bethesda, MD.

- May 2005 “How Should Intellectual Property be Rewarded and Protected in the Global Pharmaceutical Industry?” Panel Discussion, USC Law School Intellectual Property Institute, Second Annual Conference. Beverly Hills, CA.
- May 2005 “Structure & Design of Pharmacoeconomic Models.” With Marc Botteman and Ben Van Hout. ISPOR Short Course presented at the 10th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Washington, DC.
- June 2005 "Implementation and Outcomes of Commercial Disease Management Programs in the United States: the Disease Management Outcomes Consolidation Survey." Nationwide Teleconference presentation with Mark Roberts.
- October 2005 “Using Conjoint Analysis to Assess DM Intervention Attributes for Alzheimer Disease Caregivers.” Invited Presentation; Disease Management Association of America Annual Meeting, San Diego, CA.
- October 2005 “Conjoint Analysis Validation of The Hui-3 Utility Scale in An Alzheimer Disease Caregiver Population.” Abstract 1216 presented at the International Society of Quality of Life Research, San Francisco, CA.
- November 2005 “Economic Implication of Hepatitis B Viral (HbV) Load Reduction For Entecavir in Hepatitis B E Antigen-Positive Chronic Hepatitis B (CHb) Patients.” Presented at the 8th ISPOR European Conference, Florence, Italy.
- January 2006 “Methods for Selection Bias Adjustment: Propensity Scores, Instrumental Variables and the Heckman Method. Invited Grand Rounds Presentation, Maveric, Dept. of Veterans Affairs and Harvard Medical School, Boston, MA.
- March 2006 “Cost Effectiveness of Entecavir for Chronic Hepatitis B Disease in China.” Presented at the ISPOR Asian Conference, Shanghai, China.
- March 2006 “Adjusting for Selection Bias in Administrative Health Care Databases.” Invited Presentation, China Center for Pharmacoeconomics and Outcomes Research, Peking University, Beijing, China.
- April 2006 “Stated Preference Theory (Conjoint Analysis) is the Best Way to Assess Health-Related Quality of Life for Economic Assessment of Drugs and Medical Interventions: An Application in Alzheimer Disease” Invited Teleconference Presentation, ISPOR Student Chapter Network.
- October 2006 “The Value of Biomedical Innovation.” Invited Seminar, AstraZeneca Pharmaceuticals, Alderly Park, Cheshire, UK.

- October 2006 “Cost Effectiveness of Magnetic Resonance Angiography versus Digital Subtraction Angiography for Peripheral Vascular Disease.” Presentation at the 9th European ISPOR Conference, Copenhagen, Denmark.
- January 2007 “Stated Preference Theory in Assessing Health-Related Quality of Life for Economic Assessment in Alzheimer Disease. Invited Seminar; Medical University of South Carolina.
- February 2007 “Stated Preference Theory in Assessing Health-Related Quality of Life for Economic Assessment in Alzheimer Disease. Invited Seminar; Tulane University School of Public Health.
- October 2007 “Risk-Stratified Medical Costs for Asthma Patients in a Managed Care Organization (MCO).” Presentation at the 10th European ISPOR Conference, Dublin, Ireland.
- October 2007 “Stated Preference Theory in Assessing Health-Related Quality of Life for Economic Assessment in Alzheimer Disease. Invited Seminar; National University of Ireland, Galway, Ireland.
- January 2008 “How Should Drug Prices Be Measured?” Invited Seminar, School of Public Health, University of California Los Angeles, Los Angeles, CA.
- February 2008 “How Not to Use Health Economics Data: Lessons from the U.S. Health Care Sector” invited presentation at the Hong Kong Hospital Authority Conference “Use of Health Economics Data in the Health Care Environment of Hong Kong: The Way Forward.” Hong Kong SAR, China.
- March 2008 “Cost Effectiveness of Statins and Other Lipid Therapies.” Invited presentation at the 3rd International Symposium on Healthy Aging: Meeting the Challenges of an Aging Population, Hong Kong SAR, China.
- April 2008 “Pharmacoeconomic Modeling,” Invited Lister Hill Seminar presentation, University of Alabama at Birmingham School of Public Health. Birmingham, AL.
- August 2008 “Pharmacoeconomics Modeling and Empirical Analysis,” Invited Lecture Series, National University of Colombia. Bogota, Colombia.
- September 2008 “Issues in Pharmacoeconomic Methods,” Invited Lecture, Amylin Pharmaceuticals, San Diego, CA.
- November 2008 “Modeling Long-Term Mortality and Morbidity Impact with Entecavir Treatment in Chronic Hepatitis B Patients in Belgium.” Benedicte Lescrauwaet, Frederik Nevens, Danielle Zammit, Yong Yuan, Joel Hay. Podium presentation, ISPOR European Conference, Athens, Greece.

- December 2008 “Successful Pharmacoeconomic Models,” Invited presentation, Mexico ISPOR Chapter, Mexico City, Mexico.
- March 2009 “Drugs and Outcomes Research: Where are the Comparative Effectiveness Guideposts Moving To?” Opening Keynote Address, Western Pharmacoeconomics Conference, Pasadena, CA.
- April 2009 “Comparative Effectiveness: What Does It Mean and How Do We Do It?” Invited University-Wide Seminar, USC School of Pharmacy, Los Angeles, CA.
- April 2009 “Stated Preference Theory (Conjoint Analysis) Assessment of Health-Related Quality of Life for Economic Assessment of Medical Interventions,” Invited Seminar, University of Washington School of Pharmacy, Seattle, WA.
- April 2009 “Health Economic Evaluation of Oral versus IV Therapy in Oncology.” Invited Presentation, Current and Emerging Trends in the Treatment of Cancer: Pharmacoeconomics and Market Assessment, Guaraja, Brazil.
- May 2009 “Comparative Effectiveness Research: What it is and Why We Need it.” Invited Podium Presentation, International Society for Pharmacoeconomics and Outcomes Research 14th Annual International Meeting, Orlando, FL.
- August 2009 “Outcomes Research, Comparative Effectiveness, Cost Effectiveness: What is Needed Now and Why?” Invited Seminar, Colombia Chapter: International Society for Pharmacoeconomics and Outcomes Research, Bogota, Colombia.
- August 2009 “Pharmacoeconomics of Autoimmune Disease Therapy.” Invited presentation, XII Colombian Rheumatology Congress, Bogota, Colombia.
- October 2009 Debate on the Pros and Cons of Marijuana Legalization. Invited speakers, The Arsalyn Foundation, Duarte, CA.
- November 2009 Resource Use in Patients with Allergic Rhinitis (AR) Comorbidities: Oral Second-Generation Antihistamines (SGAs) versus Montelukast (MTLK)” Podium Presentation, Annual Meeting of the American College of Allergy, Asthma & Immunology, Miami Beach, Florida.
- November 2009 “Impact of Obama’s Health Care Reform on Payers” Speaker Panel Moderator; USC School of Pharmacy Board of Councilors Retreat. Los Angeles, CA.
- November 2009 “Debate on Obama’s Health Care Reform with Prof. Tom Rice, Vice Chancellor, UCLA,” at UC Davis Mondavi Center, Davis CA.
http://webcast.ucdavis.edu/IGA/2009/Health_Care_Debate_11-17-09.qtl
- December 2009 “Resource Use in Patients with Allergic Rhinitis (AR) Comorbidities: Oral Second-Generation Antihistamines (SGAs) versus Montelukast (MTLK)” Podium Presentation, Annual Meeting of the American College of Allergy, Asthma & Immunology, Nov. 5-10, Miami Beach, Florida.

- January 2010 “Medical Marijuana: The Quack Pot Cure,” Research Study Club Invited Presentation, Providence Saint Joseph Medical Center, Los Angeles, CA.
- February 2010 “Health Care Reform,” Arsalyn Foundation, UCLA, Los Angeles, CA.
- March 2010 “Obama’s Health Care Reform,” USC Executive Master’s Program in Health Administration, Los Angeles, CA.
- April 2010 “Obama Health Care Reform,” USC Schl. of Pharmacy, Lamda Chi Seminar, Los Angeles, CA.
- June 2010 “Economic Comparison of aPCC versus rFVIIa for mild-to-moderate bleeding episodes in hemophilia patients with inhibitors.” Invited presentation, 8th Inhibitor Workshop for Opinion Leaders in Hemophilia.” Gdansk, Poland.
- September 2010 “Pharmacoeconomics & Comparative Effectiveness: A U.S. Perspective.” Invited presentation to NECA (National Evidence-based Healthcare Collaborating Agency) Seoul, Korea.
- September 2010 “Cost-effectiveness of An Exclusively Human-Milk Based Diet Vs. Bovine-Milk Based Diet In The Prevention of Necrotizing Enterocolitis Among Extremely Premature Infants.” Invited presentation to the Cedars-Sinai Dept. of Pediatrics, Beverly Hills, CA.
- September 2010 “Marijuana Legalization: No on Proposition 19.” Invited presentation, Loyola Marymount University, Los Angeles, CA.
- October 2010 “Marijuana Legalization: The Quack Pot Cure to California’s Fiscal Woes.” Invited presentation UCLA Extension Campus, Westwood, CA.
- October 2010 “Marijuana Legalization Debate: Proposition 19.” Invited presentation UCLA, Westwood, CA.
- October 2010 “Marijuana Legalization Debate: Proposition 19.” Invited presentation UCSC, Santa Cruz, CA.
- October 2010 “Insurance Innovation: How to Succeed after Reform” Invited presentation, First Annual Schaeffer Center Conference, Leonard Schaeffer Center for Health Policy and Economics, University of Southern California, Los Angeles, CA.
<http://www.youtube.com/watch?v=SraGxvHlZWs>
- October 2010 “Marijuana: Potential Medical Consequences & Societal Issues Related to Legalization,” Invited presentation, The Marijuana Conference: A Forum for Discussion of Business, Legal & Health Issues. New York, NY.

- October 2010 “Marijuana Legalization: Proposition 19,” Invited presentation, The Fell Conversation, School of Policy, Planning, and Development, University of Southern California, Los Angeles, CA.
- December 2010 “Econometric Issues in Pharmacoeconomics,” Invited presentation, National University of Colombia, School of Pharmacy, Bogota, Colombia.
- December 2010 “Comparative Effectiveness Research in the Changing US Policy Environment,” Invited presentation, ISPOR Chapter of Colombia, Bogota, Colombia.
- December 2010 “Introduction to Pharmacoeconomics,” Invited presentation, Universidad del Atlántico, School of Pharmacy, Barranquilla, Colombia.
- December 2010 “Comparative Effectiveness and Outcomes Research,” Invited presentation, Universidad del Atlántico, School of Pharmacy, Barranquilla, Colombia.
- February 2011 “Pharmacy’s Changing Roles Under Health Care Reform,” Invited presentation, USC Pharmacy Student Industry Association. Los Angeles, CA.
- March 2011 “Pitfalls in Comparative Effectiveness Research: From Poison IVs to Uninformed Posteriors.” Invited Plenary Presentation, Western Pharmacoeconomics Conference, University of Washington, Seattle, WA.
- April 2011 “Medical Marijuana: Therapeutic, Economic and Policy Issues.” Invited presentation, Providence Tarzana Medical Center, Tarzana, CA.
- April 2011 “Budget Impact Models in MCO Decision Making: Current Practice, Challenges and Insights,” Invited Workshop presentation, Academy of Managed Care Pharmacy, 23’rd Annual Meeting, Minneapolis, MN.
- May 2011 “Branded Pharmaceutical Markets and Anticompetitive Harm.” Invited presentation, UCLA Dept. of Health Services, Graduate Seminar on Pharmaceutical Economics and Policy. Los Angeles, CA.
- July 2011 “Health Economics Research Objectives.” Invited presentation, UCLA Dept. of Health Services, Health Economics Workshop with Monash Univ., UCLA & USC, Los Angeles, CA.
- September 2011 “Optimal Health Care Treatment Allocation With and Without Stochastic Uncertainty.” Invited presentation, University of Tennessee College of Pharmacy. Memphis, TN.
- October 2011 “Medical Marijuana: Therapeutic, Economic and Policy Issues.” Invited presentation, Ventura Community Memorial Hospital, Ventura, CA.

- October 2011 “Medicare: Financial, Economic and Policy Issues.” Invited presentation, Association of Health Care Journalists, Business of Health Care Workshop, San Francisco, CA.
- November 2011 “Meeting the Challenges of US Health Care Reform: Payer and Provider Perspectives for the Biopharmaceutical Market.” Invited Panel Discussion, 2011 IMS Life Sciences Strategy Conference, San Francisco, CA.
- November 2011 “Health Care Reform: Where Does Pharmacy Fit?” Invited presentation, USC Pharmacy Student Industry Association. Los Angeles, CA.
- December 2011 “Health Care Costs in a Medicare Population of COPD Patients Treated with Beta-Agonists.” American Society of Health System Pharmacists Midyear Meeting, New Orleans, LA.
- December 2011 “Optimal Health Care Treatment Allocation With and Without Stochastic Uncertainty—Part I,” Schaffer Center for Health Policy and Economics, USC. Los Angeles, CA.
- February 2012 “Optimal Health Care Treatment Allocation With and Without Stochastic Uncertainty—Part II,” Schaffer Center for Health Policy and Economics, USC. Los Angeles, CA.
- May 2012 “Optimal Drug Treatment Allocation with & without Stochastic Uncertainty,” UCLA Seminar on Pharmaceutical Economics and Policy.” Los Angeles, CA.
- May 2012 “Optimal Personalized Treatment Allocation With & Without Stochastic Uncertainty,” Invited seminar, SingHealth Academy Symposium on Health Care Decision-making and Personalized Medicines, Singapore.
- May 2012 “Cancer Treatments, Expensive Medications and Cost Effectiveness: Perspectives of a Health Economist,” Panel Discussion, SingHealth Academy Symposium on Health Care Decisionmaking and Personalized Medicines, Singapore.
- May 2012 “Comparative Effectiveness & Outcomes Research: Where is the U.S. Headed?” National University of Singapore invited seminar, Singapore.
- June 2012 “Introduction to Economic Assessment of Drugs, Devices and Medical Interventions,” Conference Workshop, American Society for Health Economics 4’t Biennial Conference, Minneapolis, MN.
- June 2012 “Cost Effectiveness Analysis With and Without Stochastic Uncertainty,” Organized Podium Session, American Society for Health Economics 4’t Biennial Conference, Minneapolis, MN.
- October 2012 “U.S. Health Care Reform Issues,” Invited presentation, Arsalyn Foundation, Alhambra, CA.

- November 2012 “Preparing Drug Review Dossiers for the Academy of Managed Care Pharmacy,” Invited presentation, USC Managed Care Pharmacy Student Association, Los Angeles, CA.
- February 2013 “Hemophilia Inhibitor Bypass Agents: A Clinical and Economic Review of the Literature,” Invited Webinar on Hemophilia Treatment.
- February 2013 “Drug Patents, Intellectual Property and Pricing,” Invited seminar, Tulane University School of Public Health, New Orleans, LA.
- February 2013 “Stated Preferences and Conjoint Analysis: Theory and Applications,” Invited seminar, Tulane University School of Public Health, New Orleans, LA.
- March 2013 “Accountable Care Organizations and Health Care Reform,” Invited Seminar USC Medical and Pharmacy Students Collaboration.” USC, Los Angeles, CA.
- April 2013 “Optimal Health Care Treatment Allocation with & without Stochastic Uncertainty,” Invited Seminar, Veterans Affairs Health Care Program and University of New Mexico PEPPOR Graduate Program, Albuquerque, NM.
- April 2013 “The Current State of Comparative Effectiveness & Outcomes Research,” Invited Seminar, University of New Mexico PEPPOR Graduate Program, Albuquerque, NM.
- September 2013 “The U.S. Societal Costs of Cannabis,” Invited presentation. The Marijuana Conference, Rancho Cucamonga, CA.
- October 2013 “Conjoint Analysis of Provider Preferences for Interventions for Reducing Inappropriate Antibiotic Prescribing,” Invited presentation. BEARI Investigators Meeting. Los Angeles, CA.
- November 2013 “Pay-for-Delay Settlements for Pharmaceutical ANDA Cases: Right or Wrong?” Invited seminar, UCLA School of Public Health, Los Angeles, CA.
- February 2014 “Why Drugs Should Not Be Legalized,” Invited presentation. Arsalyn Foundation Student Conference, El Monte, CA.
- March 2014 “Cost-Effectiveness Analysis Under Stochastic Uncertainty,” Steven M. Teutsch Prevention Effectiveness Fellowship invited presentation. U.S. Centers for Disease Control and Prevention, Atlanta, GA.
- March 2014 “Assessment of Health-Related Quality of Life for Medical Interventions: A Discrete Choice Experiment Application in Alzheimer Disease,” Steven M. Teutsch Prevention Effectiveness Fellowship invited presentation. U.S. Centers for Disease Control and Prevention, Atlanta, GA.

- March 2014 “Hemophilia Treatments, Costs and Outcomes,” invited presentation. National Center on Birth Defects and Developmental Disabilities; U.S. Centers for Disease Control and Prevention, Atlanta, GA.
- September 2014 “Current U.S. Trends in Health Technology Pricing and Value,” invited presentation. Forum on HTA and Reimbursement, Peking University, Beijing, China.
- September 2014 “US Healthcare Financing System & Reforms,” invited presentation. Health Care Financing Forum, Party School of the Central Committee of the Communist Party of China, Beijing, China.
- September 2014 “U.S. Health Care Reform,” invited Plenary Symposium presentation. ISPOR 6th Asia-Pacific Conference, Beijing, China.
- February 2015 “Is there a Convergence of Health Economics with U.S. Health Policy?” Panel Discussion Invited Presentation, DePaul University Conference on Health Economics. Chicago, IL.
- March 2015 “Pharmaceutical Research & Development: An Economist's Perspective.” Invited Lecture, Harbor-UCLA Grand Rounds. Torrance, CA.
- April 2015 “Cost Effectiveness Analysis with Stochastic Uncertainty,” Invited seminar, Pharmaceutical Outcomes Research and Policy Program, University of Washington. Seattle, WA.
- April 2015 “Regulating Health Economics Modeling Claims,” Invited presentation to the Office of Medical Policy and the Center for Drug Evaluation and Research, Food and Drug Administration. Silver Spring, MD.
- September 2015 “Orphan, Specialty and Low Volume/High-Priced Drugs,” Workshop on Pharmaceutical Economics and Policy, Center for Health Economics and Outcomes Sciences, University of British Columbia. Vancouver, BC, Canada.
- November 2015 “Cost Effectiveness Analysis with Stochastic Uncertainty,” Invited seminar, Dept. of Economics, University of Iowa, Iowa City, IA.
- March 2016 “What is Pharmacoeconomic Information Under FDAMA 114?” Invited Panel Discussion, AMCP Partnership Forum, FDAMA 114: Improving the Exchange of Pharmacoeconomic Data, Washington, DC.
- March 2016 “Marijuana Legalization: Costs and Medical Harms.” Invited discussion, USC Seminar, Preventive Medicine PM547: Public Health Policy and Politics, Los Angeles, CA.
- April 2016 “Health Economics: An Introduction for Biomedical Engineers,” Invited Keynote Lecture, 20th Annual Grodins Research Symposium, USC Dept. of Biomedical Engineering, Los Angeles, CA.

- September 2016 “Enabling the Exchange of Clinical and Economic Data pre-FDA Approval,” Invited Panel Discussion, AMCP Partnership Forum, Tysons Corner, VA.
- November 2016 “2016 National and California Election Implications for Pharmaceuticals,” Invited Seminar, Pharmaceutical Economics and Policy, School of Public Health, University of California, Los Angeles, Los Angeles, CA.
- April 2018 “The Value in Aging: Health Economics Applications in Gerontology,” Invited Seminar, Université de Sherbrooke Centre de Recherche sur le Vieillissement, Sherbrooke, Quebec, Canada.
- October 2018 “Cost-Effectiveness of Screening and Management Strategies for Familial Hypercholesterolemia in the United States: A Markov Model Update,” Invited Podium Presentation, 2018 Familial Hypercholesterolemia GLOBAL SUMMIT, Marina Del Rey CA.
- January 2019 “Drug Pricing, Patents and Intellectual Property,” Invited Seminar, Pomona Student Union, Pomona College, Pomona, CA.
- February 2019 “FDA Regulation of Off-Label Medical Information: Policing Renegade Drug Companies or Infringement of Protected Commercial Speech?” John E. Osborn, with Discussion and Counter by Joel W. Hay, PhD, Seminar on Pharmaceutical Economics & Policy, Dept. of Health Policy & Management, University of California, Los Angeles, Los Angeles, CA.
- May 2019 “Value in Health at Age 20: Keep Focusing on the Science.” Invited Panel Discussion “Back to the Future in Value in Health.” ISPOR 24th Annual International Meeting, May 21-23, 2019, New Orleans, LA.
- May 2019 “Extensions of the Standard Cost Effectiveness Model: Dealing with Uncertainty, Alternative Decision Maker Perspectives & Worker Productivity.” Invited Seminar Presentation, Centre for Health Economics and Policy Analysis (CHEPA), Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada.
- October 2019 “Value Assessment for the US Healthcare Landscape,” Invited Workshop Panel Member, The Aspen Institute Health Medicine & Society Program and the USC Schaeffer Center for Health Policy & Economics, Santa Monica, CA.
- November 2019 “An Introduction to Health Care Cost Effectiveness Modeling Applications: Familial Hypercholesterolemia and Post-operative Antibiotic Prophylaxis,” Invited Seminar, Claremont Graduate University, Claremont, CA.
- November 2019 “Health Policy and Economics: Achieving Policy Impact,” Invited Keynote Podium Presentation, USC Schaeffer Center, Los Angeles, CA.

- December 2019 “An Introduction to E-Values: Treatment Selection Bias and Unobserved Confounders,” Invited Seminar, Tulane University School of Public Health and Tropical Medicine Graduate Program, New Orleans, LA.
- April 2020 “Instrumental Variables and Treatment Selection Bias,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.
- June 2020 “Survey Designs to Assess Covid-19 Pandemic burden on the US,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.
- July 2020 “Survey Designs to Assess Covid-19 Pandemic burden on the US, Norway and Sweden,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.
- September 2020 “Implementation of Covid-19 Pandemic burden surveys on M-Turk, joelhay.com and Rand American Family Panel,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.
- April 2021 “Instrumental Variables and Treatment Selection Bias,” Invited Seminar, Children’s Hospital Los Angeles, Los Angeles, CA.
- April 2021 “Instrumental Variables and Data Imputation Methods,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.
- April 2021 “Instrumental Variables and Machine Learning to Impute Patient Diagnosis in Administrative Claims Data,” Invited Seminar, Diamond Peak Research Group, Incline Village, NV.

RESEARCH CERTIFICATIONS:

5/23/2010

Completion Report

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on 5/23/2010

Learner: Joel Hay (username: jhay@usc.edu)

Institution: University of Southern California

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Investigators Conducting both Biomedical and SBR Research: This group has been established for investigators conducting both Biomedical and Social & Behavioral Research

University of Southern California

This is to certify that

HAY, JOEL W.

has completed the

Ethical Conduct in Research Course (Biomedical)

04/21/2004

Sponsored by
The Office of Compliance

Certificate Number: 1018



University of Southern California

This is to certify that

HAY, JOEL W.

has completed the

HIPAA Privacy Education Program

Sunday, March 23, 2003

Sponsored by
The Office of Compliance

Certificate Number: 2853

University of Southern California

This is to certify that

HAY, JOEL W.

has completed the human subjects education program

*"Understanding the Fundamentals:
Responsibilities and Requirements for the
Protection of Human Subjects in Research"*
07/23/2004Sponsored by
The Office of the Provost and the Office of Compliance
Your certification is valid for three years from the above date of completion.

Certificate Number: 2341




FISCAL ADMINISTRATION COURSE INFO

Joel Hay has completed
USC's Fiscal administration course
on Wed Jun 23, 2004.Please contact the USC Office of Compliance at (213) 740-8258
if you have any questions.COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.
See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Joel Hay (ID: 618466)
- **Institution Affiliation:** University of Southern California (ID: 498)
- **Institution Unit:** 330
- **Phone:** 323-442-3296
- **Curriculum Group:** CITI Good Clinical Practice
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Report ID:** 15187675
- **Completion Date:** 02/02/2015
- **Expiration Date:** N/A
- **Minimum Passing:** 80
- **Reported Score:** 91



Human Participant Protections Education for Research Teams

Completion Certificate

This is to certify that

Joel Hay

has completed the **Human Participants Protection Education for Research Teams** online course, sponsored by the National Institutes of Health (NIH), on 03/26/2004.

This course included the following:

- key historical events and current issues that impact guidelines and legislation on human participant protection in research.
- ethical principles and guidelines that should assist in resolving the ethical issues inherent in the conduct of research with human participants.
- the use of key ethical principles and federal regulations to protect human participants at various stages in the research process.
- a description of guidelines for the protection of special populations in research.
- a definition of informed consent and components necessary for a valid consent.
- a description of the role of the IRB in the research process.
- the roles, responsibilities, and interactions of federal agencies, institutions, and researchers in conducting research with human participants.

National Institutes of Health
<http://www.nih.gov>

Joel W. Hay Ph.D. -- C.V.

112

10/1/21

CITI PROGRAM



Completion Date 05-Dec-2017
Expiration Date 04-Dec-2020
Record ID 25188398

This is to certify that:

Joel Hay

Has completed the following CITI Program course:

CITI Good Clinical Practice (Curriculum Group)
GCP for Clinical Trials with Investigational Drugs and Biologics (ICH Focus) (Course Learner Group)
2 - Refresher Course (Stage)

Under requirements set by:

University of Southern California

CITI
Collaborative Institutional Training Initiative



CITI PROGRAM



Completion Date 12-Jan-2018
Expiration Date 11-Jan-2021
Record ID 19807572

This is to certify that:

Joel Hay

Has completed the following CITI Program course:

Human Research (Curriculum Group)
Biomedical Human Subjects (Course Learner Group)
2 - Refresher (Stage)

Under requirements set by:

University of Southern California

CITI
Collaborative Institutional Training Initiative

