ELYSE SWALLOW Vice President

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Ms. Swallow applies quantitative methods to real-world problems involving evaluation, decision making, strategy, and public policy in the health care and social policy sectors. She has more than 10 years of experience leading the implementation of data analytics to support life sciences companies with real-world evidence (RWE) generation, regulatory submissions, and health technology assessments (HTAs). Ms. Swallow's expertise includes indirect treatment comparisons, survey research, database analyses, natural history studies, brand strategy, policy evaluation, RWE development, individualized medicine, and predictive analytics. Additionally, she has led health and social policy program evaluations. Ms. Swallow has worked across multiple disease areas, including rare diseases, immunology, multiple sclerosis, hematology, oncology, and renal disease. Her work has been used to inform regulatory and reimbursement decisions in US and global markets, published in numerous peer-reviewed journals, and presented at dozens of clinical and economic research conferences.

EDUCATION

2008	M.A., economics, Duke University
2007	M.P.P., Sanford School of Public Policy, Duke University
2002	B.A., philosophy, Smith College

PROFESSIONAL EXPERIENCE

2009–Present	Analysis Group, Inc.
	Vice President (2019–Present)
	Manager (2015–2018)
	Associate (2013–2014)
	Senior Analyst (2011–2012)
	Analyst (2009–2010)
2006–2009	Sanford School of Public Policy, Duke University <i>Research Associate (2008–2009)</i>
	Research Analyst (2007–2008)
2002–2005	Teach For America, Furr High School, Houston ISD
	English Department Chair

PUBLICATIONS AND PRESENTATIONS

Journal Articles

Michaud K, Conaghan P, Park SH, Lozenski K, Fillbrunn M, Khaychuk V, <u>Swallow</u> E, Vaile J, Lane H, Nguyen H, Pope J. Benefits of Autoantibody Enrichment in Early Rheumatoid Arthritis: Analysis

of Efficacy Outcomes in Four Pooled Abatacept Trials. *Rheumatology and Therapy* Aug 2023 10(4):951-967.

- Done N, Bartolome L, <u>Swallow</u> E, Gao W, Carley C, Wang T, Mostaghimi A. Real-World Treatment Patterns among Patients with Alopecia Areata in the USA: A Retrospective Claims Analysis. *Acta Dermato-Venereologica* Aug 2023 25;103.
- Oladapo A, Kolodny S, Vredenburg M, <u>Swallow</u> E, Goldschmidt D, Sarathy K, Lopez P, Maitland H, Yee J. Avatrombopag treatment response in patients with immune thrombocytopenia: the REAL-AVA 1.0 study. *Therapeutic Advances in Hematology* Jul 2023;14:20406207231179856.
- Kantor D, Pham T, Patterson-Lomba O, <u>Swallow</u> E, Dua A, Gupte-Singh K. Cost Per Relapse Avoided for Ozanimod Versus Other Selected Disease-Modifying Therapies for Relapsing–Remitting Multiple Sclerosis in the United States. *Neurology and Therapy* Jun 2023 12(3):849-861.
- Howden C, Cook E, <u>Swallow</u> E, Yang K, Guo H, Pelletier C, Jacob R, and Sugano K. Real-world outcomes associated with vonoprazan-based versus proton pump inhibitor-based therapy for *Helicobacter pylori* infection in Japan. *Therapeutic Advances in Gastroenterology* May 2023; 16:17562848231168714.
- Kaul S, Ayodele O, Chen K, Cook E, <u>Swallow</u> E, Rejnmark L, Gosmanova E. Association of Serum Calcium and Phosphate With Incident Cardiovascular Disease in Patients With Hypoparathyroidism. *American Journal of Cardiology* May 2023 1;194:60-70.
- Mostaghimi A, Gao W, Ray M, Bartolome L, Wang T, Carley C, Done N, <u>Swallow</u> E. Trends in Prevalence and Incidence of Alopecia Areata, Alopecia Totalis, and Alopecia Universalis Among Adults and Children in a US Employer-Sponsored Insured Population. *JAMA Dermatology* Apr 2023 1;159(4):411-418.
- <u>Swallow</u> E, Pham T, Patterson-Lomba O, Yin L, Gomez-Lievano A, Liu J, Tencer T, Gupte-Singh K. Comparative efficacy and safety of ozanimod and ponesimod for relapsing multiple sclerosis: A matching-adjusted indirect comparison Mar 2023;71:104551.
- <u>Swallow</u> E, Marden JR, Billmyer E, Yim E, Sun SX. Burden of Illness and Treatment Patterns Among Patients With von Willebrand Disease in US Clinical Practice *Clinical and Applied Thrombosis/Hemostasis* Jan–Dec 2023 29:10760296231177023.
- Ayodele O, Rejnmark L, Mu F, Lax A, Berman R, <u>Swallow</u> E, Gosmanova EO. Five-Year Estimated Glomerular Filtration Rate in Adults with Chronic Hypoparathyroidism Treated with rhPTH(1-84): A Retrospective Cohort Study. *Advances in Therapy* Nov 2022; 39(11):5013-5024.
- Kolodny S, Oladapo A, Vredenburg M, Jamieson B, <u>Swallow</u> E, Goldschmidt D, Zichlin M, Lopez P, Davidson M, Yee J. Real-World Demographic and Clinical Characteristics of Patients Initiating Avatrombopag in the US: The Real-AVA Study. *Blood* Nov 2022 140 (Supplement 1): 13150–13151.
- Oladapo A, Kolodny S, Vredenburg M, Jamieson B, <u>Swallow</u> E, Goldschmidt D, Zichlin M, Davidson M, Yu L, Yee J. Avatrombopag Treatment Response in Patients with Immune Thrombocytopenia: A Real-World Evidence Study. *Blood* Nov 2022 140 (Supplement 1): 10889– 10890.
- Ray M, <u>Swallow</u> E, Gandhi K, Carley C, Sikirica V, Wang T, Done N, Signorovitch J, Mostaghimi A. Healthcare Utilization and Costs Among US Adolescents With Alopecia Areata. *Journal of Health Economics and Outcomes Research* Aug 2022; 9(2): 11-18.

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- Rejnmark L, Ayodele O, Lax A, Mu F, <u>Swallow</u> E, Gosmanova EO. The Risk of Chronic Kidney Disease Development in Adult Patients with Chronic Hypoparathyroidism Treated with rhPTH(1-84): A Retrospective Cohort Study. *Clinical Endocrinology* Aug 2022; e-pub ahead of print 2022/08/17; doi: 10.1111/cen.14813.
- Done N, Ray M, Gao W, Wang T, Carley C, Bartolome L, <u>Swallow</u> E, Mostaghimi A. HSD35 Real-World Treatment Patterns Among US Adolescents with Alopecia Areata: A Retrospective Claims Analysis. *Value in Health* Jul 2022; 25(7): S486.
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- Kirson N, <u>Swallow</u> E, Lu J, Mesa-Frias M, Bookhart B, Maynard J, Shivdasani Y, Lefebvre P. The societal economic value of COVID-19 vaccines in the United States. *Journal of Medical Economics* Jan 2022; 25(1): 119-128.
- Gao W, Mostaghimi A, Gandhi K, Done N, Ray M, Signorovitch J, <u>Swallow</u> E, Carley C, Wang T, Sikirica V. Patient characteristics associated with all-cause healthcare costs of alopecia areata in the United States. *Journal of Medical Economics* Jan–Dec 2022;26(1):441-444.
- Gosmanova EO, Chen K, Ketteler M, Rejnmark L, Mu F, <u>Swallow</u> E, Briggs A, Sherry N, Kaul S. Risk of Cardiovascular Conditions in Patients with Chronic Hypoparathyroidism: A Retrospective Cohort Study. *Advances in Therapy* Aug 2021; 38(8): 4246-4257.
- Vo P, <u>Swallow</u> E, Wu E, Zichlin ML, Katcher N, Maier-Peuschel M, Naclerio M, Ritrovato D, Tiwari S, Joshi P, Ferraris M. Real-world migraine-related healthcare resource utilization and costs associated with improved vs. worsened/stable migraine: a panel-based chart review in France, Germany, Italy, and Spain. *Journal of Medical Economics* Jul 2021; 24(1): 1900-1907.
- Gosmanova EO, Chen K, Rejnmark L, Mu F, <u>Swallow</u> E, Briggs A, Ayodele O, Sherry N, Ketteler M. Risk of Chronic Kidney Disease and Estimated Glomerular Filtration Rate Decline in Patients with Chronic Hypoparathyroidism: A Retrospective Cohort Study. *Advances in Therapy* Apr 2021; 38(4): 1876-1888.
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- Song J, <u>Swallow</u> E, Said Q, Peeples M, Meiselbach M, Signorovitch J, Kohrman M, Korf B, Krueger D, Wong M, Sparagana S. Epilepsy treatment patterns among patients with tuberous sclerosis complex. *Journal of the Neurological Sciences* Aug 2018; 391: 104-108.
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- Chen K, Mu F, <u>Swallow</u> E, Zhao J, Wang J, Krasner A, Sherry N, Signorovitch J. Comparison of 3year estimated glomerular filtration rates between recombinant human parathyroid hormone (1-84) (RHPTH[1-84])-treated patients with chronic hypoparathyroidism and a historical control cohort. *Endocrine Practice* Apr 2018; 24 (Supplement 1): 111.

- <u>Swallow</u> E, Messali A, Ghate S, McDonald E, Duchesneau E, Perez JR. The Additional Costs per Month of Progression-Free Survival and Overall Survival: An Economic Model Comparing Everolimus with Cabozantinib, Nivolumab, and Axitinib for Second-Line Treatment of Metastatic Renal Cell Carcinoma. *Journal of Managed Care Specialty Pharmacy* Apr 2018; 24(4): 335-343.
- Vogelzang NJ, Pal SK, Ghate SR, <u>Swallow</u> E, Li N, Peeples M, Zichlin ML, Meiselbach MK, Perez JR, Agarwal N. Clinical and Economic Outcomes in Elderly Advanced Renal Cell Carcinoma Patients Starting Pazopanib or Sunitinib Treatment: A Retrospective Medicare Claims Analysis. *Advances in Therapy* Nov 2017; 34(11): 2452-2465.
- <u>Swallow</u> E, Fang A, Signorovitch J, Plumb J, Borghs S. Can Matching-Adjusted Indirect Comparison Methods Mitigate Placebo Response Differences Among Patient Populations in Adjunctive Trials of Brivaracetam and Levetiracetam? *CNS Drugs* Oct 2017; 31(10): 899-910.
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- <u>Swallow</u> E, King S, Song J, Peeples M, Signorovitch JE, Liu Z, Prestifilippo J, Frost M, Kohrman M, Korf B, Krueger D, Sparagana S. Patterns of Disease Monitoring and Treatment Among Patients With Tuberous Sclerosis Complex-related Angiomyolipomas. *Urology* Mar 2017; 104: 110-114.
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- Mercuri E, Signorovitch JE, <u>Swallow</u> E, Song J, Ward SJ, Group DMDI, Trajectory Analysis P. Categorizing natural history trajectories of ambulatory function measured by the 6-minute walk distance in patients with Duchenne muscular dystrophy. *Neuromuscular Disorders* May 2016; 26(9): 576-583.
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- <u>Swallow</u> E, Kelley C, Signorovitch J, Wygant G, McPhee F. Daclatasvir + asunaprevir versus sofosbuvir/ledipasvir for hepatitis C genotype 1 in Japanese patients: an indirect comparison. *Journal of Comparative Effectiveness Research* May 2016; 5(3): 273-279.
- <u>Swallow</u> E, Song J, Yuan Y, Kalsekar A, Kelley C, Mu F, Kim S, Noviello S, Signorovitch J. Daclatasvir + sofosbuvir versus standard of care for hepatitis C genotype 3: a matching-adjusted indirect comparison. *Journal of Comparative Effectiveness Research* Mar 2016; 5(2): 129-139.
- <u>Swallow</u> E, Song J, Yuan Y, Kalsekar A, Kelley C, Peeples M, Mu F, Ackerman P, Signorovitch J. Daclatasvir and Sofosbuvir Versus Sofosbuvir and Ribavirin in Patients with Chronic Hepatitis C Coinfected with HIV: A Matching-adjusted Indirect Comparison. *Clinical Therapeutics* 2016 38(2): 404-412.
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 Galebach P, Kageleiry A, Stein K, Degun R, Zhang J. Characteristics, treatment patterns, and survival

among ALK+ non-small cell lung cancer (NSCLC) patients treated with crizotinib: A chart review study. *Lung Cancer* Aug 2016; 98: 9-14.

- Goemans N, Vanden Hauwe M, Signorovitch J, <u>Swallow</u> E, Song J, Collaborative Trajectory Analysis P. Individualized Prediction of Changes in 6-Minute Walk Distance for Patients with Duchenne Muscular Dystrophy. *PloS One* Oct 2016; 11(10): e0164684.
- Chen S, <u>Swallow</u> E, Li N, Faust E, Kelley C, Xie J, Wu E. Economic benefits associated with beta blocker persistence in the treatment of hypertension: a retrospective database analysis. *Current Medical Research and Opinion* Feb 2015; 1-30.
- Heng DY, Signorovitch J, <u>Swallow</u> E, Li N, Zhong Y, Qin P, Zhuo DY, Wang X, Park J, Stergiopoulos S, Kollmannsberger C. Comparative Effectiveness of Second-Line Targeted Therapies for Metastatic Renal Cell Carcinoma: A Systematic Review and Meta-Analysis of Real-World Observational Studies. *PloS One* Dec 2014; 9(12): e114264.
- <u>Swallow</u> E, Zhang J, Thomason D, Tan RD, Kageleiry A, Signorovitch J. Real-world patterns of endocrine therapy for metastatic hormone-receptor-positive (HR+)/human epidermal growth factor receptor-2-negative (HER2-) breast cancer patients in the United States: 2002-2012. *Current Medical Research and Opinion* Aug 2014; 30(8): 1537-1545.
- Chen S, Macaulay D, <u>Swallow</u> E, Diener M, Farooqui S, Xie J, Wu EQ. Real-world adherence and persistence associated with nebivolol or hydrochlorothiazide as add-on treatment for hypertension. *Current Medical Research and Opinion* Apr 2014; 30(4): 637-643.
- Sawicki GS, Ayyagari R, Zhang J, Signorovitch JE, Fan L, <u>Swallow</u> E, Latremouille-Viau D, Wu EQ, Shi L. A pulmonary exacerbation risk score among cystic fibrosis patients not receiving recommended care. *Pediatric Pulmonology* Mar 2013 10; 48(10): 954-961.
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- Signorovitch JE, Wu EQ, <u>Swallow</u> E, Kantor E, Fan L, Gruenberger JB. Comparative efficacy of vildagliptin and sitagliptin in Japanese patients with type 2 diabetes mellitus: a matching-adjusted indirect comparison of randomized trials. *Clinical Drug Investigation* Aug 2011 08; 31(9): 665-674.

Presentations

• Vo P, Swallow E, Wu E, Ellis M, Katcher N, Maier-Peuschel M, Naclerio M, Ritrovato D, Joshi P, Ferraris M. Migraine-related healthcare resource use and costs associated with migraine chronification: a panel-based chart review. 7th EAN Congress, Virtual June 19-22, 2021.

- Chen K, Geller M, Leffler D, Meckley L, Mu F, Kponee-Shovein K, Swallow E. Disease Burden and Quality of Life Impacts in Patients With Celiac Disease on a Gluten-Free Diet: An Analysis of the ICureCeliac Registry. American College of Gastroenterology Virtual Meeting October 23-28, 2020.
- Venick R, Chen K, Carter B, Hill S, Kocoshis S, Mercer D, Mu F, Swallow E, Zhao J, Wales P, Grimm A. Identification of Factors Associated With Response to Teduglutide Within 24 Weeks Among Pediatric Patients With Short Bowel Syndrome-Associated Intestinal Failure. 11th International Pediatric Intestinal Failure and Rehabilitation Symposium, Virtual June 26, 2020.
- Dhamane A, Goldschmidt D, Swallow E, Russ C, Ferri M. Physician Preferences For Oral Anticoagulation for Obese & Non-obese Patients With Non-valvular Atrial Fibrillation. American Heart Association Scientific Sessions 2019, Philadelphia, PA November 16-18, 2019.
- Chen K, Gao W, Wang Y, Swallow E. Predictors of high healthcare utilisers among patients with chronic hypoparathyroidism and application of machine learning methodology. ISPOR Europe 2019, Copenhagen, Denmark November 2-6, 2019.
- Vera-Llonch M, Qi CZ, Swallow E, Zichlin ML, Signorovitch J. Pro4 Impact of Enzyme Replacement Therapy on the Risk of Developing Gaucher Disease-Related Complications. ISPOR Europe 2019, Copenhagen, Denmark November 2-6, 2019.
- Cao X, Tang D, Ratto BE, Poole A, Ravichandran S, Jin L, Gao W, Swallow E, Vogelzang NJ. Realworld clinical outcomes of pazopanib immediately following immunotherapy discontinuation for the treatment of advanced renal cell carcinoma. ASCO Annual Meeting, Chicago, IL May 31-June 4, 2019.
- Swallow E, Song J, Peeples M, Meiselbach M, Signorovitch J, Said Q, Prestifilippo J, Wong M, Northrup H, Frost M, Korf B, Sparagana S. Treatment patterns and clinical characteristics among patients with tuberous sclerosis complex related angiomyolipomas. 2017 International Research Conference on TSC & LAM, Washington, DC June 22-24, 2017.
- Vogelzang NJ, Ghate SR, Li N, Swallow E, Peeples M, Zichlin ML, Meiselbach MK, Perez JR, Agarwal N. Real-world outcomes among patients who initiated pazopanib or sunitinib as first targeted therapy for advanced renal cell carcinoma (ARCC): A retrospective analysis of Medicare data. ISPOR 22nd Annual International Meeting, Boston, MA May 20-24, 2017.
- Swallow E, Liu WJ, Wen J, Fang A, Kirson N, Birnbaum H, Bates D. Economic burden of illness for patients with traumatic brain injury resulting in chronic motor impairment. 12th World Congress on Brain Injury of the International Brain Injury Association, New Orleans, LA Mar 29-Apr 1, 2017.
- Vogelzang NJ, Ghate SR, Li N, Swallow E, Peeples M, Zichlin ML, Meiselbach MK, Perez JR, Agarwal N. Real-world economic outcomes during time on treatment among patients who initiated pazopanib or sunitinib as first targeted therapy for advanced renal cell carcinoma (aRCC): A retrospective analysis of Medicare data. AMCP Managed Care & Specialty Pharmacy Annual Meeting, Denver, CO Mar 27-30, 2017.
- Vogelzang NJ, Pal SK, Ghate S, Li N, Swallow E, Peeples M, Zichlin M, Meiselbach M, Perez JR, Agarwal N. Real-world economic outcomes among patients (pts) who initiated sunitinib or pazopanib as first targeted therapy (TT) for advanced renal cell carcinoma (aRCC): A retrospective analysis of Medicare data. Genitourinary Cancers Symposium, Orlando, FL Feb 16-18, 2017.

- Swallow E, Ghate S, Messali A, McDonald E, Duchesneau E, Perez JR. Cost per month of overall survival and progression-free survival: Everolimus compared with cabozantinib, nivolumab, and axitinib for metastatic renal cell carcinoma. 15th International Kidney Cancer Symposium, Miami, FL Nov 4-5, 2016.
- Vogelzang N, Pal S, Ghate S, Li N, Swallow E, Peeples M, Zichlin M, Perez JR, Agarwal N. Realworld survival outcomes and prognostic factors among patients receiving first targeted therapy for advanced renal cell carcinoma: A SEER-Medicare database analysis. 15th International Kidney Cancer Symposium, Miami, FL Dec, 2016.
- Swallow E, Kelley C, Ristovska L, Signorovitch JE, McPhee F, Wygant G. Daclatasvir +asunaprevir versus sofosbuvir/ledipasvir for the treatment of chronic hepatitis c genotype 1 in Japanese patients: A matching-adjusted indirect comparison. 18th European Congress of the International Society for Pharmacoeconomics and Outcomes Research, Milan, Italy Nov 7-11, 2015.
- Ghate S, Li N, Swallow E, Zichlin M, Duchesneau E, Kang B, Perez JR. Physician preference and experience with nivolumab and cabozantinib in the treatment of advanced renal cell carcinoma (aRCC) in the United States (US): A physician survey. 15th International Kidney Cancer Symposium, Miami, FL Nov 4-5, 2016.
- Nicholas J. Vogelzang, Sumanta K. Pal, Sameer Ghate, Nanxin Li, Elyse Swallow, Miranda Peeples, Miriam Zichlin, Jose Ricardo Perez, Neeraj Agarwal. Real-World Survival Outcomes and Prognostic Factors Among Patients Receiving First Targeted Therapy for Advanced Renal Cell Carcinoma: A SEER-Medicare Database Analysis. IKCS 2016 Annual Meeting, Miami, FL Nov 4-5, 2016.
- Goemans NM, Signorovitch J, Swallow E, Song J, Ward SJ. Prognostic model for 1-year change in 6minute walk distance (6MWD) in patients with duchenne muscular dystrophy (DMD). 14th International Congress on Neuromuscular Diseases, Toronto, CA July 5-9, 2016.
- Vogelzang NJ, Signorovitch JE, Swallow E, Peeples M, Koo V, Perez JR, Ghate S, Pal SK. Temporal trends in overall survival and disease-specific survival among patients with advanced renal cell carcinoma during the targeted therapy era: A SEER-Medicare analysis. ASCO Annual Meeting, Chicago, IL Jun 3-7, 2016.
- Swallow E, Fang A, Signorovitch J, Plumb J, Borghs S. Can indirect comparison methods mitigate evolving trial populations in adjunctive antiepileptic drug trials? A propensity score matched indirect comparison of brivaracetam and levetiracetam. ISPOR 21st Annual International Meeting, Washington, DC May 21-25, 2016.
- Sparagana S, Swallow E, Song J, King S, Peeples M, Signorovitch J, Liu Z, Prestifilippo J, Kohrman M, Korf B, Krueger D, Wong M. Epilepsy treatment patterns among patients with tuberous sclerosis complex. 68th Annual Meeting of the American Academy of Neurology Annual Meeting, Vancouver, BC, Canada Apr 15-21, 2016.
- Krueger D, Song J, Swallow E, King S, Peeples M, Signorovitch J, Liu Z, Prestifilippo J, Korf B, Sparagana S, Wong M, Kohrman M. Subependymal giant cell astrocytoma treatment patterns among patients with tuberous sclerosis complex. 68th American Academy of Neurology Annual Meeting, Vancouver, BC, Canada Apr 15-21, 2016.
- Swallow E, Kelley C, Signorovitch J, McPhee F, Wygant G. Indirect comparison of daclatasvir+asunaprevir vs sofosbuvir/ledipasvir for HCV in Japanese patients. 25th APASL Conference, Tokyo, Japan Feb 20-24, 2016.

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