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Dr. Macaulay is an economist with extensive experience in the application of statistics and econometrics to health outcomes research. Her expertise includes retrospective claims analyses, patient chart reviews, clinical trial data analyses, economic modeling, and health economics and outcomes research strategy. Her work has involved the development of economic models to evaluate Medicare demonstration projects and drug expansion into emerging markets; comparative effectiveness and cost effectiveness research; prediction algorithms; the assessment of disease prevalence, burden of illness, and treatment patterns; and the development of pharmaceutical pricing strategies. Dr. Macaulay's experience encompasses a wide range of therapeutic areas, including oncology, mental health, respiratory, immunology, and other chronic disease areas with the use of multiple data sources, including clinical trial, Medicare, Medicaid, private insurance, electronic medical record, and patient chart review data. Her experience also includes analyses in support of health care commercial litigation related to patents and pharmaceutical licensing. Dr. Macaulay has published numerous articles in peer-reviewed journals, including *Health Affairs*, *Respiratory Medicine*, *PharmacoEconomics*, and *The Journal of the American Geriatrics Society*.

EDUCATION

2007 Ph.D., Economics, University of Chicago
2001 B.A., Economics and History, Clemson University

PROFESSIONAL EXPERIENCE

2013 to present Vice President, Analysis Group, Inc., New York, NY
2010 to 2013 Manager, Analysis Group, Inc., New York, NY
2007 to 2010 Associate, Analysis Group, Inc., New York, NY

PUBLICATIONS

- Kao DP, Lindenfeld J, **Macaulay D**, Birnbaum HG, Jarvis JL, Desai US, Page RL. Impact of a Telehealth and Care Management Program on All-Cause Mortality and Healthcare Utilization in Patients with Heart Failure [published online July 28 2015]. *Telemed J E Health*. doi: doi:10.1089/tmj.2015.0007.
- Le TK, **Macaulay D**, Kalsekar A, Yuan Y, Sorg RA, Wei J, Wu EQ. Costs and Resource Utilization Associated With Anemia and Rash in Chronic Hepatitis C Patients Treated With Direct-Acting Antiviral Agents in the United States [published online June 22 2015]. *Clin Ther*. 2015. doi: 10.1016/j.clinthera.2015.05.503.
- Le K, Kalsekar A, **Macaulay D**, Yuan Y, Sorg R, Behrer C, Wei J, Wu E. Treatment Patterns, Health Care Resource Utilization, and Costs in U.S. Patients Diagnosed with Chronic Hepatitis C Infection Who Received Telaprevir or Boceprevir BMS HCV treatment patterns. *J Manag Care Pharm*. 2015 April; 21(4): 308-16.

- Chao J, Skup M, Alexander E, Tundia N, **Macaulay D**, Wu E, Mulani P. Nomenclature and Traceability Debate for Biosimilars: Small-Molecule Surrogates Lend Support for Distinguishable Nonproprietary Names. *Adv Ther*. 2015 March 13.
- Au, D, **Macaulay D**, Jarvis J, Desai U, Birnbaum H. Impact of a Telehealth and Care Management Program for Patients with Chronic Obstructive Pulmonary Disease. *Annals of the American Thoracic Society*. 2015 March; 12(3): 323-331.
- Chen S, **Macaulay D**, Swallow 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. *Curr Med Res Opin*. 2014 Apr; 30(4): 637-43. Epub 2013 Nov 26.
- Baker L, **Macaulay D**, Sorg R, Diener M, Johnson S, Birnbaum H. Effects of Care Management and Telehealth: a Longitudinal Analysis Using Medicare Data. *J Am Geriatr Soc*. 2013 Sep; 61(9):1560-7.
- **Macaulay D**, Sun S, Sorg R, Yan S, De G, Wu E, Simonelli P. Development and Validation of a Claims-based Prediction Model for COPD Severity. *Respir Med*. 2013 Oct; 107(10):1568-77.
- Signorovitch J, **Macaulay D**, Diener M, Yan Y, Wu E, Gruenberger J, Frier B. Hypoglycaemia and Accident Risk in People with Type 2 Diabetes Mellitus Treated with Non-insulin Antidiabetes Drugs. *Diabetes Obes Metab*. 2013 Apr; 15(4):335-41.
- Sikirica V, Haim Erder M, Xie J, **Macaulay D**, Diener M, Hodgkins P, Wu EQ. Cost Effectiveness of Guanfacine Extended Release as an Adjunctive Therapy to a Stimulant Compared with Stimulant Monotherapy for the Treatment of Attention-deficit Hyperactivity Disorder in Children and Adolescents. *Pharmacoeconomics*. 2012 Aug 1; 30(8):e1-15.
- **Macaulay D**, Ivanova J, Birnbaum H, Sorg R, Skodny P. Direct and Indirect Costs Associated with Dupuytren's Contracture. *J Med Econ*. 2012; 15(4):664-71.
- Baker L, Johnson S, **Macaulay D**, Birnbaum H. Integrated Telehealth and Care Management Program for Medicare Beneficiaries with Chronic Disease Linked to Savings. *Health Aff (Millwood)*. 2011 Sep; 30(9):1689-97.

PRESENTATIONS

- Sakuraba A, Sandborn W, Skup M, **Macaulay D**, Reichmann W, Chao J. Comparison of Real-World Outcomes of Adalimumab and Infliximab for Patients with Moderate or Severe Ulcerative Colitis in the United States. Poster Presentation at the ACG 2015 Annual Scientific Meeting & Postgraduate Course, October 10-21, 2015, Honolulu, Hawaii.

- Chang C, Chen K, Chen Y, Cheng T, Hsu P, Lai N, Lan J, Lee C, Lee S, Lin H, Tsay G, Yen J, Bao Y, Tundia N, Yang M, **Macaulay D**, Huang Y, Garg Vishvas. Short-term Clinical Outcomes and Healthcare Resource Utilization in Patients with Rheumatoid Arthritis Tapering Anti-TNF Agents in Taiwan. Oral Presentation at the 17th Asia Pacific League of Associations for Rheumatology Congress (APLAR), September 6-9, 2015, Chennai, India.
- Rojas Serrano J, de Abreu M, Tundia N, Skup M, Sorg R, **Macaulay D**, Bao Y, Chaves L, Chao J. Projected Economic Impact of Increased Use of Biologic Treatments for Rheumatoid Arthritis in Argentina, Colombia, and Mexico Over 10 Years. Oral Presentation at ISPOR 5th Latin America Conference, September 6-8, 2015, Santiago, Chile.
- Kotze P, Tundia N, Gumen A, **Macaulay D**, Chaves L, Bao Y. Economic Impact of Expanded Use of Biologic Therapy for Crohn's Disease in Latin American Countries. Poster Presentation at ISPOR 5th Latin America Conference, September 6-8, 2015, Santiago, Chile.
- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Prevalence of Comorbidities in Patients with Celiac Disease. Oral Presentation at the 16th International Coeliac Disease Symposium (ICDS), June 21-24, 2015, Prague, Czech Republic.
- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Direct Costs in Patients with Celiac Disease-A Retrospective Claims Analysis. Poster Presentation at the 16th International Coeliac Disease Symposium (ICDS), June 21-24, 2015, Prague, Czech Republic.
- Nathan S, Reichmann W, **Macaulay D**, Yu Y. Impact of Suspected Idiopathic Pulmonary Fibrosis Acute Exacerbations on Clinical and Healthcare Resource Utilization Outcomes. Poster Presentation at the American Thoracic Society Conference, May 15-20, 2015, Denver, CO.
- Nathan S, Reichmann W, **Macaulay D**, Yu Y. Change in Forced Vital Capacity and Clinical Outcomes in Newly Diagnosed Idiopathic Pulmonary Fibrosis Patients. Poster Presentation at the American Thoracic Society Conference (ATS), May 15-20, 2015, Denver, CO.
- Nathan S, Reichmann W, **Macaulay D**, Yu Y. Association of Change in Forced Vital Capacity with Healthcare Resource Utilization in Patients with Newly Diagnosed Idiopathic Pulmonary Fibrosis. Poster Presentation at ISPOR 20th Annual International Meeting, May 16-20, 2015, Philadelphia, PA.
- Vazquez B, Sidovar M, Squillacote D, Wu E, **Macaulay D**, Sorg R, Guo A. Healthcare Resource Utilization Associated with Rescue Medication Use in Adult Patients with Seizure Clusters: A Retrospective Chart Review. Poster Presentation at ISPOR 20th Annual International Meeting, May 16-20, 2015, Philadelphia, PA.
- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Prevalence of Comorbidities in Patients with Celiac Disease. Poster Presentation at Digestive Disease Week (DDW), May 17-19, 2015, Washington, D.C.

- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Direct Costs in Patients with Celiac Disease-A Retrospective Claims Analysis. Oral Presentation at Digestive Disease Week (DDW), May 17-19, 2015, Washington, D.C.
- Liu Y, Sundaram M, Skup M, Reichmann W, **Macaulay D**, Chao J. Cost Per Responder Associated with Biologic Therapies for Psoriasis. Poster Presentation at the Academy of Managed Care Pharmacy (AMCP) Annual Meeting & Expo, April 7-10, 2015, San Diego, CA.
- Skup M, **Macaulay D**, Wei J, Terasawa E, Chao J. Comparison of Annual Treatment Costs for Patients Treated with Infusion Versus Injectables. **Gold Medal Recipient-Journal of Managed Care & Specialty Pharmacy**. 2015; 21(4-a). Oral Presentation at the Academy of Managed Care Pharmacy (AMCP) Annual Meeting & Expo, April 7-10, 2015, San Diego, CA.
- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Prevalence of Comorbidities in Patients with Celiac Disease. Poster Presentation at the International Colorectal Disease Symposium (ICDS), January 22-23, 2015, Chai Wan, Hong Kong.
- Guandalini S, Tundia N, Thakkar R, Arunajadai S, **Macaulay D**, Essenmacher K, Fuldeore M. Direct Costs in Patients with Celiac Disease-A Retrospective Claims Analysis. Oral Presentation at the International Colorectal Disease Symposium (ICDS), January 22-23, 2015, Chai Wan, Hong Kong.
- Guo A, Rabinowicz A, Squillacote D, Roberts H, Sidovar M, Wu EQ, **Macaulay D**. Clinical Characteristics and Treatment Pattern in Cluster Seizures: A Preliminary Chart Review Analysis. Poster Presentation at the 2014 Annual Meeting of the American Epilepsy Society, December 5-9, 2014, Seattle, WA.
- Liu Y, Reichmann W, Wang S, **Macaulay D**, Skup M, Chao J, Bao Y. Indirect Comparison of Adalimumab and Yedolizumab in Inflammatory Bowel Disease (IBD) in the United Kingdom: Cost Per Responder/Remitter Analysis. Poster Presentation at United European Gastroenterology Week (UEG), October 18-22, 2014, Vienna, Austria.
- Liu Y, Reichmann W, Wang S, **Macaulay D**, Skup M, Chao J, Bao Y. Indirect Comparison of Adalimumab, Infliximab, and Golimumab in Ulcerative Colitis: Cost Per Remitter Analysis. Poster Presentation at United European Gastroenterology Week (UEG), October 18-22, 2014, Vienna, Austria.
- Thorne J, Tundia N, Skup M, **Macaulay D**, Revol C, Chao J, Bao Y, Dick A. Health Care Resource Use and Costs in Persistent Non-Anterior Non-Infectious Uveitis. Poster Presentation at the European Association for Vision and Eye Research (EVER) Congress, October 1-4, 2014, Nice, France.
- Le TK, Kalsekar A, Yuan Y, **Macaulay D**, Sorg RA, Behrer CR, Wei J, Wu EQ. Contraindications for HCV therapy in US Patients with Untreated Chronic Hepatitis C (CHC). Poster Presentation at ISPOR 19th Annual International Meeting, May 31 - June 4, 2014, Montreal, QC, Canada.

- Le TK, Kalsekar A, Yuan Y, **Macaulay D**, Sorg RA, Behrer CR, Arunajadai SG, Wei J, Wu EQ. Treatment Patterns, Healthcare Resource Utilization and Costs in US Patients Diagnosed with Chronic Hepatitis C Infection. Poster Presentation at ISPOR 19th Annual International Meeting, May 31 - June 4, 2014, Montreal, QC, Canada.
- Thorne J, Tundia N, Skup M, **Macaulay D**, Revol C, Chao J, Mulani P, Dick A. Direct and Indirect Resource Use and Costs Associated With Non-Infectious Non-Anterior Uveitis. Oral Presentation at the Association for Research in Vision and Ophthalmology (ARVO), May 4-8, 2014, Orlando, FL.
- Tundia N, Skup M, Sorg R, **Macaulay D**, Chao J, Mulani P, Thorne JE. Risk of Leaving the Workforce in Non-infectious Uveitis. Presented at the Association for Research in Vision and Ophthalmology (ARVO), May 4-8, 2014, Orlando, FL.
- Liu Y, Reichmann W, **Macaulay D**, Wang S, Skup M, Mulani P, Chao J. Indirect Comparison of Adalimumab, Infliximab, and Golimumab in Ulcerative Colitis: Cost Per Remitter Analysis. Presented at Digestive Disease Week (DDW), May 3-6, 2014, Chicago, IL.
- Wang S, Ganguli A, **Macaulay D**, Reichmann W, Medema J, Cifaldi M. The economic burden of osteoarthritis in Americans: analysis from a privately insured population. Poster Presentation at the 2014 Osteoarthritis Research Society International World Congress (OARSI), April 24-27, 2014, Paris, France.
- Mendes de Abreu M, Skup M, Tundia N, Thakker K, Sorg R, **Macaulay D**, Chao J, Mulani P, Bao C. Economic Impact of Increased Use of Biologic Treatments for Rheumatoid Arthritis in Brazil in the Next Ten Years. Poster Presentation at the Pan American League of Associations for Rheumatology (PANLAR), March 17-20, 2014, Punta del Este, Uruguay.
- Wang S, Ganguli A, **Macaulay D**, Reichmann W, Medema J, Cifaldi M. The Economic Burden of Osteoarthritis In Americans: Analysis From a Privately Insured Population. Poster Presentation at the 2013 American College of Rheumatology/Association of Rheumatology Health Professionals Annual Meeting (ACR/ARHP), October 25-30, 2013, San Diego, CA.
- Au D, **Macaulay D**, Jarvis J, Birnbaum H. Impact Of Integrated Telehealth And Care Management Program On Resource Utilization In Medicare Beneficiaries With Chronic Obstructive Pulmonary Disease. Poster Presentation at the International Conference of the American Thoracic Society (ATS), May 17-22, 2013, Philadelphia, PA.
- Cohen R, Rizzo J, Yang M, Skup M, **Macaulay D**, Behrer C, Fok B, Mulani P, Chao J. High Risk of Leaving the Workforce in US Employees with Ulcerative Colitis. Poster Presentation at Inflammatory Bowel Diseases 2013, the 8th Congress of ECCO-European Crohn's and Colitis Organization, February 14-16, 2013, Vienna, Austria.
- **Macaulay D**, Sun S, Sorg R, Yan S, De G, Wu E, Simonelli P. Development and Validation of a Claims-based Prediction Model for COPD Severity. Oral Presentation at CHEST, October 20-25, 2012, Atlanta, GA.

- Page R, Kao D, **Macaulay D**, Birnbaum H, Jarvis J, Desai U, Lindenfeld J. Integrated Telehealth and Care Management Program Reduces All Cause Mortality in Medicare Beneficiaries with Heart Failure. Oral Presentation at the 16th Annual Scientific Meeting of the Heart Failure Society of America, September 9-12, 2012, Seattle, WA.
- Signorovitch J, **Macaulay D**, Diener M, Yan Y, Wu EQ, Gruenberger JB, Frier BM. Hypoglycaemia and Accident Risk in People with Type 2 Diabetes Treated with Non-Insulin Antidiabetes Drugs. Oral Presentation at the Diabetes UK Professional Conference, March 7-9, 2012, Glasgow, Scotland, UK.
- **Macaulay D**, Ivanova J, Birnbaum H, Sorg R, Skodny P. Direct and Indirect Costs Associated with Dupuytren's Contracture. Poster Presentation at ISPOR 16th Annual International Meeting, May 21-25, 2011, Baltimore, MD.

REVIEWER

Journal of Political Economy

The American Journal of Pharmacy Benefits

The American Journal of Managed Care