

Curriculum Vitae

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Place of Birth: Worcester, Massachusetts

Education

1983	BA	Philosophy	Dartmouth College
1987	MD	Medicine	Johns Hopkins University School of Medicine
1994	MPH	Clinical Effectiveness	Harvard University School of Public Health

Postdoctoral Training

07/87-06/88	Intern	Pediatrics	Johns Hopkins Hospital
07/88-06/90	Resident	Pediatrics	Johns Hopkins Hospital
07/91-06/94	Clinical and Research Fellow	Combined Program in Pediatric Gastroenterology and Nutrition	Massachusetts General Hospital; Boston Children's Hospital
07/91-06/94	Clinical and Research Fellow	Pediatric Gastroenterology	Harvard Medical School
07/91-06/94	Fellow	Medicine	Boston Children's Hospital
07/91-06/94	Fellow	Pediatrics	Massachusetts General Hospital
1993	Visiting Fellow	Nutrition	Instituto de Investigación Nutricional, Lima, Peru

Faculty Academic Appointment

07/90-06/91	Research Associate	International Health	Johns Hopkins University School of Hygiene and Public Health
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07/90-06/91	Research Associate	International Health	Abu El Reeche Hospital, Cairo University, Egypt
07/94-06/97	Instructor	Pediatrics	Harvard Medical School
07/97-06/05	Assistant Professor	Pediatrics	Harvard Medical School
07/00-06/05	Assistant Professor	Nutrition	Harvard School of Public Health
07/05 -	Investigator	Nutrition	Harvard Clinical Nutrition Research Center
07/05 -	Member	Gastroenterology	Harvard Digestive Diseases Center
07/05 -	Associate Professor	Pediatrics	Harvard Medical School
07/05 -	Associate Professor	Nutrition	Harvard School of Public Health
04/14 -	Associate Professor	Global Health and Population	Harvard School of Public Health

Appointments at Hospitals/Affiliated Institutions

1994 -1997	Assistant	Medicine	Boston Children's Hospital
1997 – 2005	Associate Physician		Boston Children's Hospital
2005-	Senior Associate Physician	Medicine	Boston Children's Hospital
1994-2007	Assistant	Pediatrics	Massachusetts General Hospital
1994-2011	Attending Gastroenterologist	Pediatrics	University of Massachusetts Medical Center
1998-2001	Attending Gastroenterologist	Pediatrics	Boston Medical Center

Other Professional Positions

1994-2002	Visiting Scientist		Massachusetts Institute of Technology
1995-2000	Consultant, Applied Research on Child Health Project		Harvard Institute for International Development
2001-2008	Site Director, Glaser Pediatric Research Network		Boston Children's Hospital
2011 -	Adjunct Professor		St. John's Research Institute, Bangalore, India
2013 -	Honorary Lecturer		Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Major Administrative Leadership Positions

Local

1995 -	Director		Center for Nutrition, Boston Children's Hospital
1998-2001	Director, Growth and Nutrition Program		Boston Children's Hospital, Division of Gastroenterology/Nutrition
1999 -	Medical Director		Boston Children's Hospital
	Center for Advanced Intestinal Rehabilitation		

2006 -	Director, Clinical Research	Boston Children's Hospital, Division of Gastroenterology/Nutrition
2009-	Founding and Co-director, Science and Living Systems 19: Nutrition and Global Health course	Harvard College

National and International

2002	Course co-director, Fundamentals of Enteral and Parenteral Nutrition / Course co-director	Department of Pediatrics, Minufiya University, Egypt
2010 -	Course co-founder and co-Director, Nutrition Research Methods, Bangalore Boston Nutrition Collaborative	St John's Research Institute Bangalore, India
2011	Course co-director, Global Infectious Diseases Training Program Protocol Development Workshop on Acute Respiratory Infections and Diarrheal Disease	Muhimbili University of Health and Allied Sciences, Dar es Salamm, Tanzania

Committee Service

Local

1994-2011	Nutrition Advisory Committee 1994-2011	Boston Children's Hospital Chair
1994-1998	Parenteral Nutrition Clinical Practice Guideline Committee 1994-1998	Boston Children's Hospital Chair
1995 -	Fellowship Selection Committee	Harvard Medical School Fellowship in Pediatric Gastroenterology, Hepatology and Nutrition, Harvard Medical School Member
1995 -	1995 - Fellowship Curriculum Committee	Harvard Medical School Fellowship in Pediatric Gastroenterology, Hepatology and Nutrition, Harvard Medical School Member
1996-1999	1995 - Acute Gastroenteritis Clinical Practice Guideline Committee 1996-1999	Boston Children's Hospital Co-Chair
1996-1998	Nutrition Screening Committee	Dana Farber Cancer Institute Member
2000-2009	Scientific Advisory Committee, General Clinical Research Center	Boston Children's Hospital Member
2000-2009	Protocol Review Subcommittee	Boston Children's Hospital Member
2001-2004	Divisions of GI/Nutrition, Endocrinology, and Nephrology Scientific Review Committee (GENSCI) 2001-2004	Boston Children's Hospital Founding Member and Division

		Representative
2001 -	2003-2004 Subcommittee on Nutrition	Chair Harvard Medical School Member
2003 - 2010	Academic Societies Committee on International Programs	Harvard Medical School Member
2003	International Fellow	Castle Society, Harvard Medical School
2009	Clinical Research Program Pilot Feasibility Award Selection Committee	Boston Children's Hospital Member
2009-2010	Biostatistics Search Committee 2009-2010	Boston Children's Hospital Member
2010	Standing Committee on African Studies	Faculty of Arts and Sciences, Harvard University
2011	Grant Review and Support Program (GRASP)	Harvard Medical School Member
2011	Global Health and Nutrition Faculty Search Committee	Harvard School of Public Health Member
2013 -	Academy for Community and Global Health Policy and Research	Boston Combined Residency in Pediatrics Member
2013 -	Standing Committee on Global Health and Health Policy	Faculty of Arts and Sciences, Harvard University Member
2013 -	Global Health Advisory Board	Boston Children's Hospital Member

National and International

March 26-April 4, 1995	Protocol Development Workshop for Multicenter Trial of Reduced Osmolarity Oral Rehydration Solution	International Centre for Diarrhoeal Disease Research, Dhaka, Bangladesh
September 5-19, 1995; April 16-25, 1996; March 10-18, 1997	Consultancies for Multicenter Trial of Reduced Osmolarity Oral Rehydration Solution	Universidad Cayetano Heredia, Lima Peru; Universidade Federal de Bahia, Salvador, Brazil
June 20-30, 1997	Data Analysis Workshop for Multicenter Trial of Reduced Osmolarity Oral Rehydration Solution	Children's Hospital No. 1, Ho Chi Minh City, Viet Nam
1999-2000	Research Agenda Task, Secretary and Diarrheal Diseases Subcommittee 1999-2000	Children's Digestive Health and Nutrition Foundation Member
July 18, 2001	Expert Consultation on Oral Rehydration Salt Formulation	UNICEF House, New York City, New York

2004	Nutrition	World Congress of Pediatric Gastroenterology, Hepatology and Nutrition Abstract reviewer
2006-2007	Continuing Medical Education (CME) Committee	American Society for Nutrition
2007	2006-2007 Nutrition	Chair Pediatric Academic Societies Abstract reviewer
2007-2008	Safety Monitoring Committee for NIAID-funded trial "Prevalence and Clinical Presentation of Respiratory Cryptosporidiosis among Children with Diarrhea in Mulago Hospital, Uganda	Mulago Hospital, Uganda
2008	2007-2008 "Setting Research Priorities to reduce Global Mortality from Childhood Diarrhea by 2015"	Chair World Health Organization Department of Child and Adolescent Health and Development Technical Expert
2008	Scientific Advisory Committee	5th International Intestinal Failure and Rehabilitation Symposium, Pittsburgh PA
2009 - 2011	Professional Nutrition Education Committee	American Society for Nutrition Member
2011	Clinical Trial Advisory Board, International Study of Amylase-resistant starch-based Oral Rehydration Solution	Vellore, India, Bill and Melinda Gates Foundation
2011	Child Health and Nutrition Research Initiative: Preventive Nutrition Strategies for Diarrhea	World Health Organization Technical Expert
2012	Child Health and Nutrition Research Initiative: Case Management of Diarrhea	World Health Organization
2012	"Effects of a protein calorie supplement on HIV-infected patients with tuberculosis"	Technical Expert Data Safety and Monitoring Board for NIH-funded trial

2012	Advisory Group "Development of new strategies to improve zinc status of children"	Member Bill and Melinda Gates Foundation
2014	Scientific Advisory Committee for Data Analysis and Presentation for MAL-ED study (Etiology, Risk Factors, and Interactions of Enteric Infections and Malnutrition and the Consequences for Child Health)	Member Bill and Melinda Gates Foundation
October 28-31, 2014	Meeting on optimization of treatment of diarrhoea; Geneva	Member World Health Organization
		Technical expert
Professional Societies		
1994 -	Massachusetts Medical Society	Member
1994 -	North American Society of Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN)	
	2002-2004	Member
1997-2005	American Society for Clinical Nutrition	Member
1997-2005	American Society for Nutritional Sciences	Member
2003 -	Society for Pediatric Research	Elected Member
	2004, 2007, 20101	Abstract reviewer for Pediatric Nutrition and Metabolism
2005-	American Society for Nutrition	Member
	2003-2007	Member, Continuing Medical Education Committee
Grant Review Activities		
2004	Special Emphasis Panel	National Center for Complementary and Alternative Medicine (NIH NCCAM) Member
2009	Clinical Research Program Pilot Feasibility Award Selection Committee	Boston Children's Hospital
2010	Scientific Review Committee, first Harvard Catalyst/InnoCentive Ideation Challenge: "What do we not know to cure type 1 diabetes?"	Member Boston Children's Hospital
2009	ZHD1 DSR-A (29): Iron in Malaria Endemic Zones	Member National Institute of Child Health and Human Development (NICHD) Special Emphasis Panel

2011	ZRG1 EMNR-S Indo-US Program for Reproductive Health	Member National Institute of Child Health and Human Development (NICHD) Special Emphasis Panel
2013	Harvard Global Health Institute Global Health Graduate Fellowship Selection Committee	Member
2014	Bill and Melinda Gates Foundation Zinc status in environmental enteropathy review panel	Member Member

Editorial Activities

Journal of Pediatric Gastroenterology and Nutrition
World Health Organization
Journal of Pediatrics
The Lancet
Thrasher Fund
Burroughs Welcome Fund
American Journal of Clinical Nutrition
Journal of the American Medical Association (JAMA)
Cochrane Infectious Diseases Group
European Journal of Clinical Nutrition
Inflammatory Bowel Disease

Other Editorial Roles

1997-1999, 2002-2004	Section Editor	Current Opinion in Pediatrics Office Pediatrics –Nutrition
2001 - 2012	Editorial board member	Nutrition
2004 -	Editorial board member	Current Nutrition and Food Science
2009 -	Editorial board member	Functional Food Reviews
2009 -	Editorial board member	Encyclopedia of Human Nutrition
2012	External Editorial Reviewer	World Health Organization electronic Library of Evidence for Nutrition Actions (eLANA)
2014 -	Editorial board member	International Health

Honors and Prizes

1983	Cum Laude	Dartmouth College
1983	Story Prize in Philosophy	Dartmouth College
1984	Finalist -Denison Student Research Award	Johns Hopkins University School of Medicine
1993	Farley Fund Award	Boston Children's Hospital
1999	Mentor	National Clinical Nutrition Internship Program
2001	Master Teacher for second year course, Physical Diagnosis	Harvard Medical School
2001	Mentor	National Medical Fellowship (Gerber Foundation Fellowship in Pediatric Nutrition -

2005, 2006	Physician Nutrition Specialist Award	Camielle Rizzo, BA) American Society of Clinical Nutrition
2007	Harvard Medical School Student Teaching Award	Boston Children's Hospital
2012	Arnold Silverman Visiting Lectureship	University of Colorado School of Medicine

Report of Funded and Unfunded Projects

Past Funded Projects

1992-1994	NIH Training Grant in Pediatric Gastroenterology (Walker, Allan) 5-T32-DK07477-12 Trainee Training grant in pediatric gastroenterology and nutrition
1992-1996	Harvard Community Health Plan Foundation: "Access to and Utilization of Oral Rehydration Solutions: A Prospective Study." Co-Principal Investigator Randomized trial of oral rehydration solution in community health centers in suburban Boston
1992-1995	International Atomic Energy Agency: "Albumin Synthesis Rates in Protein-Energy Malnutrition." Co-Principal Investigator Stable isotope study of protein metabolism in malnourished children
1995-1996	Pilot Feasibility Project of Harvard Clinical Nutrition Research Unit: "Arginine Metabolism in Bone Marrow Transplant Patients: A Stable Isotope Study" NIH/P30-DK40561 Principal Investigator Stable isotope study of protein metabolism in children undergoing bone marrow transplantation
1996	American Society for Parenteral and Enteral Nutrition Rhoads Research Foundation: "Zinc Metabolism in Bone Marrow Transplantation." Co-Investigator Observational cohort study of zinc status
1997-1999	Scandipharm, Inc.: "A Double Blind, Multicenter Crossover Study to Compare the Safety and Efficacy of Ultrasec MT20 to Placebo in the Treatment of Steatorrhea in Patients with Cystic Fibrosis." co-Investigator Multicenter randomized trial of pancreatic enzymes in patients with cystic fibrosis
1997	Boston Children's Hospital Research Faculty Council. Capital equipment support for indirect calorimeter Principal Investigator Research support for indirect calorimeter purchase
1997-2002	Commonwealth of Massachusetts Department of Public Health "Growth and Nutrition Program". Principal Investigator

- 1998-2000 Programmatic support for Growth and Nutrition clinic
 Pilot Feasibility Project of Harvard Clinical Nutrition Research Unit: "Glutamine Supplementation in Infants with Gastrointestinal Disease".
 NIH P30-DK40561
 Principal Investigator
 Randomized trial of glutamine supplementation in infants undergoing gastrointestinal surgery
- 1999-2000 Gerber Foods. "A Randomized Double-blind Trial of Cereal Supplemented with a Prebiotic in Free-Living Peruvian Infants"
 Site Principal Investigator
 Randomized trial of prebiotic supplementation in children in Peruvian slums
- 1999-2008 Glaser Pediatric Research Network, Boston Children's Hospital
 Site PI
 Site Principal Investigator for multicenter consortium.
- 1999-2004 Nutritional Evaluation and Interventions of HIV-Infected Infants and Children (Miller, Tracie)
 NIH/NIDDK DK45734-03
 Co-Investigator
 Prospective cohort study of pediatric HIV infection
- 2003-2005 Protein Metabolism in Critically Ill Surgical Neonates (Jaksic, Tom)
 NIH/NIDDK R01 HD/DK41531-01
 Co-Investigator
 Stable isotope study of surgical neonates
- 2003-2008 Trial of Vitamins among Children of HIV-infected Mothers
 NIH/NICHD R01 HD043688-0
 Co-Principal Investigator
 Randomized trial of multiple micronutrients in infants born to HIV-infected women
- 2003-2007 Massachusetts Vitamin Litigation Grant: Body Composition and Energy Expenditure in Stem Cell Transplantation.
 Principal Investigator
 Randomized trial of energy intake in bone marrow transplantation
- 2004-2007 International Atomic Energy Agency/Body composition among pregnant Tanzanian women: the role of HIV infection
 Co-Principal Investigator
 Stable isotope study of body composition during pregnancy
- 2005-2008 Gerber Foundation/Surgical Database: Necrotizing Enterocolitis
 Co-Investigator
 Observational cohort study of infants with necrotizing enterocolitis
- 2005 - 2011 Randomized Trial of Vitamin B12 in Pregnant Indian Women
 NIH/NICHD R03 HD052143-01
 Principal Investigator
 Randomized trial of vitamin B12 supplementation during pregnancy
- 2006 - 2012 A Trial of Zinc and Micronutrients in Tanzanian Children
 NIH/NICHD R01 HD048969-01A1
 Principal Investigator

Randomized trial of multiple micronutrients in infants born to HIV-uninfected women
 2009 - 2013 Prenatal Iron Supplements: Safety & Efficacy in Tanzania
 NIH/NICHD U01 HD061232-01
 Co-Investigator
 Randomized trial of prenatal iron supplementation among non-anemic pregnant women

Current Funded Projects

2010-(2015) Nutrition Collaborative Research Support Programs (CRSP), Focus on Africa and Asia (Webb)
 USAID AID-OAA-L-10-00005/6
 Co-investigator
 Nutrition Collaborative Research Support Programs (CRSP), Focus on Africa and Asia
 The purpose of the Global Nutrition CRSP is to discover what, where and how interventions can best improve nutrition and health outcomes for women and children on a large scale in Africa and Asia. We support research and build capacity with collaborators in partner universities, governments, non-governmental organizations and private enterprises, to evaluate all kinds of interventions in agriculture, health and nutrition.

2010-(2015) Patient-Oriented Research in Diarrheal Diseases
 NIH/NICHD K24 HD058795
 Principal Investigator (\$186,327)
 The major goal of this project is to mentor junior scientists in applied clinical research, as well as to determine the impact of zinc supplementation on the occurrence of anemia in Tanzanian children.

2012-(2015) Exploratory Trial of Choline Supplementation for Fetal Alcohol Syndrome (Jacobson)
 NIH/NIAAA R21 AA020332
 Co-investigator
 The major goals of this project are to perform a randomized trial of prenatal choline supplementation among pregnant women in Capetown, South Africa. Outcomes include feasibility, acceptability of choline supplementation, as well as maternal blood choline concentrations.

2012-(2015) Biomarkers of gut function and predictors of linear growth and neurodevelopment status among young Tanzanian children
 Bill and Melinda Gates Foundation OPP1066203
 Principal Investigator (\$1,738,402)
 The goal of this project is to utilize novel and robust biomarkers of increased gut permeability and diminished absorptive and functional capacity of the small intestine to identify children at risk of stunting and neurodevelopmental delay from a well-characterized population of young Tanzanian children.

2013-(2016) Harvard India Nutrition Initiative
 United States India Educational Foundation

- Principal Investigator (\$250,000)
 The goals of this project are to establish a collaborative nutrition research education effort between Harvard School of Public Health and St. John's Research Institute, Bangalore, India consisting of a 2 week course in nutrition research methods, faculty and student exchanges, and on-line education.
- 2013-(2016) The Global Dietary Database – Global Dietary Intakes, Diseases, and Policies among Children, Women, and Men
 Bill and Melinda Gates Foundation
 Co-investigator
 The major aims are to update and expand data on dietary intakes in adults, women and children, from new primary data sources, including of foods/nutrients implicated in deficiency conditions and relevant for diet quality and to evaluate and quantify the health impact of specific dietary factors throughout the lifespan, with a particular focus on maternal, pregnancy, and infant/child health outcomes relevant in Africa and Asia.

Report of Local Teaching and Training

Teaching of Students in Courses

Harvard Medical School

1994-	Pediatric Nutrition (HMS PD526M.7) 2 to 6 medical students annually	Harvard Medical School 24 hours contact time per month, 4 hours preparation per month
1996-2000	Patient Doctor II (HMS IN709M.Jb) 3 to 9 medical students	Harvard Medical School Preceptor, 9-27 hours contact time per year, 2 hours preparation time per year
2004-2008	Pediatric Core Clerkship 20 medical students	Harvard Medical School Lecturer, 1 hour lecture per month, 2 hour preparation time per year
2008-2010	Preventive Medicine and Nutrition (HMS PM711.0) 2 nd year students	Harvard Medical School Lecturer, 1 hour lecture per month, 2 hour preparation time per year
2014	Introduction to Clinical Nutrition (HMS IN757.NUT) 2 nd year students	Harvard Medical School Tutor, 5 hour small group discussion, 4 hour preparation time per year

Boston Children's Hospital

1996	Pediatric Core Clerkship, Rotch Service 4 medical students	Boston Children's Hospital 12 hours contact time per week, 1 hour preparation time per week
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Harvard School of

Public Health

1994 -	Principles of Nutrition (HSPH 201b) 30 graduate students	Harvard School of Public Health Lecturer, 2 hours contact time per year, 1 hour preparation time per year
2000-	Nutritional Problems of Less-Developed Countries (HSPH 210cd) 30 graduate students	Harvard School of Public Health 6 hours contact time per year, 10 hour preparation time per year

Harvard College

2008 -	Science and Living Systems 19: Nutrition and Global Health 200-300 undergraduate students	Harvard College Course co-director and co-founder 48 hours contact time per year, 20 hour preparation time per year
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Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

1994-	Medical Housestaff Core Conferences, Parenteral Nutrition, Treatment of Acute Diarrhea, Breastfeeding 40 housestaff and medical students	Boston Children's Hospital 3 hour preparation time, 1 hour lectures
2001-2004	Phase 1 and 2 Clinical Trials, Introduction to Clinical Research 30 faculty and fellows	Boston Children's Hospital, Clinical Research Program 2 hours contact time per year, 2 hours preparation time per year

Clinical Supervisory and Training Responsibilities

1994 -	Director, Clinical Nutrition Division of GI/Nutrition Boston Children's Hospital Responsible for fellow, resident, student and dietician training in nutrition	Ongoing
1994 -	Pediatric Gastroenterology Program Supervise fellows, residents and students in ambulatory GI care	One session per week
1999 -	Center for Advanced Intestinal Rehabilitation Program, Boston Children's Hospital Supervise fellows, residents and students in ambulatory intestinal rehabilitation care	One session per week
1994 -	Pediatric Nutrition, Boston Children's Hospital Supervise fellows, residents and students in inpatient nutrition care	One to two months per year

1994 - Pediatric Gastroenterology, Boston Children's Hospital
Supervise fellows in endoscopic procedures One half to one sessions per month

Laboratory and Other Research Supervisory and Training Responsibilities

2006 - Director, Clinical Research, Division of GI/Nutrition, Boston Children's Hospital
Coordinate clinical research seminar series and oversee division-wide resources in biostatistics and study design Ongoing

Formally Supervised Trainees

1996-1997 Alfonso Cañete, MD/ Attending pediatrician, Madrid, Spain
Reviewed literature of nutrition in pediatric critical illness with one publication

1996-1997 Caleb King, MD, PhD/ Pediatric GI faculty, UNC
Reviewed literature and authored guidelines for pediatric diarrhea management endorsed by CDC for national use

1998-2000 Alice O'Leary, MD/ Pediatrician, Massachusetts
Reviewed appropriate evaluation for undernourished children in US

1998-2000 David Andorsky, Medicine Resident/ Brigham and Women's Hospital
Retrospective review of natural history of short bowel syndrome

2000 Jeanne Lister/ UVM Medical Student
Reviewed literature and authored guidelines for pediatric undernutrition management endorsed by ASPEN

2001 Camielle Rizzo/ Pennsylvania State University
Evaluation of clinical practice guideline for parenteral nutrition use in a pediatric hospital

2001 Jennifer Gannon, MD/ Pediatrician, Massachusetts
Reviewed safety and efficacy of protective nutrients

2002-2004 Patrick Javid, MD/ Surgery resident, Brigham and Women's Hospital
Studies of intestinal failure and short bowel syndrome

2002-2004 Annamaria Kiurie, MD, ScD/ Doctoral student in Nutrition, Harvard School of Public Health
Studies of nutritional status of children in Tanzania

2004 Vivian Tang, BA/ Medical student, Brown University
Dietary intake hematopoietic transplantation

2004 Arkady Klykov, BA/ Medical student, Kansas University
Measures of energy expenditure in hematopoietic stem cell transplantation

2005-2009 Roland Kupka, ScD/ Post-doctoral student, Harvard School of Public Health
Clinical trial of multiple micronutrients in infants born to HIV-infected women

2005-2009 Deborah Duro, MD/ Gastroenterology/Nutrition fellow, Boston Children's Hospital
Multiple studies of nutritional status of children with intestinal failure

2005 Jennifer Kraker/ Medical student, Columbia University
Review of nutrition and HIV infection

- 2005 - Niles Mehta, MD/ Assistant Professor of Anesthesia, Harvard Medical School/Boston Children's Hospital
Multiple studies of nutritional status of children with critical illness
- 2006 Emily Wroe/ Medical student, Harvard Medical School
Body composition of HIV-infected mothers
- 2006-2007 Biren Modi, MD/ Surgery Resident, Brigham and Women's Hospital
Multiple studies of nutritional status and natural history of children with intestinal failure
- 2006-2008 Avery Ching, MD/ Surgery Resident, Beth Israel Deaconess Medical Hospital
Diagnostic yield of endoscopy for intestinal failure
- 2007-2009 Nasim Sabery, MD/ Gastroenterology/Nutrition Fellow, Boston Children's Hospital
Long-term outcomes in children in Tanzania whose mothers received micronutrient during pregnancy
- 2008 - Bram Raphael, MD/ Instructor of Pediatrics, Harvard Medical School/Boston Children's Hospital
Effect of cisapride in intestinal failure
- 2008- Kevin Sztam, MD, MPH/ Instructor of Pediatrics, Harvard Medical School/Boston Children's Hospital
Studies of HIV and nutrition in Tanzania
- 2008 - Colin Carter, MD/ Instructor of Pediatrics, Emergency Medicine, Harvard Medical School/Boston Children's Hospital
Effects of fetal alcohol exposure on child growth and body composition
- 2008 - Tanvi Sharma, MD/ Assistant Professor of Pediatrics, Infectious Diseases, Harvard Medical School/Boston Children's Hospital
Randomized trial of parenteral energy intake in hematopoietic stem cell transplantation
- 2008-2010 Brian Jones, MD/ Surgery Resident, Boston Children's Hospital
Safety and efficacy of ethanol locks for the prevention of blood stream infections in intestinal failure patients
- 2008-2010 Melissa Hull, MD/ Surgery Resident, Boston Children's Hospital
Serum citrulline as a biomarker for bacterial translocation
- 2009 - Christine McDonald/ Doctoral student, Harvard School of Public Health post-doctoral trainee Boston Children's Hospital
Predictors of growth failure and neurodevelopmental delay in HIV-exposed children in Tanzania
- 2009-2011 Shiela Isanaka/ Doctoral student, Harvard School of Public Health
Effects of anemia on mortality and tuberculosis risk
- 2009-2011 Julia Finkelstein/ Doctoral student, Harvard School of Public Health
Anemia and vitamin D status among children in Tanzania
- 2012 - Kerri Gosselin, MD/ Gastroenterology/Nutrition Fellow, Boston Children's Hospital
Citrulline as a biomarker of gastrointestinal function in hematopoietic stem cell transplantation
- 2014 - Analee Etheredge, PhD/ post-doctoral trainee Boston Children's Hospital
Biomarkers of environmental enteric dysfunction and infant

neurodevelopment

Formal Teaching of Peers (e.g., CME and other continuing education courses)*No presentations below were sponsored by outside entities*

1994	Physiology of the Pediatric GI Tract New England Deaconess Hospital	Single presentation Boston
1994-1996	Management of Acute Diarrhea 7 Harvard Community Health Plan Health Centers	Multiple presentations Suburban Boston
2002	Enteral Nutrition of Short Bowel Syndrome Enhancing the Safety of Parenteral and Enteral Nutrition, Harvard Medical School	Single presentation Boston
2004	Cystic Fibrosis and Pancreatic Insufficiency Cystic Fibrosis: Past, Present and Future, Harvard Medical School	Single presentation Boston
2007	Nutrition in Intestinal Failure (Pre- Transplantation), "Enhancing the Safety of Parenteral and Enteral Nutrition" Harvard Medical School	Single presentation Boston

Local Invited Presentations*No presentations below were sponsored by outside entities*

1995	Nutrition in the Hospitalized Oncology Patient / Grand Rounds Department of Oncology, Boston Children's Hospital
1996	Nutrition Support in the Intensive Care Unit / Grand Rounds Department of Surgery, Boston Children's Hospital
1996	Pancreatic Insufficiency Division of Pulmonary Medicine, Boston Children's Hospital
1996	Development of the Gastrointestinal Tract Joint Program in Neonatology, Harvard Medical School
1996	Hepatobiliary Manifestations of Cystic Fibrosis Division of Pulmonary Medicine, Boston Children's Hospital
1997	Physiology of Oral Rehydration Solutions Metabolic Support Service, Brigham and Women's Hospital
1997	Nutritional Management of Short Bowel Syndrome / Grand Rounds Department of Surgery, Boston Children's Hospital
1997	Nutritional Management of Vegetarian Children Pediatric Practice Seminar, Boston Children's Hospital
1998	Nutritional Management of Pediatric ICU Patients Multidisciplinary ICU staff, Boston Children's Hospital
1998	Nutritional Management of Diarrheal Diseases

- 1998 Department of Nutrition, Harvard School of Public Health
Gastrointestinal Manifestations of Cystic Fibrosis / Grand Rounds
Department of Gastroenterology, Boston Medical Center
- 1998 Medical Management of Short Bowel Syndrome / Grand Rounds
Department of Surgery, Boston Children's Hospital
- 1998 Special Considerations in Infant Nutrition
Division of Newborn Medicine, Boston Children's Hospital/Brigham and
Women's Hospital
- 1999 Nutritional Management of the Bone Marrow Transplant Patient
Dana Farber Cancer Institute, Boston
- 1999 Nutrition and Pediatric Cancer
Dana Farber Cancer Institute, Boston
- 2000 Clinicopathologic Conference / Pediatric Grand Rounds
Massachusetts General Hospital
- 2001, 2001 Phase 1 and 2 Clinical Trials
Clinical Research Program, Boston Children's Hospital
- 2002 Medical and Nutritional Therapy of Short Bowel Syndrome / Grand Rounds
Department of Surgery, Boston Children's Hospital
- 2003 Medical and Nutritional Therapy of Short Bowel Syndrome / Grand Rounds
Department of Gastroenterology, Massachusetts General Hospital
- 2004 Current Medical and Surgical Therapy for Short Bowel Syndrome (with Drs
Tom Jaksic and HB Kim) / Grand Rounds
Department of Medicine, Boston Children's Hospital
- 2004 Prebiotics in Health and Disease
Department of Nutrition, Harvard School of Public Health
- 2004 Parenteral Nutrition-Associated Liver Disease / Grand Rounds
Division of Newborn Medicine, Brigham and Women's Hospital, Boston
Children's Hospital
- 2006 Clinicopathologic Conference / Pediatric Grand Rounds
Massachusetts General Hospital
- 2006 Treatment of Protein Energy Malnutrition
Global Health Curriculum Series, Boston Combined Residency in Pediatrics
- 2006 Vibrio cholera: New Therapies and Models for an Old Disease (with Dr. Paula
Watnick) / Grand Rounds
Department of Medicine, Boston Children's Hospital
- 2007 Intestinal Failure in Children / Introduction to Pediatric Nutrition
Department of Nutrition, Boston Children's Hospital
- 2008 Emerging Therapies in Intestinal Failure and Intestinal Transplantation (with
Dr. Daniel Kamin) / Grand Rounds
Department of Surgery, Boston Children's Hospital
- 2009 Intestinal Failure: Rehabilitation and Transplantation Strategies (with Dr.
Heung Bae Kim) / Medical Grand Rounds
Boston Children's Hospital
- 2010 Nutrition in Surgical Patients: Current Concepts (with Dr. Nilesh Mehta) /
Surgical Grand Rounds
Boston Children's Hospital

2011	“Making the K to R transition” Harvard Catalyst course
2012	Contemporary Ethical Issues in Biomedical Research (Co- facilitator with Dr. Jordan Kreidburg) Boston Children's Hospital
2012	Growth in Intestinal Failure Surgical Grand Rounds Boston Children’s Hospital
2013	Maternal and Child Health and Nutrition in India: An Update Clinical Research Center Grand Rounds Boston Children’s Hospital
2013	Updates in Intestinal Failure Division of Gastroenterology Grand Rounds Boston Children’s Hospital
2014	Pediatric Intestinal Failure: What Infants with Short Guts can Teach Us Division of Gastroenterology Grand Rounds Beth Israel Medical Center

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by outside entities

Regional

1996	Fluid and Electrolyte Management Department of Nutrition, Simmons College, Boston
1997	ORT for Acute Diarrhea: What Can Studies in Developing Countries tell US Physicians? / Pediatric Grand Rounds University of Massachusetts Medical Center
1998	Enteral Nutrition during Acute Diarrhea in Childhood 8th International Congress on Infectious Diseases, Boston, Massachusetts
1998	Best Practices in the Care for Individuals with Developmental Disabilities: Nutrition and GI Conditions University of Massachusetts, Worcester, MA
2002	Management of Severe Malnutrition and Micronutrient Deficiencies American Academy of Pediatrics Annual Meeting, Boston, Massachusetts
2005	Current Medical and Surgical Therapy for Short Bowel Syndrome / Grand Rounds Lowell General Hospital
2006	Zinc and Diarrheal Diseases, Infectious Disease Challenges in International Public Health Boston University School of Public Health, Summer Institute for International Health

National

1994	Albumin Synthesis in Protein Energy Malnutrition
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- Department of International Health, Johns Hopkins University School of Hygiene and Public Health
- 1996 Bringing the Lessons Home: The Case for Use of Oral Rehydration Solutions in the United States
American Academy of Pediatrics Annual Meeting, Boston, Massachusetts
- 1996 Isotope Techniques in Human Nutrition
Center for Human Nutrition, University of Colorado Health Sciences Center
- 1996 Clinical Trials of ORT in the United States
Center for American Indian and Alaskan Native Health, Johns Hopkins University School of Hygiene and Public Health
- 2000 B Vitamins and Child Health
Micronutrients and Child Health Meeting, National Institutes of Child Health and Human Development
- 2001 Nutrition and Short Bowel Syndrome in Infants
Center for Human Nutrition, University of Colorado Health Sciences Center
- 2001 Is Oral Therapy Really Better for Acute Diarrhea?
Medical Grand Rounds, Denver Children's Hospital
- 2003 Gastroenterology and Nutrition in Developing Countries / Meet the Professor Breakfast
North American Society of Pediatric Gastroenterology, Hepatology and Nutrition Annual Meeting
- 2004 Nutritional Therapy in Pediatric Short Bowel Syndrome / Invited Symposium Speaker
Nutrition Week: American Society of Parenteral and Enteral Nutrition
- 2008 New developments in acute diarrhea management: Salt, water and minerals / Invited Symposium Speaker
Pediatric Academic Societies (PAS)
- 2008 Medical Management of Intestinal Failure in Children / Invited Symposium Speaker
Digestive Disease Week (DDW)
- 2008 Advances in the Management of Intestinal Failure / Gastroenterology Grand Rounds
State University of New York (SUNY) Downstate
- 2009 Novel Therapies for Intestinal Failure
Pediatric Grand Rounds/University of Miami Miller School of Medicine, Miami, Florida
- 2011 Updates in Intestinal Failure / Neonatal/Perinatal conference
Connecticut Children's Medical Center, Hartford, CT
- 2012 Nutritional Outcomes in Intestinal Failure
7th International Pediatric Intestinal Failure and Rehabilitation Symposium, Pittsburgh, PA
- 2012 What do we want an improved zinc intervention for diarrhea to achieve?
Bill and Melinda Gates Foundation, Seattle, Washington
- 2012 Updates in Parenteral Nutrition / Meet the Professor Breakfast
North American Society of Pediatric Gastroenterology, Hepatology and Nutrition Annual Meeting, Salt Lake City, Utah

- 2012 Arnold Silverman Visiting Professor
 Micronutrient supplementation among HIV-exposed infants / Research talk
 Evolving Therapies in Pediatric Intestinal Failure / Grand Rounds
 Management of Acute Diarrhea A to Z
 Children's Hospital of Colorado University of Colorado Department of Pediatrics
- 2013 Visiting Professor Emory University Egleston Children's Hospital
 Emerging Therapies in Intestinal Failure / Pediatric Grand Rounds
 Update in Acute Diarrhea Management / Pharmacy Grand Rounds
 Nutritional Support in Children Undergoing Hematopoietic Stem Cell Transplantation
- 2013 Invited Speaker
 Controversies in Parenteral Nutrition
 Annual Meeting – North American Society for Pediatric Gastroenterology, Hepatology and Nutrition
- 2014 Diagnosis and Treatment of Nutritional Deficiencies
 Caring for the Child with Intestinal Failure
 Advances in Pediatric Gastroenterology, Hepatology and Nutrition 2014
 Cambridge, MA
- 2014 Pediatric Enteral Autonomy: How Do We Measure Success?
 8th International Pediatric Intestinal Failure and Rehabilitation Symposium
 Atlanta, GA
- 2014 Pediatric Intestinal Failure: How Low Can We Go?
 Department of Pediatrics Grand Rounds
 Acute Diarrhea Management
 Pediatric Resident Lecture
 Geisel School of Medicine, Children's Hospital at Dartmouth
 Lebanon, NH
- International**
- 1999 International Low Birth Weight Symposium and Workshop; Centre for Health and Population Research / Invited participant
 Dhaka, Bangladesh
- 2000 Oral Rehydration in the Treatment of the Dehydrated Infant / 2nd International Symposium on Nutritional Problems in Infancy
 Madrid, Spain
- 2002 Fundamentals of Enteral and Parenteral Nutrition / Course Co-Director
 Department of Pediatrics, Minufiya University, Egypt
- 2002 Second Research Coordination Meeting on "The application of isotopic and nuclear techniques in studies related to intrauterine growth restriction (IUGR) issues in populations from developing countries" / Invited Speaker
 International Atomic Energy Agency, Capetown, South Africa
- 2003 Allergic Diseases and the Environment, 53rd Nestle Nutrition Meeting / Invited lecturer
 Lausanne, Switzerland
- 2003 Grand Rounds / Department of Pediatrics
 Muhimbili University College of Health Sciences, Dar es Salaam, Tanzania

2005	Pediatric HIV Disease, World Congress of Gastroenterology / Invited Speaker Montreal, Canada
2009	International Symposium of Pediatric Gastroenterology and Nutrition / Invited Speaker Colegio Colombiano de Gastroenterologia, Hepatologia y Nutricioan Pediatria, Cali, Colombia
2010	Inaugural International Course in Nutrition Research Methods / Course Co-Director Bangalore Boston Nutrition Collaborative, Bangalore, India
2010	Alberta Children's Hospital/University of Calgary / Visiting Professor Calgary, Canada
2010	Protocol Development Workshop on Pediatric Infectious Diseases Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
2011	2nd International Course in Nutrition / Course Co-Director Bangalore Boston Nutrition Collaborative, Bangalore, India
2011	Global Infectious Diseases Workshop Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
2012	3rd International Course in Nutrition Research Methods / Course Co-Director Bangalore Boston Nutrition Collaborative, Bangalore, India
2013	4th International Course in Nutrition Research Methods / Course Co-Director Bangalore Boston Nutrition Collaborative, Bangalore, India
2013	11 th China Nutrition Science Conference and International DRIs Summit Hangzhou, China
2013	Visiting Professor/Hubei Maternal and Child Health Hospital Wuhan, China
2013	Visiting Professor/Tongji Medical College Wuhan, China
2013	35 th European Society for Parenteral and Enteral Nutrition/Invited lecturer Leipzig, Germany
2013	Jodhpur National University, Jodhpur, India Rural Public Health Update – Plenary Speaker

Report of Clinical Activities and Innovations

Current Licensure and Certification

1988	Federal Licensing Examination (FLEX)
1991	Massachusetts Medical License
1991	American Board of Pediatrics
1995, 2002, 2012	Sub-Board, Pediatric Gastroenterology
1998	American Board of Nutrition/Physician Nutrition Specialists
2011	American Academy of Pediatrics Helping Babies Breathe Mentor

Practice Activities

1994 -	Ambulatory Care	Pediatric Gastroenterology Program	One session per week
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1999 -	Ambulatory Care	Center for Advanced Intestinal Rehabilitation Program, Boston Children's Hospital	One session per week
1994 -	Inpatient Attending	Pediatric Nutrition, Boston Children's Hospital	One to two months per year
1994 -	Endoscopic procedures	Pediatric Gastroenterology, Boston Children's Hospital	One half to one sessions per month

Clinical Innovations

Report of Technological and Other Scientific Innovations

1994-1998	<u>New formulations of oral rehydration solution.</u> In conjunction with colleagues in Brazil, India, Peru, Bangladesh, Vietnam and WHO, I helped design and carry out two large clinical trials of ORS under the aegis of the CHOICE Study group whose results led the WHO to change global recommendations for the composition of ORS, the first significant change in the composition of ORS since its inception in the 1970's. Original articles numbers 3, 6, 7, 10, 14, 15, 17, 29, 61 and Review numbers 1, 14, 24, 27, 39 and 41 are relevant, with Review 41 being adopted by the CDC and AAP for national guidelines.
1997 – present	<u>Clinical application of indirect calorimetry.</u> With colleagues in Intensive Care Medicine and others, we have established the clinical utility of measuring resting energy expenditure in hospitalized pediatric patients, challenging the standard of using equation-driven estimates of energy needs during illness. See original articles 4, 16, 42, 54, 59, 68, 72, 77, 94, 98, 99, and 111. ASPEN guidelines now recommend the use of this procedure as part of standard practice in the ICU.
1999 – present	<u>Establishment of multidisciplinary intestinal rehabilitation program.</u> In conjunction with faculty and staff in Surgery, Nutrition, Gastroenterology, Nursing, Social Work and others, I am founding Medical Director of the Center for Advanced Intestinal Rehabilitation, the largest center for care of children with short bowel syndrome in the US. We have designed and applied cutting edge surgical, medical and nutritional therapies, reporting the highest rates of survival in this medically fragile group of patients. We have also published one of the first textbooks for the care of intestinal failure patients. See original articles 18, 24, 28, 34, 35, 39, 40, 41, 45, 48, 49, 50, 51, 57, 58, 62, 63, 64, 65, 69, 71, 73, 74, 76, 79, 80, 81, 95, 100, and 109. Rates of intestinal transplantation around the world have fallen precipitously over the past 5-10 years as the concept of intestinal

	rehabilitation has taken hold.
2003 - present	<u>Nutritional outcomes after stem cell transplantation.</u> In conjunction with colleagues in Stem Cell Transplantation, we have used cutting edge nutritional and body composition technologies to define the nutritional needs of children undergoing transplantation, defining important changes in resting energy expenditure, body composition, micronutrient status, and bone mineral density in these subjects. See original articles 23, 27, 33, 44, 52, 70, 88, and 89. The concept that standard composition of parenteral nutrition prescriptions leads to overfeeding the SCT patient is now acknowledged in the oncology community.
2012 - present	<u>Air displacement plethysmography.</u> We have recently established this non-invasive measure of body composition, making Boston Children's Hospital the only pediatric facility in New England with this technology.

Report of Education of Patients and Service to the Community

Activities

No activities below were sponsored by outside entities

2003-2004	Zervas Elementary School Food Policy Committee / Member Formulated safe food policy for elementary school system
2007	Oak Hill Middle School Science class / Guest lecturer Guest lecturer for science class
2009 - 2013	Newton Tanzania Collaborative / Advisory Board Advised educational and cultural exchange charity
2013	Speaker at Annual Oley Foundation meeting (family support group for patients with intestinal failure)

Educational Material for Patients and the Lay Community

No activities below were sponsored by outside entities

Books, monographs, articles and presentations in other media

2000	Manual of Pediatric Nutrition (3 rd ed.)	Co-editor	Hendricks KM, Duggan C, Walker WA (eds). BC Decker, Inc. 2000.
2003	Nutrition in Pediatrics: Basic Science and Clinical Applications (3 rd ed.)	Co-editor	Walker WA, Watkins JB, Duggan C (eds). BC Decker, Inc. 2003.
2005	Manual of Pediatric	Co-editor	Hendricks KM, Duggan C (eds).

April 3, 2006	Nutrition (4 th ed.) STEP Procedure Webcast	Commentator	BC Decker, Inc. 2005. http://www.or-live.com/childrenshospitalboston/1361/
2006	Nutritional Issues in the Pediatric Office. Critical Conversations with Pediatric Experts. American Academy of Pediatrics	Commentator	Duggan C, Hall RT, Stallings VA. Prep Audio 2006, volume 1, number 12.
2008	Nutrition in Pediatrics: Basic Science and Clinical Applications (4 th ed.)	Co-editor	Duggan C, Watkins JB, Walker WA (eds). BC Decker, Inc., 2008.
2012	Clinical Management of Intestinal Failure	Co-editor	Duggan C, Gura K, Jaksic T. CRC Press, 2012.
2014	Manual of Pediatric Nutrition (5 th ed.)	Co-editor	Sonneville K, Duggan C. PMPH-USA, Inc., 2014.

Educational material or curricula developed for non-professional students

N/A

Patient educational material

N/A

Recognition

2007	Best Doctors Listing (Pediatric Gastroenterology)	Boston Magazine
2011	Best Doctors	American database

Report of Scholarship

Peer reviewed publications in print or other media

Research investigations

- 1) **Duggan C**, Sommer A, Auer C, Burkhard K. Automated differential threshold perimetry for detecting glaucomatous visual field loss. *Am J Ophthalmol* 1985; 100:420-423.
- 2) Sommer A, **Duggan C**, Auer C, Abbey H. Analytic approaches to the interpretation of automated threshold perimetric data for the diagnosis of early glaucoma. *Trans Am Ophthalmol Soc* 1985; 83:250-267.
- 3) Fayad I, Hashem M, **Duggan C**, Refat M, Bakir M, Fontaine O, Santosham M. Comparative efficacy of rice-based and glucose-based oral rehydration salts plus early reintroduction of food. *Lancet* 1993; 342:772-775.

- 4) Hendricks KM, **Duggan C**, Gallagher L, Carlin A, Richardson D, Collier S, Simpson W, Lo C. Malnutrition in hospitalized pediatric patients: current prevalence. *Arch Pediatr Adolesc Med* 1995;149:1118-1122.
- 5) **Duggan C**, Shamberger RC, Antonioli D, Leichtner AM. Intraoperative endoscopy in the diagnosis of partial intestinal obstruction in infancy. *Dig Dis Sci* 1995;40:2236-2238.
- 6) **Duggan C**, Refat M, Hashem M, Wolff M, Fayad I, Santosham M. How valid are clinical signs of dehydration in infants? *J Pediatr Gastroenterol Nutr* 1996;22:56-61.
- 7) Santosham M, Fayad I, Abu Zikri M, Hussein A, Amponsah A, **Duggan C**, Hashem M, El Sady N, Abu Zikri M, Fontaine O. A double blind clinical trial comparing World Health Organization oral rehydration solution with a reduced osmolarity solution containing equal amounts of sodium and glucose. *J Pediatr* 1996;128:45-51.
- 8) **Duggan C**, Colin A, Higgins L, Rifai N. Vitamin A status in acute exacerbations of cystic fibrosis. *Am J Clin Nutr* 1996; 64:635-639.
- 9) **Duggan C**, Nurko S. "Feeding the gut": The scientific basis for continued enteral nutrition during acute diarrhea. *J Pediatr* 1997, 131:801-808.
- 10) **Duggan C**, Refat M, Hashem M, Fayad I, Santosham M. Interrater agreement in the assessment of dehydration in infants. *J Trop Pediatr* 1997; 43:119-121.
- 11) Fox VL, Abel SD, Malas S, **Duggan C**, Leichtner AM. Complications following percutaneous endoscopic gastrostomy and subsequent catheter replacement in children. *Gastrointest Endosc* 1997; 45:64-71.
- 12) Bousvaros A, Zurakowski, D, **Duggan C**, Law T, Rifai N, Goldberg N, Leichtner AM. Vitamin A and E serum levels in children and young adults with inflammatory bowel disease: effect of disease activity. *J Pediatr Gastroenterol Nutr* 1998; 26:129-135.
- 13) Murray K, Lillehei C, **Duggan C**. Congenital microgastria: treatment with transient jejunal feeding. *J Pediatr Gastroenterol Nutr* 1999; 28:343-345.
- 14) Alam NH, Majumder RN, Fuchs GJ, and the CHOICE Study Group. Efficacy and safety of oral rehydration solution with reduced osmolarity in adults with cholera: a randomised double-blind clinical trial. *Lancet* 1999; 354:296-299.
- 15) **Duggan C**, Lasche J, McCarty M, Mitchell K, Dershewitz R, Lerman SJ, Higham M, Radzevich A, Kleinman RE. Oral rehydration solution for acute diarrhea prevents subsequent unscheduled follow-up visits. *Pediatrics* 1999, 104, e29. <http://pediatrics.org/cgi/content/full/104/3/e29.kbkhb>
- 16) Lyons J, Rauh-Pfeiffer A, Ming-Yu Y, Lu X-M, Zurakowski D, Curley M, Collier S, **Duggan C**, Nurko S, Thompson J, Ajami A, Borgonha S, Young VR, Castillo L. Cysteine metabolism and whole blood glutathione synthesis in septic infants and children. *Crit Care Med* 2001; 29:870-877.
- 17) CHOICE Study Group. Multicenter randomized double blind clinical trial to evaluate the efficacy and safety of a reduced osmolarity oral rehydration salts solution in children with acute watery diarrhea. *Pediatrics*, 2001; 107:613-618.

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- 20) Zinc Against Plasmodium (ZAP) Study Group. Lack of effect of zinc on the treatment of Plasmodium falciparum malaria in children: a randomized controlled trial. *Am J Clin Nutr*, 2002; 76: 805-812.
- 21) **Duggan C**, Penny ME, Hibberd P, Gil A, Huapaya A, Cooper A, Coletta F, Emenhiser C, Kleinman RE. Oligofructose-supplemented infant cereal: two randomized, blinded, community-based trials in Peruvian infants. *Am J Clin Nutr*, 2003; 77:937-42.
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- 23) **Duggan C**, Bechard L, Donovan K, Vangel M, O'Leary A, Holmes C, Lehmann L, Guinan E. Resting energy expenditure changes among children undergoing allogeneic stem cell transplantation. *Am J Clin Nutr* 2003, 78:104-109.
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- 27) Thornley I, Lehmann LE, Sung L, Holmes C, Spear JM, Brennan L, Vangel M, Bechard LJ, **Duggan C**, Guinan E. A multi-agent strategy to decrease regimen-related toxicity in children undergoing allogeneic hematopoietic stem cell transplantation. *Biology of Blood and Marrow Transplantation*, 2004, 10:635-44.
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- 29) **Duggan C**, Fontaine O, Pierce NF, Glass RI, Mahalanabis D, Alam NH, Bhan MK, Santosham M. Scientific rationale for a change in the composition of oral rehydration solution. *JAMA* 2004; 291: 2628-2631.
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- 43) Muthayya S, Dwarkanath P, Mhaskar M, Mhaskar R, Thomas A, **Duggan C**, Fawzi WW, Bhat S, Vaz M, Kurpad A. The relationship of neonatal serum vitamin B12 status with birth weight. *Asia Pac J Clin Nutr* 2006; 15:538-543.
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Letters to the Editor

- 1) **Duggan C**. Oral rehydration solution: buy it, make it (letter). *Contemporary Pediatrics* 1993; 10:12.
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Professional educational materials or reports, in print or other media

- 1) Nutrition Syllabus: An exhaustive syllabus for GI/Nutrition fellows in the Division
- 2) Topics in Clinical Research: Description of clinical research methods for Glaser Pediatric Research Network fellows

Clinical Guidelines and Reports

- 1) Parenteral Nutrition Clinical Practice Guideline, Boston Children's Hospital
- 2) Acute Gastroenteritis Clinical Practice Guideline, Boston Children's Hospital

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

Abstracts

1. Bechard LJ, Feldman HA, Gura K, Venick R, Guinan EC, Gordon CM, **Duggan C**. Bone loss during hematopoietic cell transplantation (HCT) in children. Experimental Biology 2013, poster presentation.
2. McDonald C, Manji K, Kupka R, Okuma J, Bosch R, Kisenge R, Aboud S, Bellinger D, Fawzi W, **Duggan C**. Effect of multiple micronutrient supplementation on the neurodevelopment of HIV-exposed Tanzanian infants. Experimental Biology 2013, poster presentation.
3. Carter RC, Manji K, Kupka R, Okuma J, Kisenge R, Aboud S, Fawzi W, **Duggan C**. Hemoglobin at age 6 weeks and subsequent mortality among HIV-exposed infants. Experimental Biology 2013, oral presentation.
4. McDonald C, Ackatia-Armah R, Kellogg M, Erhardt JG, Doumbia S, Brown KH, **Duggan C**. Changes in plasma citrulline concentration among young Malian children with moderate acute malnutrition following a 12-week dietary intervention. Experimental Biology 2013, poster presentation.
5. Gosselin K, Bechard LJ, Feldman HA, Kellogg M, Gura K, Sonis A, Venick R, Gordon CM, Guinan EC, **Duggan C**. Changes in serum citrulline during hematopoietic cell transplantation (HCT) in children. Experimental Biology 2013, poster presentation.

Narrative Report

My major field of expertise is in the **nutritional management of the sick or ill child**, and this has been reflected in my clinical, administrative and research interests. My expertise in global health has also informed clinical innovations at Boston Children's Hospital. I am board certified in Pediatric Gastroenterology (American Board of Pediatrics) and in Nutrition (American Board of Physician Nutrition Specialists). I am founding Director of the Center for Nutrition at Boston Children's Hospital, a multidisciplinary consult service that provides care for a wide range of complex medical and surgical patients, including those in the three Intensive Care Units and the Stem Cell Transplant Unit. The Center now includes 5 physicians, 24 nutritionists, two nurse practitioners and one pharmacist. My duties as attending physician include the oversight of GI fellows, registered dietitians, and nurses in the nutritional care of patients. The average inpatient census is approximately 50, and coverage is provided 7 days per week, 24 hours per day. I attend on the Clinical Nutrition Service one to three months per year. I also attend weekly in the Gastroenterology Ambulatory Program.

In 1999 with partners in several disciplines, I initiated a multidisciplinary program for children with short bowel syndrome (the Center for Advanced Intestinal Rehabilitation), of which I am Medical Director. The program is also staffed by two attending surgeons, two additional gastroenterologists, fellows in pediatric surgery and gastroenterology, four nurse practitioners, two dietitians, one nurse, a social worker and a pharmacist. Our cohort of patients has increased from 10 to 250 since 1999 and children are referred for evaluation from around the world. Our establishment of this center has identified intestinal rehabilitation after massive resection as a feasible option for many children, leading to drastic reductions in the performance of intestinal transplantations globally. Our team has been in the forefront of research advances in the field, including innovations in the nutritional, hormonal and surgical therapy for these patients.

My **local clinical research interests** are in the nutritional management of sick or catabolic patients, including those with cystic fibrosis, cancer, HIV infection, and intestinal failure. I have led studies evaluating the formulation and effectiveness of oral rehydration solutions (ORS) for the treatment of acute diarrhea. One randomized community-based trial was selected by the American Association of Health Plans as one of the best 50 studies of health interventions in a managed care setting. I am also recognized as a national leader in the field of nutrition in the setting of hematopoietic stem cell transplantation, having performed several studies of the nutritional and energy needs of these patients that have affected practice guidelines.

My **global health research interests** are in the nutritional management of women and children in resource-poor areas. I helped design and carry out two large clinical trials of ORS under the aegis of the CHOICE Study group whose results led the WHO to change global recommendations for the composition of ORS, the first significant change in the composition of ORS since its inception in the 1970's. My work in ORS research has also led to my participation in international (WHO, UNICEF) and national (CDC) policy making groups on the topic of diarrheal diseases. I was the lead author of the first national treatment guidelines for diarrhea management published by the CDC and senior author for their revision (which were endorsed in their entirety by the American Academy of Pediatrics for national use). I have been continuously funded by NIH since 2003 to perform randomized trials of micronutrient supplementation in susceptible women and children in poor countries. I have been recently funded by the Gates Foundation to identify

novel biomarkers of gastrointestinal barrier and absorptive function in these susceptible populations.

My **education efforts** have spanned Boston Children's Hospital, HMS, HSPH as well as Harvard's Faculty of Arts and Sciences (FAS) and several academic institutions globally. Within the Division of Gastroenterology, Hepatology and Nutrition, I oversee the education of all GI/Nutrition fellows in the field of nutrition, which includes didactic sessions, bedside teaching, and outpatient clinics in nutrition. I am a regular lecturer for the residents noon-time lecture series on and am a member of the core faculty for two HMS and one HSPH courses noted above. I was selected by the Training and Education Committee of the North American Society of Pediatric Gastroenterology and Nutrition to co-author training guidelines in the field of nutrition. I have been selected three times by the American Society of Clinical Nutrition to serve as a mentor in the National Clinical Nutrition Internship Program, a nationally competitive award for medical students. I was also selected as a mentor for the Gerber Foundation Fellowship in Pediatric Nutrition, which is a foundation-supported program to increase minority representation in academic medicine. In 2009, with colleagues Wafae Fawzi and Clifford Lo, I inaugurated the General Education course Science and Living Systems 19: Nutrition and Global Health. The course has been well-received by FAS students with enrollment exceeding 200 students in 2012 and 2013. I am also the founding course director of the Bangalore Boston Nutrition Collaborative, an annual two week course in nutrition research methods held at St. John's Research Institute in Bangalore, India.

I have edited three widely read texts in the field of nutrition. The Manual of Pediatric Nutrition is a handbook for medical students, residents and fellows. Review of the 4th edition noted it to be "an excellent book... with a comprehensive description of virtually all topics on pediatric nutrition" (Arch Dis Child 2006; 91:547). With my colleagues Tom Jaksic and Kathleen Gura, I am editor of Clinical Management of Intestinal Failure (CRC Press, 2012), one of the first textbooks in the field of intestinal rehabilitation. Reviews have noted it to be "... an exhaustive reference... well-written... the perfect addition to a learning library" (Nutr Clin Pract 2013; 28:136). I am also Editor-in-Chief of the upcoming 5th edition of Nutrition in Pediatrics: Basic Science and Clinical Applications (PMPH-USA, anticipated 2014). This textbook is a 1000 page standard reference in the field of pediatric nutrition. Reviews in the academic press have noted that previous editions of the book provided "an up-to-date comprehensive review of pediatric nutrition well suited to both pediatricians and nutritionists in basic and clinical sciences" (JAMA, 2004; 291:886), a "valuable text... wonderful reference book.. [and] timely resource" (Arch Pediatr Adolesc Med 2004; 158:604), "an up-to-date, comprehensive textbook of pediatric nutrition" (Am J Clin Nutr 2004; 80:1091), and as "a tour de force...[with] no obvious gaps" (Arch Dis Child 2004; 89:984).