
Medicine®
Wolters Kluwer

March 2019 - Volume 98 - Issue 11
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Medicine. 98(11):e14812, March 2019.

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Medicine. 98(11):e14827, March 2019.

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Section Editor Profiles

Dr. Khaled Ahmed Abdelrahman, MD, FRCS

Ophthalmology

Khaled Ahmed Abdelrahman graduated from the Ains Shams University School of Medicine in Cairo, Egypt in 1990 and received a master's degree in Ophthalmology in 1995. He received his FRCS in Edinburgh in 2002. Dr. Abdelrahman served as the Chief of Cornea, External Eye Disease and Refractive Surgery and the Medical Director of Magrabi- Riyadh Center until May 2015. He served as a consultant in Suliman Al Habib, Olaya Medical Complex, and currently serves as a consultant at Dallah Hospital.

Dr. Abdelraham is a member of the International Society of Refractive Surgery (ISRS), a member of the American Academy of Ophthalmology (AAO), a member of the European Society of Cataract & Refractive Surgeon (ESCRS), member of the Middle East Africa Council of Ophthalmology (MEACO), member of Saudi Ophthalmology Society (SOS), member of Egyptian Ophthalmology Society (EOS) and also a reviewer in the Journal of Refractive Surgery and Journal of Medicine, a former visiting Professor in King Saud University and a Fellow of Royal College of Surgeons of Edinburgh. Dr. Abdelraham is also the representative of the International Society of Refractive Surgery in Saudi Arabia. He has over 30 years of experience and is a registered ophthalmology consultant in many countries, including the UK, Russia, Egypt, Saudi Arabia, Oman, and Kuwait.

TOP

Dr. Somchai Amornyotin, MD

Anesthesiology

Somchai Amornyotin graduated from the Faculty of Medicine Siriraj Hospital, Mahidol University in 1989. He became the staff of the Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand in 1996. Until 2004 he became the associate professor of the Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University. From 2005 until 2009 he was the chief of Anesthesiology Division of Siriraj GI Endoscopy Center, Faculty of Medicine Siriraj Hospital, Mahidol University. His first scientific paper was published in Thailand in 1999.

He has practiced anesthesia for gastrointestinal endoscopy since 2002. He was the committee of Siriraj Gastrointestinal Endoscopy Center, Faculty of Medicine Siriraj Hospital in 2005. More than 90 of his articles have been published in Thai and international medical journals. Dr. Amornyotin is a member and committee of the Royal College of Anesthesiologists of Thailand, the Gastroenterological Association of Thailand, and many scientific societies. He is the reviewer and editor of many international journals.

TOP

Dr. Gunjan Arora, Ph.D.

Clinical Immunology

Gunjan Arora graduated from the University of Delhi and completed research at CSIR-Institute of Genomics and Integrative Biology, New Delhi, India. Dr. Arora's background is in infectious disease and he worked on a wide number of bacterial and parasitic pathogens. Dr. Arora performed his postdoctoral research at Dr. Eric Long's group at NIAID, NIH where he showed the role of natural killer cell-mediated antibody-dependent cellular cytotoxicity against the malaria parasite. Dr. Arora has 10 years of post-PhD experience in global health, immunology, and microbiology. He has 26 publications in peer-reviewed journals about published four book chapters. In the past, he has served as a review for several journals including *Frontiers, MDPI, Nature Press, BMC Microbiology,* and more. Currently, he is working on the immunopathology of Lyme disease and

Dr. Abdelouahab Bellou, MD, MSc, Ph.D.

Critical Care and Emergency Medicine

Abdelouahab Bellou is Professor of Therapeutics and Emergency Medicine, MD, MSc, Ph.D. (University of Rennes 1, France), Adjunct Professor at the Department of Emergency Medicine, Wayne State University. President of the HealthCare Network & Research Innovation Institute, LLC, USA. Former chair of the Section of Geriatric Emergency Medicine of the European Society for Emergency Medicine (EUSEM) and member of the Research Committee of EUSEM. Founder of the Global Network on Emergency Medicine. Prof. Bellou has been committed to the advancement of emergency medicine. He served as a former president of the European Society for Emergency Medicine; he was involved in the development of EM in Europe. Prof. Bellou's expertise areas include healthcare facility designing, research and innovation, clinical immunology and allergy, emergency medicine education, geriatric emergency medicine, acute cardiac care, ED operations improvement, ED design, and layout. He is also a basic science researcher working on the role of potassium voltage-dependent channels in anaphylactic shock.

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Dr. Eric Bush, MD

Palliative Care

Eric Bush is Board Certified in Internal Medicine, Addiction Medicine and Hospice & Palliative Medicine. He currently lives in Maryland and has been practicing medicine for 17 years. He graduated from the State University of New York at Buffalo in 2004, as a Doctor of Medicine. Prior to this, he attended the State University of New York at Buffalo School of Pharmacy receiving a Bachelor of Science degree in 1994. In 1996, Dr. Bush received a Master's in Business Administration from the State University New York at Buffalo School of Management.

Dr. Bush's healthcare career started in 1988 as a combat medic (& later LPN) in the US Army Reserve. After completing pharmacy school, he practiced as a pharmacist with Roswell Park Cancer Institute in Buffalo, NY; completed Internal Medicine Residency with SUNY Buffalo & subsequently worked as a Fellow and Attending Physician for the Pain and Palliative Care Services at the National Institute of Health in Bethesda, MD; as Medical Director for Capital Caring in Washington, D.C. Medical Director of Hospice with Gilchrist and a Geriatrics Attending Physician at Greater Baltimore Medical Center. Dr. Bush previously served as Medical Director of Frederick Memorial Hospital Pain and Supportive Care Services (obtaining Joint Commission Certification for the Inpatient Palliative Care Service), and Medical Director of Hospice of Frederick County which received national recognition during his tenure in 2015 with the Circle of Life Citation of Honor for Excellence in Hospice and Palliative Care. He also served as the Chairman of the Frederick Memorial Hospital Ethics Committee. Dr. Bush currently serves as an Academic Editor and is the Section Chief for Palliative Care for the online journal Medicine.

Since 2016, Dr. Bush haves served (& continues to do so) as the Chief Medical Officer for Hospice of the Chesapeake & Chesapeake Supportive Care located in Pasadena, Maryland. The organization is a community-based non-profit that serves 1200 seriously ill residents daily in Maryland. The organization attained The Joint Commission's Certification in Community Based Palliative Care (one of only 54 programs nationally with this distinction). Dr. Bush also serves as our organization's Occupational Health Physician and has helped our 300 plus employees navigate the ongoing Covid 19 pandemic. Dr. Bush is also an entrepreneur and the CEO for Hospiceandpalliativeboardreview.com

TOP

Dr. Ovidiu Constantin Baltatu, MD, Ph.D.

Cardiovascular

Ovidiu Constantin Baltatu has enjoyed more than 20 years as an MD/Ph.D. scientist, during which time he has run interdisciplinary translational research teams in both academia and the pharmaceutical industry. He has actively contributed to discoveries in areas of the physiopathology of diseases and new diagnosis, therapeutic, and prevention strategies. Dr. Baltatu is currently affiliated with the Center of Innovation, Technology, and Education (CITE) at Anhembi Morumbi University, Laureate International Universities.

TOP

Dr. Lindsay Cormier, Ph.D.

Drugs and Devices

Lindsay Cormier is an Associate Professor at Eastern Kentucky University and holds a Ph.D. in molecular and biomedical pharmacology and a master's in public health. Her biomedical research laboratory investigates the synthesis and development of novel oncological drugs for cancer diagnosis and treatment. In collaboration, Dr. Cormier has patented cutting-edge pharmaceutical targeting compounds towards reproductive cancers. Her research also investigates the use of hospital protocols related to public health issues including transparency, disease reporting and tracking, and pharmaceutical use.

TOP

Dr. Ediriweera Desapriya, Ph.D.

Public Health

Ediriweera Desapriya is a research associate in the Emergency Medicine department at the University of British Columbia. Dr. Desapriya received his Ph.D. at the University of Tsukuba and previously worked in Pediatrics at UBC as a research associate and as a professor at the Institute of Social Science University of Tsukuba.

Dr. Desapriya is an internationally recognized researcher in injury prevention with his most notable research involving indicators of automobile accidents and traffic legislation. Dr. Desapriya has received several grants and awards, including but not limited to the Canadian Institute of Health Research-Emergency Department survey on drug-impaired drivers, the Saskatchewan Pediatric Injury Prevention community grant, the Auto 21 Grant Networks of Centers of Excellence, and the Marquis Who's Who in Medicine and Health Care.

Dr. Desapriya has published more than 100 peer-reviewed research articles, 4 chapters, and a book. He is an Editorial Board member of the *World Journal of Clinical Pediatrics* and *Advances in Automobile Engineering*, a contributing editor for *Global Cardiovascular Health Community*, and a member of *the British Medical Journal*'s online forum. Dr. Desapriya is also a member of the Canadian Association for Road Safety Professionals and a member of the Canadian Council of Motor Transport.

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Dr. Jianxun Ding, Ph.D.

Drugs and Devices

Oncology

Jianxun Ding is a professor at Changchun Institute of Applied Chemistry (CIAC), Chinese Academy of Sciences (CAS), P. R. China. He received his B.S. degree from the University of Science and Technology of China in 2007 and obtained his Ph.D. degree at CIAC, CAS, in 2013 under the supervision of Prof. Xuesi Chen. From 2017-2019, he worked with Prof. Omid C. Farokhzad and Prof. Jinjun Shi from Brigham and Women's Hospital, Harvard Medical School, as a postdoctoral research fellow. His research focuses on the synthesis of functional biodegradable polymers, the development of bioresponsive polymer platforms for controlled drug delivery, the exploitation of polymer-based adjuvants for immunotherapy, and the preparation of polymer scaffolds for regenerative medicine. Dr. Ding has published more than 120 academic articles in mainstream journals, including *Advanced Materials, Progress in Polymer Science, Nano Today, Advanced Functional Materials, ACS Nano, Trends in Biotechnology, Nature Communications, Nano Letters, Biomaterials, Science Bulletin, Journal of Controlled Release*, with over 6,500 citations. He also serves as an Associate Editor of *Frontiers in Biotechnology and Bioengineering*, as Editorial Board Members of *Polymers, Molecules, Pharmaceutics, PLoS ONE*, and *Current Pharmaceutical Design*.

TOP

Dr. Leonardo Roever, MHS, PhD

Global Health

Leonardo Roever is CEO of the Brazilian Meta-Analysis Research Network (BRAMETIS), holds a degree from UNIT (2002), a specialization from UNIFESP (2003) and UFU (2020), a master's degree (2008), a doctorate (2019) and a Post-Doctorate (2021) in Health Sciences from UFU. The total of publications comprises more than 300 articles in journals specialized as an author and/or co-authored, including high-impact journals such as *The Lancet*, *Nature*, *Nature Medicine*, *The Lancet Neurology*, *The Lancet Diabetes & Endocrinology*, *The Lancet Respiratory Medicine*, *The Lancet Global Health*, *European Heart Journal*, *JACC*, *Circulation* and *British Medical Journal* (BMJ). Ad Hoc for the Medical Research Council (MRC) is part of UK Research and Innovation, Patient-Centered Outcomes Research Institute (PCORI-USA) and Health and Medical Research Fund (HMRF) - Hong Kong.

Senior Board Member - *BMC Medical Research Methodology*, Editorial Board (*Neurology*, *International Journal of Cardiology*, *BMC Medical Research Methodology*, *BMC Emergency Medicine* and *Lipids in Health and Disease*), Associated Editor [*BMC Cardiovascular Disorders (Epidemiology)* and *Frontiers in Cardiovascular Medicine*], Section Editor [*Medicine* (USA - Baltimore, Maryland), Academic Editor of *BioMed Research International (Critical Care)*] and others.

TOP

Dr. Lydia Eccersley, Ph.D.

Hematology

Lydia Eccersley is a Consultant Haematologist at St Bartholomew's Hospital in London, UK, where she specializes in Haematological malignancies. Dr. Eccersley completed her general hematology training at Hammersmith and Royal Free Hospitals in London and completed a Ph.D. at Imperial College London, on a mechanism by which EBV promotes lymphoma development.

Dr. Dennis Enix, MBA, DC

Complementary and Alternative Medicine

Dennis Enix, MBA, DC is a musculoskeletal research scientist and former Professor of Research at Logan University in Chesterfield, USA, and a former manufacturing engineer in the aerospace and defense industry. Dr. Enix's research focuses on spinal biomechanics and anatomical research. He has taught courses in Research Methodology, Information Literacy, Anatomy and Physiology, and Clinical Methodology. Dr. Enix completed his Doctoral degree in chiropractic medicine at Logan University and a Fellowship in Rehabilitation Science at the Southern California University of Health Sciences and a Master's Degree in Business Administration from Webster University.

Dr. Enix is a member of Sigma Xi, the Scientific Honor Society, and the North American Spine Society and serves on its Research Council and Clinical Practice Guideline Committee and has co-authored several guidelines and served on several International Delphi panels. Dr. Enix is the Section Editor for complementary and alternative medicine for the Journal Medicine, and on the editorial board of the North American Spine Society journal SpineLine, and the journal Topics in Integrative Health Care and is a reviewer for multiple journals and textbooks. He has authored numerous scientific publications in The Spine Journal, Clinical Anatomy, Physical Medicine & Rehabilitation, Annals of Anatomy, Chiropractic & Manual Therapies, Journal of Chiropractic Medicine, and others and received several federal and private research grants and multiple research awards at national and international conferences.

TOP

Dr. Marcello Iriti, Ph.D.

Nutrition

Marcello Iriti has been studying nutraceuticals, functional foods, and essential oils relevant for human health, focusing on their preclinical (*in vitro*/*in vivo*) and in human pharmacological activities. He has been investigating the health-promoting effects of the traditional Mediterranean diet as well as the ethnopharmacology of herbal remedies of traditional healing systems. Dr. Iriti is a member of the Asian Council of Science Editors and Society of African Journal Editors, a founding member of the Italian Society of Environmental Medicine, a member of the Working Group 'Pharmacognosy and Phytotherapy' of the Italian Pharmacological Society. He holds the main patent for 'Compositions Comprising Rutin Useful for the Treatment of Tumors Resistant to Chemotherapy' (WO2015036875A1; US20160213698; US9757405B2; EP3043821).

TOP

Dr. Nikhil Jain, Ph.D.

Infectious Diseases

Nikhil Jain completed his Ph.D. in Biochemistry from the Indian Institute of Technology, Kanpur. During his postdoctoral research at Michigan State University and Baylor College of Medicine, he studied the structural basis of Ribosome biogenesis in prokaryotes. At present, he is working as a staff scientist at St. Jude Children's Research Hospital in Memphis. He has experience in working in the diverse biomedical field including Microbial genetics, structural biology, and Biochemistry.

TOP

Dr. Sinan Kardeş, MD

Rheumatology

Sinan Kardeş is an Associate Professor at the Istanbul Faculty of Medicine. He received his Doctor of Medicine degree from Marmara School of Medicine in 2013. Dr. Kardeş completed his medical ecology and hydroclimatology residency at Istanbul Faculty of Medicine and he completed his residency training in 2017.

Dr. Kardeş is a member of the International Society of Medical Hydrology and Climatology (ISMH), International Society of Biometeorology (ISB), Society of Medical Ecology, and Hydroclimatology Specialists (SMEHS), Turkish Society of Spa Medicine and Balneology, and Turkish League Against Rheumatism (TLAR). He has research interests in rheumatic and musculoskeletal diseases, exercise, balneotherapy, and randomized controlled trials.

TOP

Dr. Neeraj Lalwani, MD, DABR, FSAR

Radiology

Neeraj Lalwani is an American Board-Certified radiologist working as an Associate Professor of Radiology at VCU School of Medicine, as well as a consultant in the Department of Radiology at VCU Health, Richmond, Virginia. Before joining VCU, he was an Associate Professor of Radiology at Wake Forest University, North Carolina, and Assistant Professor of Radiology and director of Gastrointestinal Imaging at the University of Washington, Seattle.

Born in India, Dr. Lalwani has completed his Abdominal Imaging and Body MRI Fellowships at the University of Texas Health Sciences Centre, San Antonio. He is a recognized and passionate educator in radiology who has a particular interest in pelvic MRI, oncology, gastrointestinal and hepatobiliary imaging.

Dr. Lalwani is an established academician and researcher in radiology and has received the most coveted American Roentgen Ray Society's Figley Fellowship award (2019) and the Radiological Society of North America's Honored Educator award (2020). He has published numerous papers in highly influential journals and has presented numerous invited talks, oral presentations, and educational exhibits at national and international conferences, and won numerous prestigious accolades.

TOP

Dr. Yan Li, MD

Immunology

Surgery

Yan Li worked as a Staff and Research Leader in Colorectal Surgery of Digestive Disease and Surgery Institute in Cleveland Clinic and Assistant Professor in the School of Medicine at Case Western Reserve University in Cleveland, Ohio. He is a resourceful and dedicated medical professional, investigator, and educator in the domain of Medicine, Immunotherapy, Oncology therapy, and Regenerative medicine with 20 years of cumulative direct and indirect patient care as well as 15 years of progressive Clinical and Translational research experiences.

Dr. Li was presented with the Keith Rainin Foundation Synergy Award. He attributes his professional successes to his openness to collaborations. He maintains his professional affiliation with the American Professional Immunologists and the American Heart Association.

TOP

Professor Dan Lipsker, MD

Dermatology

Dan Lipsker is Professor of Dermatology at the University of Strasbourg, France and he works as Dermatologists in the Clinique Dermatologique des Hôpitaux Universitaires de Strasbourg. He is interested in the whole spectrum of clinical dermatology and dermatopathology. He has senior editing activities in dermatology and internal medicine journals and has written and/or edited numerous books, among which the major French Textbook of Dermatology and the leading textbook on Clinical Examination and diagnosis in Dermatology. He has worked and published in many fields, and his main interests include diagnostic reasoning and morphologic approach to skin diseases, skin manifestations of internal diseases, autoinflammatory diseases and the Schnitzler syndrome, connective tissue diseases, Lyme borreliosis, and melanoma epidemiology.

TOP

Dr. Giuseppe Lucarelli, MD, Ph.D.

Urology

Giuseppe Lucarelli currently works as Associate Professor at the Department of Emergency and Organ Transplantation, UNIBA: Universita degli Studi di Bari Aldo Moro (Italy). Dr. Lucarelli is a clinician-scientist, urologist, and transplant surgeon, and his primary research interests are in urologic oncology and kidney transplantation. Dr. Lucarelli has served as an author on over 200 publications.

TOP

Dr. Gaurav Malhotra, MBBS, DRM, DNB

Endocrinology

Gaurav Malhotra is a National Board Certified Nuclear Medicine Physician and Professor of Nuclear Medicine at Homi Bhaba National Institute of the Department of Atomic Energy in India. For the last two decades, he has been working at the Radiation Medicine Centre of Bhabha Atomic Research Centre, where he has been managing thyroid clinics, diagnostic nuclear medicine scans, and targeted therapies. He is a National Medical Council recognized postgraduate teacher, thesis guide, examiner, and assessor for MD nuclear medicine courses in India. He has numerous publications and book chapters in preferred journals and serves on the editorial board of Clinical Nuclear Medicine journal of the USA. His special interests and ongoing clinical research are focused on thyroid disorders, adrenal tumors including paragangliomas, pituitary tumors, other endocrine malignancies, ectopic Cushing's syndromes, and oncogenic osteomalacia.

TOP

Dr. Parag Parekh, Ph.D.

Diagnostic Medicine and Pathology

Parag Parekh received his Ph.D. in Chemistry from the University of Florida at Gainesville. He trained at the interface of the two disciplines as a Chemical Biologist and a Bioanalytical Chemist with a particular focus on generating aptamer probes for varied applications. He was a postdoctoral fellow at the Department of Pathology and Genomic Medicine at Houston Methodist Research Institute and later joined as Research Scientist at the Department of Endocrine Neoplasia and Hormonal Disorders at the MD Anderson Cancer Center. Subsequently, he joined the Baylor College of Medicine/Texas Children's Hospital as a Senior Research Scientist in 2019. Dr. Parekh joined *Medicine* in 2016 and handles papers related to Diagnostic Medicine and Pathology.

TOP

Professor Davor Plavec, MD, MSc, Ph.D

Pulmonology

Davor Plavec leads Research Department at Srebrnjak Children's Hospital. His professional training consisted of Specialist training in Occupational Medicine (Institute for Medical Research and Occupational Health, Zagreb, 2001-04) and successive appointments at the same institution as Senior Scientist and Research Director, and Specialist (2004-05). During the preceding period, he was awarded M.D. (1987), M.Sc. (1991), and Ph.D. (1999) at the Medical School University of Zagreb. After completing his clinical specialist training, he was promoted to the position of Assist. Professor in 2009, which was followed by an Assoc.Professor in 2014 and Full Professor position at the Medical School University JJ Strossmayer, Osijek, Croatia. He is also teaching at several other faculties in Croatia. He also finished Specialist training in Sports Medicine (2011-13).

His research has focused upon the origins and natural history of asthma and allergy across the life-course, with an emphasis on prevention and translation for patient benefit. His research findings are of great practical significance and have informed and changed national and international guidelines on asthma prevention and management. His studies in food allergy substantially impacted clinical practice. His discovery that IgE-response to peanut allergen Ara h 2 is much more predictive of true peanut allergy than standard tests using whole allergen extract marked the start of the component-resolved diagnostics as the new gold standard in clinical practice.

Of merit is his recent pioneering research in the emerging field of biomarkers of diagnosis and control of asthma and COPD: the role of urates in exhaled breath condensate, fractional exhaled breath temperature, and non-invasive lung function diagnostics in small children. His research was funded by several EU (FP6, FP7, HORIZON 2020), national and investigator-initiated grants. He published > 250 publications (> 120 in WoS) with > 2000 citations.

He served for several terms as a Board Member of several professional societies (Croatian Respiratory Society, Croatian Society for Allergy and Clinical Immunology, Croatian Society for Sports Medicine, Croatian Toxicology Society) and is a member of EAACI and ERS.

From 2000-2008 he was acting as Managing Editor of the Croatian edition of JAMA. Acting as Academic editor in Medicine Journal (from 2018) and PLOS ONE Journal (from 2018). He is acting as a reviewer for >20 peer review journals, being rewarded the Top reviewer award by Publons (WoS) in Clinical Medicine and Cross-Field for 2018 and 2019.

Dr. Christine Pocha, MD, Ph.D., MPH, FAASLD

Gastroenterology and Hepatology

Christine Pocha, MD is a board-certified gastroenterologist and transplant hepatologist at Avera Liver Center & Transplant Institute. She holds an appointment as Associate Professor of Medicine at the University of South Dakota. Dr. Pocha completed a Ph.D. in Clinical Pharmacology and an MPH in Clinical Epidemiology at the University of Massachusetts. Her main research and clinic interests include alcoholic and non-alcoholic liver disease, complications of cirrhosis, and hepatocellular cancer. She has presented at national and international meetings and published extensively. She has spearheaded many clinical trials particularly on liver cancer as well as large epidemiology studies. Dr. Pocha earned her medical degree from Friedrich-Schiller-University in Jena, Germany. She completed a residency in internal medicine, subspecialty training in gastroenterology and hepatology including liver transplant at the same university. After further residency training in the U.S. Dr. Pocha has worked at liver transplant centers in the U.S., Germany, and Switzerland. She proudly holds privileges as Honorary Consultant at the Department of Hepatology at King's College in London and goes there as often as time allows. In 2016, she accepted the position as Director of Hepatology and Medical Director of Liver Transplant at Avera. Dr. Pocha was awarded a fellowship to the American Association of the Study of Liver Disease (AASLD). She serves as a chair of the scientific review committee and board member of educational subcommittees for AASLD. She is a member of the European Association for the Study of the Liver (EASL) as well as a primary reviewer at the UNOS National Liver Review Board. She serves on the editorial board as well as an expert reviewer for many GI/Hepatology journals.

TOP

Dr. Khaled Saad, MSc, Ph.D.

Pediatrics

Khaled Saad graduated from Assiut University's programs in Medicine and Surgery in 1997, and he obtained a master's degree (MSc) in Pediatrics in 2003. After that, he joined the Pediatrics Department, at Assiut University, as a staff member teaching pediatrics for medical students and postgraduates. In 2009, he received a Ph.D. degree in clinical pediatrics. He is a professor in the Pediatrics and pediatric neurology, Department at the Assiut University Children's Hospital, the largest pediatric medical center in Upper Egypt, a teaching hospital with more than 550 beds that provides primary and tertiary care for children in all governorates in Upper Egypt. He has a considerable number of international publications (82 publications) plus three book chapters. Prof. Khaled is a section academic editor in 5 journals and an editorial board member of 48 international medical journals in the fields of pediatrics and general medicine. He is a referee in 150 international medical journals.

TOP

Prof. Dr. rer. nat. Oliver Schildgen

Infectious Diseases

Oliver Schildgen received his Dr. rer. nat. (Ph.D.) from the University of Essen. He currently serves as the Head of Molecular Pathology Unit in the Institute of Pathology, Hospital of the Private University Witten/Herdecke. Prof. Dr. Schildgen has authored 190 publications. His primary field of research is medical virology.

Prof. Dr. Schildgen is a member of several scientific societies including the German Society for Virology, the European Society for Clinical Virology, the Paul Ehrlich Gesellschaft für Chemotherapie, and Microbiology Society, UK. Prof. Dr. Schildgen has received several prestigious awards and nominations such as the Medizin-Management Award, the Wolfgang-Stille-Award of the Paul-Ehrlich-Society (P.E.G.) for Chemotherapy, International Abbott Diagnostic Award of the European Society for Clinical Virology, International Meteka-Award of the Austrian Society for Microbiology (ÖGHMP), and more. Prof. Dr. Schildgen has also presented as a keynote lecturer at many conferences including but not limited to the Medical Physiology 2010 conference, Cambridge, UK, the WHO sponsored International Symposium on Viral respiratory disease Surveillance, and the International Symposium on HIV and Emerging Infectious Diseases.

In addition to serving as Section Editor of Infectious Diseases for *Medicine*, Prof. Dr. Schildgen currently serves as the Editor-in-Chief of Reviews in *Medical Microbiology* and as an Academic Editor for *Expert Review of Molecular Diagnostics*, *Cancers*, and *PloS One*. He also served as an Expert Evaluator for numerous councils and foundations such as the French National Research Agency (ANR), the Polish Research Council, the Belgian Ministry of Health, and more.

TOP

Dr. Dominik Steubl, MD

Nephrology

Dominik Steubl attended medical school at the Technical University Munich, Germany from 2003-2009. He completed his residency in internal medicine and nephrology at Hospital Rechts der Isar, Technical University Munich and affiliated hospitals, Germany 2010-2016. He completed research as a postdoc in the Division of Nephrology at Tufts Medical Center from 2017-2018. He is currently serving as a nephrology attending and a faculty member in the Division of Nephrology at Technical University Munich, Germany with a clinical focus on peritoneal dialysis and transplantation immunology.

TOP

Dr. Wen-Wei Sung, MD, Ph.D.

Surgery

Urology

Wen-Wei Sung completed M.D.-Ph.D. program training at Chung Shan Medical University in 2016, followed by one-year post-graduate year training. Afterward, he works in the Chung Shan Medical University and the Hospital as a resident of the Department of Urology and an Assistant Professor at the Chung Shan School of Medicine. His research focuses on oncoimmunology in the aspects of tumor progression and precision medicine. He also interests in the prognostic markers in types of cancer. He is the principal investigator of projects exploring personalized therapeutic strategies via primary cancer cells and in vivo models in urogenital and gastrointestinal cancers. He also serves as the editor (PLOS ONE; Medicine; World Journal of Gastrointestinal Oncology, WJGO) and the reviewer for more than forty journals.

Dr. Giovanni Tarantino, MD

Metabolic Disorders

Giovanni Tarantino received his MD with distinction from Federico II University of Naples School of Medicine in 1970. He received his specialization in Endocrinology and Metabolic Diseases in 1974 and Internal Medicine in 1980. Dr. Tarantino completed his residency at Federico II University School of Medicine Hospital of Naples and later served as a consultant in Hepatology, as a research fellow, a principal clinical investigator in Hepatology, and an adjunct professor of Internal Medicine. Dr. Tarantino also served as Chief of the Hepatology in Internal Medicine and the Director of Investigative and Non-invasive Laboratory of Hepatic Hemodynamics and Ultrasonography of the Federico II School of Medicine Hospital of Naples. He was also the Coordinator at the Specialization School of Internal Medicine of the Federico II University Medical School.

After retiring from his professorship, Dr. Tarantino now serves as a consultant for the Internal Medicine team and a clinical investigator in the field of Hepatology and Clinical Medicine. Dr. Tarantino also serves as an editor for several medical journals including *Advances in Therapy, Medicina, Current Medicinal Chemistry, Frontiers in Medicine, BMC Pharmacology*, and more. Dr. Tarantino has published nearly 200 papers in peer-reviewed international journals and several chapters for books. His area of expertise includes non-alcoholic fatty liver disease, metabolic syndrome, obesity, atherosclerosis, PCOS, HCV-related chronic hepatitis, HCV-related arthritis, therapy of liver cirrhosis, portal hypertension, hepatic encephalopathy, imaging-ultrasonography of liver and spleen, psoriatic arthritis, and inflammation.

TOP

Dr. LW Zheng, DDS, MD, Ph.D.

Oral Medicine

LW Zheng is a clinical associate professor in Oral Medicine in the Division of Oral & Maxillofacial Surgery, Faculty of Dentistry, The University of Hong Kong. Dr. Zheng's research interests include compromised tissue healing/regeneration in the oral and maxillofacial region, as well as oral cancer and pre-cancer conditions. Dr. Zheng published two books, two dissertations, seven book chapters, and over 80 peer-reviewed journal articles.

TOP

Dr. Qinhong Zhang, Ph.D., MD

Neurology

Complementary and Alternative Medicine

Qinhong Zhang is an associate professor of Acupuncture and Moxibustion College of Heilongjiang University and a research scholar at the Stanford University School of Medicine.

Dr. Zhang was elected to join the Outstanding Innovative Talent Plan of both Heilongjiang Province and the Heilongjiang University of Chinese Medicine. He hosted and participated in 13 research projects, including national, provincial, and ministerial levels. Among them, Dr. Zhang hosted one project for the National Natural Science Foundation (Youth Scholar Fund), two projects for the Heilongjiang Provincial Department of Education, and two projects for the Heilongjiang University of Chinese Medicine. He has published three books and 65 research papers in more than 20 prominent international articles. Dr. Zhang won two awards at the ministerial level and one national invention patent.

Dr. Zhang's professional fields of interest include headache, migraine, frozen shoulder, tennis elbow, neck pain, Whiplash, lower back pain, knees pain, sciatica, etc., stroke rehabilitation (all weakness, paralysis, pain, emotional, urinary, and bowel disorders), brain and spinal cord injury, hearing loss, tinnitus, insomnia, stress, anxiety, depression, urinary disorder (urinary incontinence, urinary retention), and bowel disorder (constipation, bowel incontinence, irritable bowel syndrome).

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Telah melaksanakan penelitian dengan judul sebagai berikut :

No.	Judul Karya Ilmiah	Tahun Pelaksanaan
1	Individual and Neighborhood Socioeconomic status in the prediction of liver transplantation among patients with liver disease (C-18)	2019
2	Survival Analysis of Hemodialysis Patients (C-25)	2016
3	Climate Conditions, Larvae Free Number, DHF Incidence in Surabaya Indonesia (C-37)	2013
4	Development of Air Polluter Model for the Carbon Monoxide (CO) Element Based on Mixed Geographically Temporal Weighted Regression (MGTWR) Kriging (C-38)	2014
5	Comparison Between Hotdeck Method and Regression Method in Handling Health Science Missing Data (C-47)	2016
6	Effect of Climate and Sanitation of Rats Population and Index Flea as Indicator Detection Yersinia Pestis in Port Surabaya (C-51)	2016
7	Factors that Affect the Incidence of HIV/AIDS (An Analysis Using Tobit Regression) (C-57)	2016
8	Demographic Transition and Conditions of Health to Elderly People in East Java Province, Indonesia (C-58)	2016
9	Survival Cox Proportion Hazard in Chronic Kidney Disease with Hemodialysis at Haji General Hospital, Surabaya (C-62)	2018
10	Risk Factors Clustering of Malnutrition Case Based on The Utilization of Toddler Health Service at Lamongan Regency in 2016 (C-63)	2018
11	The Role of the National Health Insurance Program in the Use of Health Services in City X (C-74)	2020
12	Multilevel Analysis of Lifestyle and Household Environment for Toddlers With Symptoms of Acute Respiratory Infection (ARI) in Indonesia in 2007, 2012, and 2017 (C-94)	2022
13	Indikator Karakteristik Fisik Rumah Dominan dalam	2016

	Penentuan Status Kemiskinan untuk Program Rehab Rumah tidak Layak Huni di Kabupaten Sidoarjo (C-110)	
14	Perbandingan Tingkat Konsistensi Normalitas Distribusi Metode Kolmogorov-Smirnov, Lilliefors, Shapiro-Wilk, dan Skewness-Kurtosis (C-105)	2014
15	Penerapan Metode Artificial Neural Network dalam Peramalan Jumlah Kunjungan Ibu Hamil (K4) (C-112)	2019
16	Viability Status of Diabetes Melitus Patients with Complications of Hyperglycaemia, Cetoasidosis, and Gangrene (C-119)	2020
17	Prevalensi Rasio Pelayanan Kesehatan Maternal dan Ketersediaan Fasilitas Kesehatan di ERAJKN/KIS di Indonesia (C-124)	2016
18	Faktor Demografi WUS yang Berhubungan Dengan Status Gizi Berdasarkan LILA di Puskesmas Pacarkeling Tahun 2017 (C-126)	2018
19	Comparison of MICE and Regression Imputation for Handling Missing Data (C-130)	2018
20	The Affecting Factors to Grade of Breast Cancer in Dr. Soetomo Hospital of Surabaya (C-133)	2018
21	Risk Factors of HIV and AIDS Mortality At Ibnu Sina Hospital (C-134)	2018
22	Subset Best Method Regression Analysis with Cp Mallows Statistics on Factors Affecting Life Expectancy (C-135)	2022
23	Hubungan Pola Pengasuhan Orang Tua dengan Tindakan Pencegahan Kekerasan Seksual pada Anak (C-136)	2017

Adapun penelitian tersebut layak dilakukan dan menghasilkan output yang sangat baik, meskipun belum ada ***Uji Ethical Clearance*** karena merupakan penelitian yang menggunakan data sekunder.

Demikian surat keterangan ini kami buat untuk dapat dipergunakan sebagai persyaratan pengusulan Jabatan Fungsional Guru Besar.

Surabaya, 24 April 2023
Dekan

Dr. Santi Martini, dr. M.Kes
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Individual and neighborhood socioeconomic status in the prediction of liver transplantation among patients with liver disease

A population-based cohort study in Taiwan

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Abstract

Given the fact that >80% of liver transplantations (LTs) were living donor liver transplantation (LDLT) in Taiwan, we conducted this study to assess whether patients with lower socioeconomic status are subject to a lower chance of receiving hepatic transplantation.

This was a cohort study including 197,082 liver disease patients admitted in 1997 to 2013, who were at higher risk of LT. Personal monthly income and median family income of living areas were used to indicate individual and neighborhood socioeconomic status, respectively. Cox proportional hazard model that considered death as a competing risk event was used to estimate subdistribution hazard ratio (sHR) of LT in association with socioeconomic status.

Totally 2204 patients received LT during follow-up, representing a cumulative incidence of 1.12% and an incidence rate of 20.54 per 10^4 person-years. After adjusting for potential confounders, including age, sex, co-morbidity, location/urbanization level of residential areas, we found that patients with < median monthly income experienced significantly lower incidence of LT (aHR = 0.802, 95% confidence interval (CI) = 0.717–0.898), but those with >- median monthly income had significantly elevated incidence of LT (aHR = 1.679, 95% CI = 1.482–1.903), as compared to those who were not actively employed. Additionally, compared to areas with the lowest quartile of median family income, the highest quartile of median family income was also associated with significantly higher incidence rate of LT (aHR = 1.248, 95% CI = 1.055–1.478).

Higher individual and neighborhood socioeconomic status were significantly associated with higher incidence of LT among patients with higher risk of LT.

Abbreviations: aHR = adjusted hazard ratio, CI = confidence interval, DDLT = deceased donor liver transplantation, ELSD = end-stage liver disease, HbsAg = hepatitis B surface antigen, HCC = hepatocellular carcinoma, ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification, LDLT = living donor liver transplantation, LT = liver transplantation, NHI = National Health Insurance, NHIRD = National Health Insurance Research Database, SES = socioeconomic status.

Keywords: cohort studies, liver transplantation, propensity score, socioeconomic status

Editor: Goran Augustin.

PHW and CYL are contributed equally to this work.

The authors declare that there is no duality of interest associated with this manuscript.

This study was partially supported by a grant from the Ministry of Science and Technology with National Scientific Council (MOST 106-2314-B-006-025), who however has no role in this study.

This study was supported by grant from the Ministry of Science and Technology (grant nos. 107-2314-B-006-057-MY2, MOST 106-2629-B-006-002).

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Supplemental Digital Content is available for this article.

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Medicine (2019) 98:11(e14849)

Received: 11 October 2018 / Received in final form: 31 January 2019 / Accepted: 18 February 2019

http://dx.doi.org/10.1097/MD.0000000000014849

1. Introduction

Mounting evidence has suggested lower rates of access to liver transplantation (LT) among racial minorities, older, single, divorced, immigrants, and patients with lower income or inadequate insurance.[1–4] The reasons for such lower access to LT in these disadvantaged or lower socioeconomic status (SES) people could be multifaceted. A lower SES was found to be associated with lower waiting list registration rates for LT; and wait-list mortality was higher for the public insurance group than for the private insurance group.[5] Additionally, many patients with lower SES were residents of less developed areas, who usually have to face multiple financial and physical barriers to health care access. For example, they need to travel long distances for health care which also adds difficulty in receiving follow-up care.[6,7] Moreover, maintaining or expanding access to LT and the subsequent care is often threatened by the high cost of care, which also poses challenging to poor patient populations.[8]

Despite the above findings, most of the previous studies of the association between SES and prevalence rate of LT came from Western societies, whose context could be different from what has been observed in Taiwan at least on the following aspects.

First, unlike Western societies where most LT were deceased donor liver transplantation (DDLT) are common, there was widespread acceptability of the idea of living donor liver transplantation (LDLT) in East Asia, including Taiwan where more than 80% of LT are LDLT.[9] Additionally, according to Taiwan Human Organ Transplant Act, patients with end-stage liver disease (ESLD) can received liver organ from their adult (>=18 years) relatives who are no more than fifth degree of kinship.[10] This context could make unequal chance of LT for patients in need.

Second, due to the current regionally based allocation system in most Western nations, some patients list for and are transplanted away from home in regions with shorter waits and higher transplant rates. Such geographic disparity in availability of LT causes the dilemma of lower socioeconomic status, multiple listing, and death on the liver transplant waiting list.[11] Although there is also urban–rural difference for the residential areas of Taiwan, there is little barrier against accessibility to health care for most Taiwanese people mainly due to a relatively small area of Taiwan (394 km (245 mi) long, 144 km (89 mi) wide and has an area of 35,883 km^2 (13,855 mi^2). A convenient transportation system further effectively removes physical barriers against LT in areas away from home.

Third, Taiwan launched its National Health Insurance (NHI) program in 1995, which covers nearly all local residents. Such universal health insurance coverage greatly benefits several disadvantaged populations, such as children, elderly people, and non-working adults, who may receive health care at a reasonable cost.[12] The implementation of NHI program is thus expected to effectively remove the financial barriers to LT.

For such unique context mentioned above, Taiwan is a good setting for further examining the relationship between socioeconomic status and prevalence of LT. We hypothesized that there is still socioeconomic inequality in incidence of LT among patients with liver diseases.

2. Methods

2.1. Source of data and study design

The National Health Insurance Research Database (NHIRD) of Taiwan contains a large data size with complete and valid information of diagnoses and procedures in patients admitted. This retrospective cohort study was conducted using the NHIRD of Taiwan, which used the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to define diseases and procedures.[13] We listed the ICD-9-CM codes of procedures and diseases described in this study in Supplementary Table S1, http://links.lww.com/MD/C870. Access to NHIRD was approved by the Review Committee of the National Health Research Institutes. Informed consents from study participants are waived as all study subjects included in the NHIRD are anonymous.

2.2. Identification of study cohort

We used a retrospective cohort study design in this study. A total number of 1,971,811 patients were admitted, between 1997 and 2013, for treatment or operation of various liver diseases. These patients did not have histories of LT. Details of these liver diseases and operations were listed in Supplemental Table S1, http://links.lww.com/MD/C870. Because not all patients admitted for liver diseases and operations are at potential risk of LT, we managed to calculate propensity score in an attempt to include only those who had higher chance of performing LT. Using LT as the dependent variable, we used multiple logistic regression model to calculate probability of performing LT. The independent variables included in the probability prediction model included liver diseases and operations shown in Supplemental Table S1, http://links.lww.com/MD/C870, as well as demographic characteristics, selected co-morbidity, locations of residences, and socioeconomic status presented in Table 1 and Supplemental Table S2, http://links.lww.com/MD/C870.

Supplemental Table S3, http://links.lww.com/MD/C870. The distribution of patients admitted for treatment or operation of various liver diseases and percentage of LT, according to different percentiles of propensity score. A higher propensity score is indicative of greater chance of receiving LT. More than 98.97% (2,968/2,999) of LTs were performed in patients with propensity scores >=50th percentile. The proportion decreased to 91.53%, 73.49%, 56.22%, and 21.97% for the >=75th, >=90th, >=95th, and >=99th percentile, respectively. We used the Youden index to determine that the 90^{th} percentile was the optimal cut-off point[14] of propensity score, which may maximize the sensitivity and specificity of risk prediction. Thus, all patients (n=197,082) with a propensity score greater than 90th (i.e., 0.00341) were included as the study cohort in this study. The c-static for the multiple logistic regression was estimated at 0.79, suggesting a satisfactory level of model discrimination.

2.3. Measures of socioeconomic status

In this study, we used monthly income to indicate a person's SES. The amount of insurance premier in NHI program has been determined according to individual beneficiary's monthly income, which has been frequently used as an indicator of individual's SES.[15,16] Neighborhood SES was defined by the averaged median household income in each of 316 city districts or townships all over Taiwan in 1997–2003.[17] Both personal monthly income and median family income were determined for the year of index date. For a patient who had different monthly incomes in the year of index date, we calculated the mean monthly income for this patient.

2.4. Follow-up, end-point, and covariates

All 197,082 study subjects were followed from the date (i.e., index date) of his/her first hospitalization for treatment or

Table 1

Numbers and prevalence of liver transplantation according to characteristics of study subjects.

Characteristics	No. of patients (%)	No. of person-years observed	No. of patients with LT	Incidence rate of LT (per 10^4 person-years)
Total	197082 (100.00%)	1073157.71	2204	20.54
Demographics				
Sex				
Male	147101 (74.64%)	777616.90	1659	21.33
Female	49981 (25.36%)	295540.81	545	18.44
Age, years				
18−<45	55588 (28.72%)	367793.36	349	9.49
45–54	33209 (17.16%)	187069.13	904	48.32
55–64	41256 (21.32%)	199398.23	810	40.62
>=65	63496 (32.81%)	292526.51	91	3.11
Missing	3533		50	
Co-morbidity				
Liver cancer				
No	97072 (49.25%)	648484.24	831	12.81
Yes	100010 (50.75%)	424673.47	1373	32.33
Liver tumor				
No	174383 (88.48%)	964289.88	1923	19.94
Yes	22699 (11.52%)	108867.82	281	25.81
Hepatitis				
No	848 (0.43%)	3232.73	0	0
Yes	196234 (99.57%)	1069924.97	2204	20.60
Decompensated liver cirrhosis				
No	106312 (53.94%)	666820.97	1006	15.09
Yes	90770 (46.06%)	406336.73	1198	29.48
Liver surgery				
No	164916 (83.68%)	882427.83	1677	19.0
Yes	32166 (16.32%)	190729.87	527	27.63
Heart disease				
No	189501 (96.15%)	1018652.61	2102	20.64
Yes	7581 (3.85%)	54505.10	102	18.71
Renal disease				
No	164984 (83.71%)	907760.32	1810	19.94
Yes	32098 (16.29%)	165397.38	394	23.82
Hypertension				
No	160660 (81.52%)	844154.59	1771	20.98
Yes	36422 (18.48%)	229003.12	433	18.91
Diabetes mellitus				
No	140413 (71.25%)	732450.42	1454	19.85
Yes	56669 (28.75%)	340707.28	750	22.01
Albumin disorder				
No	194773 (98.83%)	1059903.50	2169	20.46
Yes	2309 (1.17%)	13254.21	35	26.41
Coagulopathy				
No	181938 (92.32%)	992078.84	1802	18.16
Yes	15144 (7.68%)	81078.86	402	49.58
Thrombocytopenia				
No	163303 (82.86%)	865470.74	1429	16.51
Yes	33779 (17.14%)	207686.97	775	37.32
Splenomegaly				
No	189776 (96.29%)	1026187.23	2034	19.82
Yes	7306 (3.71%)	46970.48	170	36.19
Alcoholism				
No	183015 (92.86%)	978071.08	2032	20.78
Yes	14067 (7.14%)	95086.63	172	18.09
Drug addiction				
No	196525 (99.72%)	1069129.34	2199	20.57
Yes	557 (0.28%)	4028.36	5	12.41
Propensity score*				
<Q1	47715 (24.21%)	302562.91	219	7.24
Q1−<Q2	50589 (25.67%)	291282.91	297	10.20
Q2−<Q3	49372 (25.05%)	224420.15	500	22.28
>=Q3	49406 (25.07%)	254891.74	1188	46.61

(*continued*)

Table 1
(continued).

Characteristics	No. of patients (%)	No. of person-years observed	No. of patients with LT	Incidence rate of LT (per 10^4 person-years)
Locations of residences				
Urbanization level				
Urban	45660 (23.21%)	257413.81	616	23.93
Satellite	57834 (29.40%)	315669.42	662	20.97
Rural	93236 (47.39%)	496782.27	916	18.44
Missing	352		10	
Geographic location				
Northern	72822 (37.02%)	411613.16	927	22.52
Central	40998 (20.84%)	224890.91	567	25.21
Southern	75646 (38.45%)	394466.11	645	16.35
Eastern and remote	7264 (3.69%)	38895.33	55	14.14
Missing	352		10	
Measures of socioeconomic status				
Monthly income[†]				
Dependents	46481 (23.59%)	243014.40	499	20.53
<Median	118096 (59.94%)	637733.19	1061	16.63
>=Median	32449 (16.47%)	191606.54	644	33.61
Missing	56		0	
Median family income[‡]				
<Q1	14165 (8.78%)	69715.37	153	21.95
Q1−<Q2	23927 (14.83%)	120930.76	248	20.51
Q2−<Q3	37584 (23.29%)	191540.16	456	23.81
>=Q3	85673 (53.10%)	464750.90	1163	25.02
Missing	35733		184	

[*] Propensity score: Q1 = 0.0043, Q2 = 0.0059, and Q3 = 0.0106
[†] Median = 21,900 NTD (1 USD ≅ 30 NTD)
[‡] Q1 = 447,000, Q2 = 477,000, and Q3 = 528,000 New Taiwan Dollars (NTD); 1 USD ≅ 30 NTD.
LT = liver transplantation.

operation of various liver diseases in 1997–2013 to the occurrence of LT, based on the medical orders (liver organ receipt: 75022B 75021B, 75020B) and LT operation codes (ICD-9-CM, 50.5X, V59.6, V42.7, or V42.9), death, or end of 2013. During the follow-up period, 2204 patients received LT, representing a cumulative LT incidence of 1.12%. Figure 1 illustrates the study patients' enrollment and follow-up.

To avoid confounding, information of a number of potential risk factors for LT was also retrieved from the NHI medical claims and registries of beneficiaries at baseline, namely, prior to and on the index date. These potential confounders included age, sex, selected co-morbidity of liver disease (see Supplemental Table S1, http://links.lww.com/MD/C870), and geographic locations/urbanization level of residence. The geographic location was defined as the northern, central, southern, and eastern parts of Taiwan. The categorization of urbanization level was based on the classification scheme proposed by Liu *et al*[18] who classified all 316 cities and townships of Taiwan into 7- ordered levels of urbanization according to various indicators, including population density, proportion of residents with college or higher education, percentage of elderly (>65 years) people, proportion of the agricultural workforce, and number of physicians per 105 people. Adjustment for the geographic locations and level of urbanization may help reduce the presence of an urban-rural difference in accessibility to medical health services in Taiwan.[19]

2.5. Statistical analysis

Person-years from index date to the occurrence of LT, death, or end of 2013 was calculated for each study patient. We then calculated the overall and specific incidence rate of LT, according to various characteristics of study patients. We then conducted Cox proportional hazard regression models to estimate the hazard ratios (HRs) of LT in association with patient's individual and neighborhood socioeconomic status. Since there was a large number of deaths that occurred during follow-up, the potential effect of competing mortality should be taken into account to estimate the relative hazard.[20] By taking death as a competing risk event and LT the outcome event of interest, sub-distribution hazard ratios (sHRs) were estimated using the method proposed by Fine and Gray.[21] Multivariate regression analyses were sequentially constructed. The first model was established by adjusting the propensity score; then, selected co-morbidity associated with liver disease was additionally adjusted. The full model will further adjust for patients' age, sex, and location/urbanization level of residential areas.

Missing information on the variables analyzed in this study was not managed due to only very few of them. All statistical analyses were performed with SAS (version 9.4; SAS Institute, Cary, NC). A *P*-value <.05 was considered statistically significant.

3. Results

Over 1,073,157.71 person-years of follow-up, 2204 patients received LT, representing a prevalence rate of 20.54 per 10^4 person-years. Male patients had a slightly higher LT incidence rate than females (21.33 vs 18.44 per 10^4 person-years). Compared to middle-aged patients (40.62–48.32 per 10^4 person-years), those younger than 45 years (9.49 per 10^4

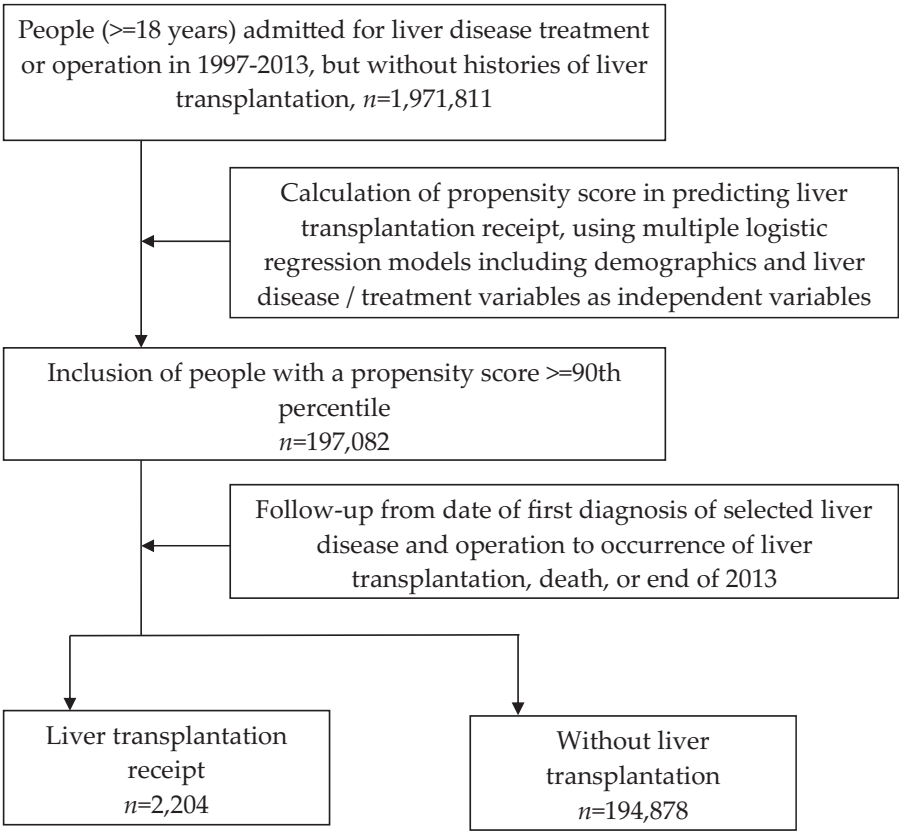

Figure 1. Flowchart of study patients' enrollment and follow-up.

person-years) and 65 years and older (3.11 per 10^4 person-years) had much lower incidence rate of LT. Patients with co-morbidity related to liver disease were found to consistently experience higher incidence of LT, except those with hypertension, alcoholism, and drug addiction (Table 1).

There is a gradient relationship between urbanization level and LT incidence, where patients living in the urban areas had the highest incidence rate of LT (23.93 per 10^4 person-years), followed by those from satellite city districts/townships (20.97 per 10^4 person-years) and rural areas (18.44 per 10^4 person-years). Compared to southern, eastern, and remote areas, northern and central parts (more developed) of Taiwan also had higher incidence rates of LT. With respect to personal monthly income, patients who had higher than median monthly income had twice prevalence rate of LT than those who had monthly income lower than median (33.61 vs 16.63 $\times$ 10^4 person-years). Additionally, the highest LT incidence rate was also observed in patients with the highest quartile of neighborhood median family income (25.02 $\times$ 10^4 person-years). The prevalence rate for the patients in the other 3 quartiles were lower at 23.81 $\times$ 10^4 person-years (Q2-<Q3), 20.51 $\times$ 10^4 person-years (Q1−<Q2), and 21.95 $\times$ 10^4 person-years (<Q1) (Table 2).

Table 2

Competing risk regression analyses of measures of socioeconomic status in predicting liver transplantation receipt.

	Subdistribution hazard ratios (sHRs) of liver transplantation receipt			
Measures of socioeconomic status	**Crude estimates (95% CI)**	**Model 1[*] (95% CI)**	**Model 2[†] (95% CI)**	**Model 3[‡] (95% CI)**
Monthly income[§]				
Dependents (ref.)	1.000	1.000	1.000	1.000
<Median	0.830 (0.746–0.923)	0.825 (0.742–0.918)	0.953 (0.854–1.063)	**0.802 (0.717–0.898)**
>=Median	1.879 (1.672–2.112)	1.824 (1.622–2.052)	2.174 (1.924–2.456)	**1.679 (1.482–1.903)**
Median family income of residential city/township[‖]				
<Q1	1.000	1.000	1.000	1.000
Q1−<Q2	0.951 (0.777–1.163)	0.958 (0.783–1.173)	0.945 (0.772–1.155)	0.952 (0.778–1.164)
Q2−<Q3	1.130 (0.941–1.357)	1.130 (0.940–1.359)	1.112 (0.926–1.335)	1.107 (0.922–1.329)
>=Q3	1.272 (1.075–1.505)	1.267 (1.069–1.502)	1.263 (1.067–1.495)	**1.248 (1.055–1.478)**

[*] Adjustment for propensity score

[†] Adjustment for propensity score and selected co-morbidity

[‡] Adjustment for propensity score, selected co-morbidity, age, and sex

[§] Median = 21,900 NTD (1 USD ≅ 30 NTD)

[‖] Q1 = 447,000, Q2 = 477,000, and Q3 = 528,000 New Taiwan Dollars (NTD); 1 USD ≅ 30 NTD.

Results from Cox regression models with sequential adjustment for potential confounders were similar. The full mode (i.e., Model 3) indicated that compared to dependents (not actively employed), patients with < median monthly income experienced significantly lower incidence rate of LT [aHR = 0.802, 95% confidence interval (CI) = 0.717–0.898], but those with >= median monthly income had significantly elevated prevalence rate of LT (aHR = 1.679, 95% CI = 1.482–1.903). Compared to those living in areas with lowest quartile of median family income (reference group), only those in the highest quartile showed significantly higher incidence rate of LT (aHR = 1.248, 95% CI = 1.055–1.478). Those who lived in areas with median family income within the inter-quartile range (i.e., Q1 – <Q3) showed no significant difference in LT incidence, in comparison with the reference group (Table 2).

4. Discussion

Even with a context different from that of Western society, this study still observed an inverse association between personal and neighborhood SES status and incidence of LT in Taiwan. Liver disease patients with higher incomes or living in areas with the highest quartile of median family income were observed to have significantly higher incidence rate of LT. Such findings are unlikely to be accounted by a number of known factors that may influence the chance of LT receipt, including demographic characteristics, live disease related co-morbidity, and rural–urban difference in accessibility to healthcare.

Although our study findings are essentially similar to what have been observed in studies of Western societies, interpretations of study findings might not be exactly the same as explanations commonly made in previous studies due to dissimilar context. Because more 80% of LT are LDLT in Taiwan,[9] and the donors of liver organ must be close relatives of patients, the chance of LT may not be equal for all ESLD patients in Taiwan. For examples, patients without relatives eligible for liver organ donations are forced to register with the waitlist for DDLT, for which the time-to-LT is much longer than receiving LDLT.

An earlier Taiwanese study showed a clustering of viral hepatitis in families of patients with chronic liver diseases, likely due to infection and common genetic origins.[22] Yu et al[23] analyzed a total of 671 first-degree relatives of HBsAg-positive hepatocellular carcinoma (HCC) cases in Taiwan, who were from 165 simplex families defined as having only one HCC case and 72 multiplex families with more than one case, and found that familial aggregation of HCC in HBsAg carriers is associated with familial clustering of liver cirrhosis. A recent Taiwanese study also suggested different genetic susceptibility between familial and sporadic HBV-related HCC.[24] Such family clustering in liver disease might have limited the availability of living donors for lower SES patients with ESLD in Taiwan. Additionally, a multiple-nation study demonstrated that socioeconomic indicators are strong predictors of hepatitis A seroprevalence rates in the Middle East and North Africa, where the prevalence of viral hepatitis A was higher among lower SES populations.[25] The review by Chak et al[26] also indicated that social, cultural, and language barriers may prevent effective implementation of interventions for screening and treatment of chronic hepatitis B and C. Disadvantaged people were particularly vulnerable to lack of such interventions. Because of higher prevalence of liver disease in families with lower SES, the ESLD patients from lower SES families might face considerable lack of potential family donors. Given the fact that the prevalence of HBsAg in the general population of Taiwan was the highest in the world (approximately 11%–20%) before the launch of the universal hepatitis B vaccination in 1984,[27] such problem could be even more imperative in Taiwan

The other reason that could possibly explain our findings is poor survival of the liver disease patients with lower SES. Although we managed to consider liver disease related co-morbidity in the regression model, this way of doing may not fully account for the risk factors that may influence survival. A recent review of studies conducted Singapore where there is also little physical barrier to accessibility of health care, like Taiwan, also observed disparity in health in association with SES. This review found that people staying in public rental housing were associated with poorer health status and outcomes, mainly through lower participation in health screening, preferred alternative medicine practitioners to Western-trained doctors for primary care, and lower utilization of primary care.[28] This review highlights the importance of health behavior and health literacy in explaining the SES related health disparity. A poor survival rate of patients with lower SES for reasons other than co-morbidity related disease burden could be responsible, at least to some extent, for the lower LT prevalence noted among patients with lower SES in our studies.

One of the strengths involved in this study was that this is the first study to investigate the relationship between SES and receipt of LT under Taiwan's specific context. While LDLT quickly became the predominant form of LT in most Asian countries, it did not find such widespread acceptance in the Western societies. Such differences are primarily due to cultural, religious, and political reasons.[29] Additionally, this study was based on Taiwan's NHI claim data, which provides complete information of all LT, which makes the estimations of LT incidence valid. On the other hand, this study was limited by inadequate consideration of liver disease severity. The SES disparities in LT prevalence could be due to dissimilarity of disease severity or necessity between people with lower and higher SES. However, we managed to minimize such residual confounding by adjusting propensity score and co-morbidity in the regression models. One major limitation of our study was that generalizability of our study results could be limited as the context in Taiwan is different from that of Western society. Taiwan is relatively small in its land, so that the regional variation in transplant rates is expected to be small. In addition, under the universal health insurance coverage of all Taiwanese residents, the disadvantaged populations, such as children, elderly people, and nonworking adults may receive health care at a reasonable cost, which greatly increases the chance of LT for those disadvantaged populations.

In conclusion, our study noted that higher individual and neighborhood socioeconomic status were significantly associated with higher prevalence rates of LT. Although findings from this study are of lesser clinical implications, reallocation of medical resources that may improves the availability of LT for those end-stage liver disease patients should be considered by health policy makers in Taiwan.

Acknowledgment

The authors are profoundly grateful to Drs Carol Strong, Yih-Jyh Lin, and Yao-Li Chen for their comments during the preparation of manuscript.

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