

MARIEL S. LAVIERI

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ACADEMIC APPOINTMENT

THE UNIVERSITY OF MICHIGAN, Industrial and Operations Engineering, College of Engineering
Assistant Professor January 2010 –
Visiting Scholar November 2009 – December 2009

RESEARCH INTERESTS

Applications of Operations Research to Healthcare

Medical Decision Making: Disease Modeling; Treatment Decisions; Outcomes Measurement; Screening and Monitoring Rules

Policy and Operations: Health Workforce Planning; Patient Flow Modeling; Training; Attrition; Capacity Planning; Promotion Rules; Learning; Nursing; Global Health; Resource Allocation, Hospital Readmissions

Methodology

Dynamic Programming; Stochastic Control; Partially Observable State Space Models (including Kalman Filter); Applied Statistics; Bayesian Updating; Optimization; Linear Programming

EDUCATION

PhD in Management Science

Sauder School of Business - University of British Columbia, Vancouver, BC (2004-2009)

Advisor: Dr. Martin L. Puterman

Dissertation Title: Nursing Workforce Planning and Radiation Therapy Treatment Decision Making: Two Healthcare Operations Research Applications

Master of Management Science

Canadian Operational Research Society Diploma in Operational Research

Sauder School of Business - University of British Columbia, Vancouver, BC (2002-2004)

Advisor: Dr. Martin L. Puterman

Dissertation Title: An LP Based Distribution Network Planning Tool for a Large Pulp and Paper Company

Bachelor of Science

Industrial and Systems Engineering Major, Contrabass Performance Minor; *Summa Cum Laude*
University of Florida, Gainesville, Florida (1997-2002)

Bachelor of Arts

Statistics Major; *Summa Cum Laude*

University of Florida, Gainesville, Florida (1997-2002)

TEACHING EXPERIENCE

UNIVERSITY OF MICHIGAN (Ann Arbor, Michigan)

New courses developed

IOE 513: Seminar in Health Care Operations Research: The purpose of this course is to provide students with an overview of some of the many applications of operations research in healthcare and to motivate students to contribute to this growing literature. It surveys and evaluates research done in this field and addresses some of the technical issues encountered when developing healthcare operations research models.

Courses taught at U of M

Course #	Course title	Teaching Role	Term
<i>IOE 513</i>	<i>Healthcare Oper Res</i>	<i>Instructor</i>	<i>Winter 14</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Winter 14</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Fall 13</i>
<i>IOE 440</i>	<i>Op. Analysis and Mgmt</i>	<i>Instructor</i>	<i>Fall 13</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Winter 13</i>
<i>IOE 513</i>	<i>Healthcare Oper Res</i>	<i>Instructor</i>	<i>Fall 12</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Fall 12</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Winter 12</i>
<i>IOE 591</i>	<i>Healthcare Oper Res</i>	<i>Instructor</i>	<i>Fall 11</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Fall 11</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Winter 11</i>
<i>IOE 899</i>	<i>IOE Seminar</i>	<i>Instructor</i>	<i>Winter 11</i>
<i>IOE 591</i>	<i>Healthcare Oper Res</i>	<i>Instructor</i>	<i>Fall 10</i>
<i>IOE 316</i>	<i>Intr Markov Proc</i>	<i>Instructor</i>	<i>Fall 10</i>
<i>IOE 899</i>	<i>IOE Seminar</i>	<i>Instructor</i>	<i>Fall 10</i>

Ph.D. committees Chaired/co-chaired

- Gregory Schell, Anticipated graduation: May 2015, “Personalized Medicine in Optimal Chronic Disease Management”. Chair. Awards: 2012 Doing Good With Good OR, First Prize; 2013 Society for Medical Decision Making Lee Lusted Award for Quantitative Methods and Theoretical Developments, First Prize.
- Elliot Lee, Anticipated graduation: May 2016, “Resource Allocation in Chronic Disease Screening”. Chair. Awards: 2012 NSF Graduate Research Fellowship; 2012 University of Michigan Bonder Scholar.

Other Ph.D. students for whom significant guidance has been provided

- Pooyan Kazemian – Industrial and Operations Engineering, Current student. Awards: 2013 Bonder Scholarship for Applied Operations Research in Health Services, First Price.
- Jonathan E. Helm – Industrial and Operations Engineering, Current position: Kelley School of Business, Indiana University. Awards: 2012 Doing Good With Good OR, First Prize.
- Weihong Hu – H. Milton Stewart School of Industrial and Systems Engineering, Georgia Institute of Technology, Current student. Awards: 2013 Public Programs, Service and Needs Paper Competition, Honorary Mention.

- **Doctoral committee member**
- Jivan Deglise-Favre-Hawkinson – Industrial and Operations Engineering, Current student
- Amir Sadrpour – Industrial and Operations Engineering, Current student
- Chate Eamrunroj – Industrial and Operations Engineering, Current student
- Chien-Chih You – Electrical Engineering, Defense: June 2012

M.S. students advised/co-advised

- Kaiyue Zheng, 2013, “Validation of Estimation Model of the Time and Value of Neoadjuvant Prostate-Specific Antigen Nadir”, Current status: Applying to PhD programs
- Ming Liu, 2012, “Modeling Screening of Hepatocellular Carcinoma through Markov Decision Models”, Current status: Unavailable
- Jingnan Wang, 2011, “Application of TNT Algorithm to Guide Monitoring of Glaucoma Patients”, Current status: Operations Research Analyst, Reddwerks Corporation
- Valerie Chase, 2011, “Predicting Emergency Department Volume using Forecasting Methods to Create a “Surge Response” for Non-Crisis Events”, Current position: VA Ann Arbor Healthcare System
- Luying Wang, 2010, “Resource Allocation: The Trade-off Between Treatment and Prevention”, Current position: Business Technology Consulting with Deloitte Consulting; Detroit Office
- Yedan Yin, 2010, “Understanding Emergency Department Crowding”, Current position: Nexteer Automotive

Undergraduate students advised in independent/directed studies

September 2013 – present

- Julien Brathwaite, IOE Sophomore
- Sam Devaprasad, Eng Sophomore
- Michael Hu, Dual Major Eng and Mathematics
- Filip Jankovic, IOE Sophomore
- Manqi Li, IOE Junior
- Xiang Li, IOE Senior
- Jianyu Liu, IOE Junior
- Monique Manners, LS&A Junior
- Kunal Sanghani, IOE Senior
- Kedi Wu, IOE Junior
- Yongcai Xu, IOE Senior
- Han Lin Yeo, IOE Senior
- Alexandra Zalewski, Eng Freshman

September 2012 – August 2013

- Julien Brathwaite, IOE Freshman
- Sam Devaprasad, Eng Freshman
- Filip Jankovic, IOE Freshman
- Michael Hu, Dual Major Eng and Mathematics

- Xiang Li, IOE Junior
- Xiang Liu, IOE Senior
- Channa Schramm, LS&A Junior
- Pamela Martinez Villarreal, SROP: UTEP Eng Junior
- Yongcai Xu, IOE Junior

September 2011 – August 2012

- Francisco Aldarondo, SROP: University of Puerto Rico – Mayaguez Eng Junior
- Amanda Bayagich, Eng Freshman
- Sean Locke, Eng Freshman
- Xiang Liu, IOE Junior
- Nan Wang, Eng Junior
- Nan Zhong, IOE Senior

September 2010 – August 2011

- Paras Garg, Eng Freshman
- Emily Kupa, Eng Freshman
- Kyle Ogrodzinski, IOE Senior
- Jade Watts, IOE Junior

January 2009 – August 2010

- Jade Watts, IOE Sophomore

Other teaching experience

SAUDER SCHOOL OF BUSINESS (Vancouver, British Columbia)

Statistics Instructor – 2007

Comm 291: Application of Statistics in Business

Teaching Assistant – 2004-2008

Graduate level Decision Analysis

Graduate level Forecasting for Management

Graduate level Introduction to Logistics and Operations Management

UNIVERSITY OF FLORIDA (Gainesville, Florida)

Statistics Tutor – 2000-2001

Regression Analysis

Probability Theory

Nonparametric Statistical Methods

Design of Experiments

PUBLICATIONS AND SCHOLARLY PRESENTATIONS¹

Full articles in refereed publications

1. M. Hu*, B. Jacobs, H. Chang, J. Ye, J. Brathwaite*, T. Morgan, J. S. Montgomery, K.S. Hafez, A.Z. Weizer, S. Gilbert, C.T. Lee, M.S. Lavieri, J.E. Helm, B.K. Hollenbeck, T.A. Skolarus, Sharpening the focus on causes and timing of readmission after radical cystectomy for bladder cancer, *Cancer* (accepted)
2. G. Schell, M.S. Lavieri, J. D. Stein and D. Musch. Filtering Data from the Collaborative Initial Glaucoma Treatment Study for Improved Identification of Glaucoma Progression. *BMC Medical Informatics and Decision Making* 13(1): 137-145. 2013
3. J.D. Piette, J.B. Sussman, P.N. Pfeiffer, M.J. Silveira, S.S. Baveja, M.S. Lavieri, Maximizing the Value of Mobile Health Monitoring by Avoiding Redundant Patient Reports: Prediction of Depression-Related Symptoms and Adherence Problems in Automated Health Assessment Services. *Journal of Medical Internet Research* 15(7): e118. 2013
4. E. Lee, S. Edward, A. Singal, M.S. Lavieri, M. Volk, Improving Screening for Hepatocellular Carcinoma by Incorporating the Pattern of Alpha-fetoprotein over Time. *Clinical Gastroenterology and Hepatology*. Volume 11: No 4: 437-440. 2013
5. M. Foo, M.S. Lavieri, T. Pickles. Impact of Neoadjuvant Prostate-Specific Antigen Kinetics on Biochemical Failure and Prostate Cancer Mortality: Results From a Prospective Patient Database. *International Journal of Radiation Oncology*Biolog*Physics*. Volume 85: No 2: 385-392. 2013
6. M.S. Lavieri, M.L. Puterman, S. Tyldesley, W.J. Morris. When to Treat Prostate Cancer Patients Based on their PSA Dynamics. *IIE Transactions on Healthcare Systems Engineering*. Volume 2: No.1: 62-77. 2012
7. V. Chase, A.M. Cohn, T. Peterson, M.S. Lavieri. Predicting Emergency Department Volume using Forecasting Methods to Create a “Surge Response” for Non-Crisis Events. *Academic Emergency Medicine*. Volume 19: No. 5: 569-576, 2012
8. M.S. Lavieri, M.L. Puterman, Optimizing Nursing Human Resource Planning in British Columbia. *Health Care Management Science*. 12: 119-128. 2009
9. M.S. Lavieri, S. Regan, M.L. Puterman, P.A. Ratner. Using Operations Research to Plan the British Columbia Registered Nurses’ Workforce. *Health Care Policy*. Volume 4: No. 2. 2008
10. J. Dekle, M.S. Lavieri, E. Martin, H. Emir, R.L. Francis. A Florida County Locates Disaster Recovery Centers. *Interfaces*. Volume 35: Issue 2. Mar.-Apr. 2005

Articles under review

1. J. Helm, M.S. Lavieri, M. Van Oyen, J. D. Stein and D. Musch. Dynamic Forecasting and Control Algorithms of Glaucoma Progression for Clinician Decision Support, manuscript submitted to *Operations Research* (third review)

¹ Throughout this section, I:

- Underlined the names of current graduate student(s) to whom I have provided significant guidance
- Double underlined the names of former graduate student(s) to whom I have provided significant guidance
- Underlined the names of undergraduate student(s) and noted by an asterisk * after their name

2. G. Schell, M.S. Lavieri, J. Helm, X. Liu*, D. Musch, M. Van Oyen, J. D. Stein. Using Filtered Forecasting Techniques to Determine Personalized Monitoring Schedules for Patients with Open-Angle Glaucoma, manuscript submitted to *Ophthalmology* (second review)
3. E. Lee, M.S. Lavieri, M. Volk, Y. Xu* Designing Learning Based Policies for Hepatocellular Carcinoma Screening under Constrained Resources (under first review)

Working papers

4. W. Hu, M.S. Lavieri, A. Toriello, X. Liu*. Strategic Health Workforce Planning.
5. G. Schell, M.S. Lavieri, W. Wiitala, J. Sussman, R. Hayward. Modeling Patient-Specific Treatment Outcomes for Improved Coronary Heart Disease Management.
6. Lee E., M.S. Lavieri, M. Volk. Screening for Hepatocellular Carcinoma: An Application of Dynamic Allocation Indices.
7. G. Schell, M.S. Lavieri, X. Liu*, A. Toriello, K. Martyn, G. Freed. Strategic Planning of Pediatric Nurse Practitioners: How Policy Changes Yield Self-Sufficiency.
8. M. Hu*, M.S. Lavieri, J. Helm, K. Wu, T.A. Skolarus. Readmissions Interventions through Delay Time Analysis.
9. M.S. Lavieri, M.L. Puterman, S. Tyldesley, W.J. Morris. A New Approach for Estimating the Time and Value of Neoadjuvant Prostate-Specific Antigen Nadir.

Refereed conference proceedings papers

10. E. Lee, Lavieri MS, Volk M. Evaluating Hypothetical Screening Policies on Historical Patient Data. *Proceedings of Data Mining and Health Informatics Workshop 2012*
11. G. Schell, M.S. Lavieri, Filip Jankovic, R. Hayward, J. Sussman, W. Wiitala. Parameterization of Simulation to Compare Hypertension Treatment Policies. *Proceedings of Data Mining and Health Informatics Workshop 2013*

Refereed conference summaries or abstracts

12. G. Schell, M.S. Lavieri, J. D. Stein and D. Musch. Logistic Regression with Filtered Data to Improve Progression Identification. *Society for Medical Decision Making Annual Meeting 2013*
13. G. Schell, M.S. Lavieri, J. Helm, X. Liu*, D. Musch, M. Van Oyen, J. D. Stein. Comparison of Control Algorithms for Scheduling Testing Visits. *Society for Medical Decision Making Annual Meeting 2013*
14. M. Hu*, B. Jacobs, H. Chang, J. Ye, J. Brathwaite*, T. Morgan, J. S. Montgomery, K.S. Hafez, A.Z. Weizer, S. Gilbert, C.T. Lee, M.S. Lavieri, J.E. Helm, B.K. Hollenbeck, T.A. Skolarus, Understanding Readmissions After Cystectomy. *American Urological Association North Central Section 87th Annual Meeting 2013*
15. J. D. Stein, J. Helm, M.S. Lavieri, , D. Musch, G. Schell, M. Van Oyen, Using Filtered Forecasting Techniques to Determine Personalized Monitoring Schedules for Patients with Open Angle Glaucoma. *5th World Glaucoma Congress 2013*
16. P. Kazemian, J. Helm, M.S. Lavieri, J.D. Stein, M. Van Oyen. Optimal Simultaneous Dynamic Monitoring and Treatment Control for Chronic Diseases. *Institute for Operations Research and the Management Sciences Healthcare 2013*

17. G. Schell, M. Lavieri, R. Hayward, J. Sussman, W. Wiitala. Risk-Sensitive Treatment Decisions to Minimize Coronary Heart Disease Events. *Institute for Operations Research and the Management Sciences Healthcare* 2013
18. E. Lee, M. Lavieri, M. Volk. Screening for Hepatocellular Carcinoma in a Capacitated System. *Institute for Operations Research and the Management Sciences Healthcare* 2013
19. W. Hu, M.S. Lavieri, A. Toriello, X. Liu*. Strategic Health Workforce Planning. *Institute for Operations Research and the Management Sciences Healthcare* 2013
20. M.S. Lavieri, J. Helm, G. Schell, M. Van Oyen, D. Musch, J. D. Stein, Personalizing the Frequency and Timing of Testing to Check for Glaucoma Progression: a Novel Approach. *The Association for Research in Vision and Ophthalmology* 2013
21. J. D. Stein, J. Helm, M.S. Lavieri, , D. Musch, G. Schell, M. Van Oyen, Using Filtered Forecasting Techniques to Determine Personalized Monitoring Schedules for Patients with Open Angle Glaucoma. *American Glaucoma Society Annual Meeting* 2013
22. Lee, E., S. Edward, A. Singal, M.S. Lavieri, M. Volk, Improving Screening for Hepatocellular Carcinoma by Incorporating the Pattern of Alpha-fetoprotein over Time. *American Association for the Study of Liver Diseases Annual Meeting* 2012
23. G. Schell, M.S. Lavieri, J. Sussman, R. Hayward, Optimal Treatment Policies for Risk-Averse Patients with Limited Resources. *Institute for Operations Research Applied to Health Services* 2012
24. V. Chase, M.S. Lavieri, A.M. Cohn, T. Peterson. Modeling Care Utilization Ratios to Guide Surge Responses for Non-Crisis events. *Society for Medical Decision Making Annual Meeting* 2011
25. M.S. Lavieri, J. Helm, D.C. Musch, J.D. Stein, M. Van Oyen. Dynamic State Space Models of Glaucoma. *Institute for Operations Research and the Management Sciences Healthcare* 2011
26. G. Schell, M.S. Lavieri, D.C. Musch, J.D. Stein. Analysis of Repeated Measures Data for Glaucoma Progression Classification. *Institute for Operations Research and the Management Sciences Healthcare* 2011
27. M. Foo, M.S. Lavieri, T. Pickles. Impact of Neoadjuvant Prostate-Specific Antigen Kinetics on Biochemical Failure and Prostate Cancer Mortality: Results From a Prospective Patient Database. *Annual Meeting of the American Society for Radiation Oncology* 2010

Keynote speaker

28. M.S. Lavieri. Application of Operations Research to Chronic Disease Management. *International Conference on Operations Research: Special Section as the Recipient of the Young Participant with Most Practical Impact Award* (Rotterdam, Netherlands: 2013)
29. M.S. Lavieri. Sequential Disease Management of Patients with Chronic Conditions: Examples of how Operations Research Models may Guide Medical Decision Making. *ORAHS* (Istanbul, Turkey: 2013)
30. M.S. Lavieri. Data-Driven Medical Decision Making of Chronic Disease Patients. *Statistical and Applied Mathematical Sciences Institute Opening Workshop, Data-Driven Decisions in Healthcare* (North Carolina, USA: 2012)
31. M.S. Lavieri. Modeling PSA Dynamics. *Cancéropôle Lyon Auvergne Rhône-Alpes Day on Operations Research in Cancer Treatment & Operation Management* (Paris, France: 2010)

32. M.S. Lavieri. Tutorial: Applying Operations Research in Cancer Care. *Operational Research Applied to Health Services PhD Workshop* (Toronto, Canada: 2008)

Invited seminar speaker at peer institutions (since 2010)

33. M.S. Lavieri. Sequential Disease Management of Patients with Chronic Conditions. *Texas A&M, Department of Industrial and Systems Engineering* (Texas, USA: 2013)
34. M.S. Lavieri. Dynamic Forecasting and Control Algorithms with Application to Glaucoma. *University of Minnesota, Department of Industrial and Systems Engineering* (Minnesota, USA: 2012)
35. M.S. Lavieri. When to Treat Prostate Cancer Patients Based on their PSA Dynamics. *University of Illinois, Urbana-Champaign* (Illinois, USA: 2011)
36. M.S. Lavieri. Special Topics in Healthcare OR *Universidad de los Andes* (Bogota, Colombia: 2010)

Selected seminars at the University of Michigan (since 2010)

37. M.S. Lavieri, W. Wiitala. *Data-driven Medical Decision Making of Chronic Disease Patients. Providing Better Healthcare Through Systems Engineering: Seminars and Discussion. Department of Industrial and Operations Engineering. 2013*
38. M.S. Lavieri. *Medical Decision Making of Chronic Disease Patients. Toyota Artificial Intelligence Seminar Series. Department of Electrical Engineering and Computer Science. 2013*
39. M.S. Lavieri. Optimizing the Frequency and Timing of Testing to Check for Glaucoma Progression, a Novel Approach. *Vision Research Seminar. Department of Ophthalmology and Visual Sciences. 2012*
40. M.S. Lavieri. Dynamic Forecasting and Control Algorithms with Application to Glaucoma. *Department of Statistics Seminar Series 2012. Providing Better Healthcare Through Systems Engineering: Seminars and Discussion. Department of Industrial and Operations Engineering 2011*
41. V. Chase (mentored by M.S. Lavieri, A.M Cohn and T. Peterson) Predicting ED Patient Volume in Order to Create a “Surge Response” for Non-Crisis Events. *University of Michigan Department of Emergency Medicine. 2011*
42. M.S. Lavieri. When to Treat Prostate Cancer Patients Based on their PSA Dynamics. *University of Michigan Decision Consortium. Department of Psychology. 2011*
43. M.S. Lavieri. Guiding Policy and Patient-specific Healthcare Decisions using Industrial Engineering. *Child Health Evaluation and Research Unit Health Services Research Seminar 2011*
44. M.S. Lavieri. Improving Health Care Delivery and Medical Decision Making Using Operations Research Techniques. *Internal Medicine Grand Rounds 2010*

Invited conference research presentations

45. Lee E., M.S. Lavieri, M. Volk. Design of Hepatocellular Carcinoma Screening Policies through Reinforcement Learning. *Institute for Operations Research and the Management Sciences Annual Meeting* (Minnesota, USA: 2013)
46. M.S. Lavieri. Healthcare Operations Research: Research, Teaching and Service. *Institute for Operations Research and the Management Sciences Annual Meeting* (Minnesota, USA: 2013)

47. P. Kazemian, J. Helm, M.S. Lavieri, J.D. Stein, M. Van Oyen. Optimal Simultaneous Dynamic Monitoring and Treatment Control for Chronic Diseases. *Institute for Operations Research and the Management Sciences Annual Meeting* (Minnesota, USA: 2013)
48. W. Hu, M.S. Lavieri, A. Toriello, X. Liu*. Strategic Health Workforce Planning: Modeling, Optimality, and Uncertainty. *Institute for Operations Research and the Management Sciences Annual Meeting* (Minnesota, USA: 2013)
49. J. Helm, M.S. Lavieri, M. Van Oyen, J. D. Stein. Sequential Filtering of Glaucoma Progression. *Institute for Operations Research and the Management Sciences Annual Meeting* (Arizona, USA: 2012)
50. M.S. Lavieri, J. Helm, G. Schell, M. Van Oyen, J. D. Stein and D. Musch. Sequential Monitoring of Glaucoma Patients. *Institute for Operations Research and the Management Sciences Annual Meeting* (Arizona, USA: 2012)
51. G. Schell, M.S. Lavieri, J. Sussman, R. Hayward. Optimal Optimal Hypertension Management for Risk-averse Patients with Scarce Resources. *Institute for Operations Research and the Management Sciences Annual Meeting* (Arizona, USA: 2012)
52. V. Chase, M.S. Lavieri, A.M. Cohn, T. Peterson. Modeling Care Utilization Ratios to Guide Surge Responses for Non-Crisis events. *Invited Poster Presentation - Institute for Operations Research and the Management Sciences Annual Meeting* (North Carolina: 2011)
53. M.S. Lavieri. Guiding Policy and Patient-Specific Healthcare Decisions using Operations Research. *George B. Dantzig invited session - Institute for Operations Research and the Management Sciences Annual Meeting* (Texas, USA: 2010)
54. J. Helm, G. Schell, M.S. Lavieri, M. Van Oyen, J. D. Stein and D. Musch. Monitoring Glaucoma Patients Using Visual Field Progression and Intraocular Eye Pressure *Institute for Operations Research and the Management Sciences Annual Meeting* (Texas, USA: 2010)
55. M.S. Lavieri, M.L. Puterman, S. Shechter, S. Tyldesley. When to Treat Prostate Cancer Patients Based on their PSA Dynamics. *Pierskalla competition invited session - Institute for Operations Research and the Management Sciences Annual Meeting* (California, USA: 2009)
56. M.S. Lavieri, M.L. Puterman, S. Shechter, S. Tyldesley. Radiation Therapy Treatment Decision Making for Prostate Cancer Patients Based on PSA Dynamics. *34th Conference on Operational Research Applied to Health Services* (Toronto, Canada: 2008); *Institute for Operations Research and the Management Sciences Annual Meeting* (Washington, USA: 2008); *Mayo Clinic Conference on Systems Engineering and Operations Research in Health Care* (Rochester, USA: 2009)
57. M.S. Lavieri, T. Pickles, M.L. Puterman, S. Shechter, S. Tyldesley. Modeling of PSA Dynamics of Prostate Cancer Patients Receiving Neoadjuvant Hormone Therapy Prior to Radiation Therapy. *Institute for Operations Research and the Management Sciences Annual Meeting* (Seattle, USA: 2007); *Joint Statistical Meetings* (Denver, USA: 2008)
58. S. Regan, M.S. Lavieri, M.L. Puterman, P.A. Ratner. Applying Operations Research to Health Human Resource Planning. *Canadian Institute for Health Information Health Human Resources Conference* (Ottawa, Canada: 2007)
59. M.S. Lavieri, S. Regan, M.L. Puterman, P.A. Ratner. A Unified Approach to Health Human Resource Planning in British Columbia. *Canadian Association for Health Services and Policy*

Research (Toronto, Canada: 2007); *Poster session at the UBC Centre for Healthcare Management: An Operations Research Symposium* (Vancouver, Canada: 2007)

60. M.S. Lavieri, J. French, T. Pickles, M.L. Puterman, S. Shechter, S. Tyldesley. Improving Accessibility to Radiation Therapy for Cancer Patients. *Institute for Operations Research and the Management Sciences Annual Meeting* (Pittsburgh, USA: 2006)
61. M.S. Lavieri, M.L. Puterman. Optimal Nursing Workforce Planning. *Institute for Operations Research and the Management Sciences Annual Meeting* (San Francisco, USA: 2005); *Canadian Operational Research Society Annual Meeting* (Montreal, Canada: 2006); *22nd European Conference on Operational Research* (Prague, Czech Republic: 2007); *33rd Conference on Operational Research Applied to Health Services* (Saint Etienne, France: 2007)
62. M.S. Lavieri, S. Yin, M.L. Puterman. An LP Based Distribution Network Planning Tool for a Large Pulp and Paper Manufacturer. *Institute for Operations Research and the Management Sciences Annual Meeting* (Atlanta, USA: 2003); *XI Latin American Summer Workshop on Operations Research* (Villa de Leyva, Colombia: 2005)

Other invited presentations

63. M.S. Lavieri. When to Treat Prostate Cancer Patients Based on their PSA Dynamics (invited poster). *Veterans Affairs Health Services Research and Development Service/Veterans Engineering Resource Center National Field-based Conference* (Indiana: 2010)
64. M.S. Lavieri. Nursing Workforce Planning Models *Vancouver Island Health Authority* (Videoconference presentation: 2010)

Other abstracts in non-refereed conference proceedings

65. G. Schell, M.S. Lavieri, R. Hayward, J. Sussman, W. Wiitala. Sequential Resource Allocation Decisions for Coronary Heart Disease Patients. *Institute for Operations Research and the Management Sciences Annual Meeting* (Minnesota, USA: 2013)
66. M.S. Lavieri. Medical Decision Making of Chronic Disease Patients. *Canadian Operational Research Society* (Vancouver, Canada: 2013)
67. A. Toriello, M.S. Lavieri. Strategic Health Care Workforce Planning. *Institute for Operations Research and the Management Sciences Annual Meeting* (Arizona, USA: 2012)
68. Lee E, Lavieri MS, Volk M. Screening for Hepatocellular Carcinoma: An Application of Dynamic Allocation Indices. *Institute for Operations Research and the Management Sciences Annual Meeting* (Arizona, USA: 2012)
69. J. Helm, G. Schell, M.S. Lavieri, M. Van Oyen, J. D. Stein and D. Musch. Dynamic Forecasting and Control Algorithms with Application to Glaucoma. *Institute for Operations Research and the Management Sciences Annual Meeting* (North Carolina, USA: 2011)

RESEARCH PROGRAMS UNDERWAY

- **Improved Monitoring of Chronic Disease Patients:** The purpose of this research area is to determine the optimal frequency of monitoring chronic diseases based on each patient's progression characteristics which are learned sequentially over time. System dynamic models are integrated with real-time feedback-driven forecasting and control algorithms to help clinicians

determine the interval of time until a particular patient should be monitored next. The models have been validated on glaucoma patients using data from two large multi-center clinical trials. 3 PhD students, 1 master student and 7 undergraduate students have been involved in this research. The research has been done in collaboration with a clinician from the Department of Ophthalmology (Joshua Stein), a senior faculty member from the IOE Department (Mark Van Oyen) and a senior faculty member from the Department of Ophthalmology (David Musch). In addition to the ongoing work on glaucoma monitoring, I have been:

- developing a **modeling framework of inpatient care and postoperative monitoring to decrease unnecessary hospital readmissions after cystectomy** (in collaboration with former PhD student, Jonathan Helm (faculty at Indiana University), two urologists (Ted Skolarus and Bruce Jacobs, faculty at the University of Michigan and researchers in the VA Ann Arbor Healthcare System) and three undergraduate students)
- investigating potential collaboration opportunities to design a **modeling framework for depression monitoring using mobile health** (in collaboration with Satinder Baveja (Professor of Electrical Engineering and Computer Science, University of Michigan) and John Piette (VA Senior Research Career Scientist and Professor of Internal Medicine, University of Michigan))
- **Disease Screening in a Capacitated System:** the purpose of this research area is to investigate how patients suffering from a given disease should be screened for further diseases in a capacitated system. The problem is modeled within the multi-armed bandit framework. The policies derived incorporate individual patient information (which is gathered sequentially over time) while taking resource availability into consideration. Screening for liver cancer for patients suffering from cirrhosis is used as the test bed. The policy's performance is tested on patient data from the Hepatitis-C Antiviral Long Term Treatment against Cirrhosis. A PhD student, a medical resident, and an undergraduate student have been involved in this research. Furthermore, the research is done in collaboration with two clinicians: Michael Volk (Division of Gastroenterology and Hepatology, University of Michigan) and Amit Singal (Division of Digestive and Liver Diseases, University of Texas Southwestern, Texas).
- **Treatment Planning for Chronic Disease patients:** the purpose of this research area is to develop a modeling framework to guide sequential treatment decisions faced by chronic disease patients. We have created a constrained Markov decision process formulation to determine the optimal treatment regimen while incorporating (1) drug titration and discontinuation, (2) the constrained resources available for treatment, and (3) the level of risk aversion - and corresponding conditional value at risk - of the patient. Managing hypertension and coronary heart disease risk is used as the test bed. We are in the process of parameterizing the model using longitudinal clinical data from a sample of 2.5 million patients from the Veterans Affairs hospital system. Using the results of the patient-centered MDP formulation, we have also started to address the problem of allocating scarce resources amongst a panel of patients such that the expected total number of coronary heart disease events for the panel is minimized. One PhD student and one undergraduate student have actively participated in this research. The research is done in collaboration with two faculty members from the Division of General Internal Medicine at the University of Michigan and Research Scientists at the VA Ann Arbor Healthcare System (Jeremy Sussman and Rodney Hayward) and a Research Health Science Specialist at the VA Ann Arbor Healthcare System (Wyndy Wiitala).
 - Potential applications to third-world countries are currently being explored in collaboration with John Piette (VA Senior Research Career Scientist and Professor of

- Internal Medicine, University of Michigan) and Samuel Cordova-Roca (President of the Latin American Atherosclerosis Society).
- I am also working on extensions to the prostate cancer treatment planning algorithms developed during my PhD dissertation with collaborators from the BC Cancer Agency (Canada) and the Peter MacCallum Cancer Centre (Australia).
 - **Health Workforce Planning:** As I study the interaction between medical decisions and capacity allocation, models to meet short and long-term capacity requirements are needed. I have therefore started to develop:
 - **Short-term capacity models** to determine when to call additional physicians given forecasted demand at the emergency department. The models have been done in collaboration with two master students, IOE faculty Amy Cohn and Emergency Department physician Timothy Peterson.
 - **Long-term workforce management models** for large health care systems with arbitrary deterministic non-decreasing demand, using infinite linear programming. The initial model monitors hiring, training and promotion of health care workers across the entire system. We provide a series of conditions the system can satisfy to ensure that one-period lookahead policies are optimal. We also give a sensitivity analysis of the cost impact of various system parameters, such as demand. One PhD student and three undergraduate students from the University of Michigan, as well as one PhD student from Georgia Tech have participated in this research. The research is done in collaboration with Alejandro Toriello (faculty at Georgia Tech), Gary Freed (Division of General Pediatrics, University of Michigan) and Kristy Martyn (Acting Professor of Nursing; Assistant Dean for Clinical Advancement, Nell Hodgson Woodruff School of Nursing, Emory University).
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TECHNOLOGY TRANSFER

Provisional patents and patents pending

Patient Specific Modeling and Forecasting of Disease Progression

- Patent 13/668,280 filed on November 4, 2012
- Provisional Patent 010109-11001P filed on November 4, 2011

Industry interactions

- Ontario Public Health Association: Collaborative project on HHR Planning (Supply and Demand) for Ontario Association of Public Health Dentistry (2013)
- Tauber Institute student projects advised: 2011 (Cardinal Health – 3rd prize in Spotlight competition), 2012 (Chrysler), 2013 (Ford)
- Veterans Administration Ann Arbor Healthcare System: Investigation of opportunities to apply engineering tools to improve operational efficiency and quality of care. (2011-2012)
- Altarum Institute: Collaborative project on the trade-off between treatment and prevention. (2010)

OUTREACH ACTIVITIES

- Development of Emergency Department Simulation Game to teach pre-college students industrial engineering concepts in an interactive way (already shared with over 160 girls from under-served schools from Ypsilanti, Detroit and Ann Arbor).
 - In collaboration with Females Excelling More in Math, Engineering, and Science; Women in Science and Engineering Program and U-M Center for Healthcare Engineering and Patient Safety.
 - The game has also been shared with Bonder Scholars from multiple universities (both nationally and internationally), who implemented it at their local communities as part of the Bonder Scholar Service Day
- Development of Diversity Initiative at the Industrial and Operations Engineering Department to address (1) the variability of female and underrepresented minority students admitted to pursue graduate level programs in Industrial and Operations Engineering and (2) the high rate of female and underrepresented minority students that discontinue their education prior to completion of their PhD degree
 - New seminar series geared towards promoting role models that have had an active involvement and/or strong sensitivity to the needs of underrepresented minority students at their institutions
 - Provide a safe environment to discuss the needs of underrepresented minority students in our department through diversity-sponsored activities
 - Support increased follow-up of student recruits
- Active participation in the Society of Hispanic Professional Engineers sponsored activities
- Revitalized the University of Michigan INFORMS Student Chapter
 - Recruited students to fill in all officer positions and established formal procedure to ensure sustainability of the chapter
 - Developed a document describing the roles of each position
 - Guided students in the development of a Chapter website and sponsored activities and outreach
 - The activities and achievements of the Chapter were recognized by the Institute for Operations Research and the Management Sciences with the 2013 Cum Laude INFORMS Student Chapter Annual Award (awarded to the strongest student chapters in the country).
- Development of an Introduction to Healthcare Simulation module as part of the *Graduate Medical Education Scholars Program at the University of Michigan's Department of Emergency Medicine* (implemented in 2011, 2012 and 2013)
- Development of lesson plan for high school students to design programs to validate medical datasets used in my research (in the planning phase)
 - In collaboration with Pioneer High school

AWARDS AND SCHOLARSHIPS

Young Participant with Most Practical Impact Award - International Conference on Operations Research organized by the German and the Dutch OR Society (International)

- Awarded as an “outstanding young researcher in the field of Operations Research for making an important contribution to the practice of OR”

Lee Lusted Award for Quantitative Methods and Theoretical Developments, First Prize - Medical Decision Making (International)

- Awarded to mentored student for our work on "Comparison of Control Algorithms for Scheduling Testing Visits”

Lee Lusted Award for Quantitative Methods and Theoretical Developments, Finalist - Medical Decision Making (International)

Awarded to mentored student for our work on "Logistic Regression with Filtered Data to Improve Progression Identification”

Public Programs, Service and Needs Paper Competition, Honorary Mention

- Awarded for our work on "Strategic Health Workforce Planning”

Bonder Scholarship for Applied Operations Research in Health Services (International)

- Awarded to mentored student for the greatest potential to make a significant contribution to the field of applied Operations Research in health

Doing Good With Good OR, First Prize - INFORMS (International)

- Awarded to mentored students for our work on "Dynamic Monitoring of Chronic Diseases”

Health Economics Lee Lusted Finalist - Medical Decision Making (International)

- Awarded to mentored student for our work on "Modeling Care Utilization Ratios to Guide Surge Responses for Non-Crisis events”

George B. Dantzig Dissertation Award - Honorary Mention (International)

- Given for the best dissertation in any area of operations research and the management sciences that is innovative and relevant to practice

Pierskalla Best Paper Award (International)

- Awarded for the best paper presented in a Health Applications Section sponsored session at INFORMS for our work modeling PSA dynamics

Bonder Scholarship for Applied Operations Research in Health Services (International)

- Awarded by the Health Care Applications Section of INFORMS to the student with the greatest potential for making a significant contribution to the field of applied Operations Research in health

Itoko Muraoka Fellowship/UGF (National)

- Awarded to the top students pursuing a graduate degree in Canada

NSERC Postgraduate Scholarship D (National)

- Awarded to the top students pursuing a PhD degree in the natural sciences or engineering in Canada

NSERC Canadian Graduate Scholarship (National)

- Awarded to the top NSERC Post Graduate Scholarship applicants based on academic achievements and research ability and potential

Dean Earle D MacPhee Memorial Fellowship in Commerce and Business Administration (Institutional)

- Awarded for academic excellence during a doctoral program at the University of British Columbia

Supply Chain and Logistics Canada-Best Student Paper in British Columbia

- Awarded to the top paper in the field of supply chain in the province of British Columbia. This paper could not be published due to the confidentiality agreement signed with the company

Walter H Gage and Elsie M Harvey Education Abroad Scholarship (Institutional)

- Awarded to the top graduate students that participate in an exchange program

President's list (Institutional)

- Awarded to all students with a 4.00/4.00 GPA in the semester

University of Florida College of Engineering Scholarship (Institutional)

- Awarded to the top students in the department

PAD Scholarship (International)

- Awarded to the top two students of all German schools in the country

Valedictorian of high school's graduation class (Institutional)

- Awarded to the best student in the graduation class

Promoted 2 years in school (Institutional)

- Graduated high school at the age of 16

Chacao Award as one of Caracas' most distinguished students (National)

- Awarded to the best students in the country

GRANTS

Rackham Graduate School

Industrial and Operations Engineering Faculty Allies Diversity Grant – 2013-2014

\$20,900 towards diversity initiatives in the department

Role: Principal Investigator

MCubed

Strategic Health Workforce Planning – 2013-2014

\$60,000 (Share in project budget: \$60,000)

Role: Principal Investigator

Engineering Translational Research Fund

Patient Specific Modeling and Forecasting of Disease Progression – Awarded in 2012

- \$5,000 (share in project budget: \$5,000, to be shared with clinical collaborators)

- Role: Principal Investigator.

NSF: CMMI-1161439

Forecasting and Control Methodology for Monitoring of Chronic Diseases – 2012-2014

- \$280,000 (share in project budget: \$126,572)

- Role: Principal Investigator.

MICHR: Pilot Grant Program

Improving Monitoring of Glaucoma Patients – 2010-2011

- \$50,000 (share in project budget: \$50,000)

- Role: Principal Investigator. In collaboration with Dr. Joshua Stein, Ophthalmology.

RACKHAM:

Faculty Research Grant – 2010-2011

- \$52,173 (share in project budget: \$52,173)
- Role: Principal Investigator.

CIHR: New Emerging Team Grant—Access to Quality Cancer Care

Improving Access to Quality Cancer Care using Operations Research Methods – 2007-2012

- \$278,488/year (share in project budget: ~\$30,000)
- Role: Co-Investigator. Participated in the grant application process. This grant partly supported my dissertation research.

OTHER PROFESSIONAL EXPERIENCE

CENTRE FOR OPERATIONS EXCELLENCE (Vancouver, British Columbia)

Project Advisor, Provincial Health Services Authority (PHSA) – Contract, 2005

- Developed a methodology to analyze the flow of coronary artery disease patients through the cardiac care system

CENTRE FOR OPERATIONS EXCELLENCE (Vancouver, British Columbia)

Project Analyst, NorskeCanada – Contract, 2003

- Developed a linear programming model of the global distribution network of finished products
- Optimized the logistics system based on tradeoffs between time and cost

WORKSHOPS

- 2012 University of Michigan Teaching Circle on Large Engineering Courses
- 2011 INFORMS Teaching Effectiveness Colloquium
- 2010 NSF CAREER Proposal Writing Workshop
- 2010 Big Ten Women's Workshop
- 2010 IIE Junior Faculty Colloquium
- 2010 United for Sight Global Health Conference
- 2008 Models of Cancer and its Therapeutic Control: From Molecules to the Organism. Rocquencourt, France (Sponsored by MITACS and CEA-EDF-INRIA to attend this workshop)
- 2006 Workshop on Approximate Dynamic Programming. Cocoyoc, Mexico (Sponsored by NSF to attend this workshop)
- 2005 XI Latin American Summer Workshop on Operations Research. Villa de Leyva, Colombia (Sponsored by CORS to attend this workshop)

SERVICE

University of Michigan

- University of Michigan INFORMS Student Chapter Faculty Advisor (2012-present)
- IOE Department Graduate Program Committee (2010-present)
- Faculty Ally for Diversity in Graduate Education (2011-present)
- IOE Department Committee (2011)

- Review of MS Degree Requirements (Winter 2011)
- UROP Poster Judge (2011)
- Marshal, Commencement Ceremonies (2009, 2010, 2011)

Service to the profession

- Editorial Board: Operations Research for Healthcare
- Reviewer:
 - Operations Research
 - MSOM
 - POMS
 - IIE Transactions
 - Journal of the Operational Research Society
 - IIE Transactions on Healthcare Systems Engineering
 - Omega, The International Journal of Management Science
- Secretary/treasurer Section on Public Programs, Services and Needs (2013, 2014)
- Judge, INFORMS Pierskalla Paper Competition (2013)
- Judge, INFORMS Healthcare Student Paper Competition (2013)
- Member of the International Program Committee of the ORAHS Conference (2013)
- Cluster Chair, INFORMS Healthcare Section on Public Programs, Services and Needs (2013)
- Cluster Co-Chair, INFORMS Section on Public Programs, Services and Needs (2012)
- Chaired Sessions at the INFORMS Annual Meetings (2010, 2011, 2012)
- Council member, INFORMS Health Applications Society (2010)
- Co-chair Data Mining and Health Informatics Workshop (2010)
- Pierskalla Best Paper Competition Chair, INFORMS Health Applications Society (2010)
- NSF Review Panel

AFFILIATIONS

- INFORMS MSOM
- INFORMS Health Applications Society
- INFORMS Section on Public Programs, Services and Needs
- Institute of Industrial Engineers
- Society for Medical Decision Making
- Association for Research in Vision and Ophthalmology
- Canadian Operational Research Society

SKILLS

- **Computer:** SAS, R, NCSS, MATLAB, AMPL, ARENA, C⁺⁺, Java, HTML, Visual Basic
- **Language:** Fluent in reading, speaking and writing English, Spanish, and German