

Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

Online Proceedings

SESSION 1B

TECHNIQUES FOR IMPROVING QUALITY OF MEDICAL CARE

*Session Moderator: Eric Seibel, Mechanical Engineering
MGH 228*

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Availability of Common Pediatric Radiology Studies: Are Rural Patients at a Disadvantage?

Shruthie Gnaneswaran, Senior, Biochemistry

Molly Sarah (Molly) Thach, Senior, Biochemistry

Mentor: Kathleen Kieran

Although increasing utilization of outreach clinics has increased accessibility to subspecialty care for pediatric patients, the availability of pediatric urologic imaging in local settings has not been previously described. We undertook this study to describe the availability of common radiographic tests ordered by pediatric urologists, and to determine if availability disparities exist between urban and rural locations. We identified 88 freestanding hospitals in Washington and contacted via phone survey asking whether they offered flat plate abdominal X-rays (AXR), renal-bladder ultrasounds (RBUS), voiding cystourethrograms (VCUG), MAG-3 renal scans, and nuclear cystograms (NC) to pediatric patients. 74 institutions (84.1%) completed the survey; 17 (23.0%) were rural (population <2500), and 25 (33.8%) were in urban areas (population >50,000). 73 (98.6%) institutions offered AXRs, 68 (91.9%) offered RBUSs, 44 (59.5%) offered VCUGs, 26 (35.1%) offered MAG-3s, and 15 (20.3%) offered NCs to children. The availability of AXRs (100% versus 96%, $p=0.88$) and RBUSs (70.6% versus 96%, $p=0.15$) was similar in rural and urban settings, while VCUGs (11.8% vs 72%, $p=0.001$), MAG-3s (5.9% vs. 60%, $p=0.006$), and NCs (0% vs 44%, $p=0.017$) were more commonly available in urban settings. Rural hospitals were less likely to employ in-person radiologists (35.3% vs 96%, $p<0.0001$) or offer sedation (6.3% vs 36%, $p=0.01$) during testing, but were equally likely to offer child life (0% vs 20%, $p=0.28$) and to have age restrictions on the tests offered (17.6% vs 40%, $p=0.50$). Fellowship-trained pediatric radiologists were employed exclusively in urban settings (16% vs 0%, $p=0.39$). Our findings portrayed that rural Washington state hospitals have less ac-

cess to radiographic tests and are promoted by broad radiographic procedures that are not specialized to the individual pediatric patient. These results bring forth a future set of criteria for each Washington state hospital in how they treat pediatric patients with more inclusive treatment plans.

SESSION 1E

EXCITATIONS: ART AND VISUALITY

*Session Moderator: Rebecca Cummins, School of Art + Art
History + Design
MGH 238*

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Rediscovering Play: Furthering Redefinition and Engaging in Observation

*Maria Santas (Maria) Cage, Senior, Early Childhood &
Family Studies*

Mary Gates Scholar

Mentor: Phillip Thurtle, Comparative History of Ideas

Mentor: Kathleen Meeker, College of Education

Play is considered central to early childhood development, and has been an activity fascinating to me personally as a childcare provider of many years. Seminal scholars Jean Piaget and Lev Vygotsky still inform much of the current understanding and practice of play as a process, or tool, aiding the linear progression toward adulthood. Yet, my own experiences in returning to academia later in life have unexpectedly ushered me into exploring the intricacies and implications of play as an adult learner, and in cultivating a framework for play that is less linear, and more holistic. My interdisciplinary research began in the 2016 Summer Institute in the Arts and Humanities, and proposes four interconnected components of play (mindfulness, cues of resonance, vitality, and metastability), reframing play as a *capacity* of attending to possibility, rather than an activity or behavior of childhood. My current research expands upon my assertions of play, designing and implementing a qualitative pilot study exploring if these elements of play are present during interactions of play, and how they manifest in contexts of adult-child interaction. Situating my understanding of play in the scholarly literature of both Early Childhood Development and Anthropological perspectives grounds my theory and expands my assertions to stretch

beyond a singular approach. Through observation of adult-child interactions in existing video footage I seek to test the veracity of play as a mindset, and analyze interpersonal contexts play happens within. The broader implications of my assertions of play may offer the reframing of playfulness as an important tool for adults as facilitators, and proponents of play, across childhood learning environments. While play itself is a highly studied activity, I challenge theoretical perceptions of play in the hopes of better supporting playful minds across the early years of human development.

POSTER SESSION 2

Commons East, Easel 63

1:00 PM to 2:30 PM

Gender Disparity in Urology Literature

Harsukhjit Kaur (Harsukh) Deol, Senior, Biology (General)
Mentor: Kathleen Kieran

Academic publications in medicine share important clinical information and increase name recognition and name branding. This study was done to evaluate disparities in numbers and types of publications for women in the field of urology. Work is ongoing but to date, 9 issues from 2001 from the Journal of Urology were looked at. Articles were reviewed and type of paper was listed, along with the first and last author from each, and authors' gender. A total of 817 papers were looked at including papers involving clinical research, lab/science research, case reports, editorials, review articles, and letters to editors. There were a total of 1492 authors (as some papers only had one author), in which there were a total of 63 female authors listed as the first author and 39 female authors as the last given author, giving a total of 102 female authors. There were 6 papers in which both the first and last primary authors were female. In all, this gives 6.84% of papers written by a primary author who is female and all remaining papers written by men. To date, research has shown that men are more likely to author primary research in high impact journals than women, which represents an opportunity in post graduate medical training programs.

POSTER SESSION 2

Commons West, Easel 33

1:00 PM to 2:30 PM

The Quantification of Microplastics along a Primary Puget Sound River: A Study from Headwaters to Estuary

Gerrad Kathrine (Gerrad) Hofmans, Senior, Oceanography
Mentor: Kathleen Newell, School of Oceanography

The world's reliance on plastic is a contemporary dependence as its malleable function, low production cost, and increasing abundance has been universally favored over all other

products. Created with the intention of short-term and one-time use, the global production of plastic reached 299 million tonnes in 2013, with 10-20 million tonnes ending up in the oceans annually. This study explores the contribution of microplastics to the marine environment from river systems, and quantifies the microplastic load within the stream as it passes from rural to urban environments. Microplastics are separated into two categories based on how they are formed; primary and secondary. Primary microplastics are manufactured, generally as resin pellets, which are melted down to form anything from shampoo bottles to water bottles. Secondary microplastics form from the breakdown of macroplastics after extended exposure to UV radiation and/or weathering. The sampled river is fed by a remote, glacially fed lake in the Cascadia Mountain Range, flowing into the upper Skykomish River, the Snohomish River, and eventually to the Puget Sound. Samples were collected by towing a 335 μ mesh manta trawl and analyzed, after a wet peroxide oxidation and density separation, to quantify the concentration of microplastics present in the stream. From the samples processed thus far, and the data from another study conducted on the same river system, a correlation has been found between the amount of plastics in the stream and the populations of the towns the stream passes through. This correlation implies that the growing quantity of microplastics within the stream, as it flows from rural to urban environments, is supplied through anthropogenic influences. Following this study, microplastic pollution can no longer be thought of as a coastal and marine issue, but rather a problem that starts much further inland.

POSTER SESSION 2

Commons West, Easel 32

1:00 PM to 2:30 PM

Concentration of Microplastics in Beach Sediments Surrounding Seattle, Washington in the Puget Sound Estuary

Frances Ke'ala (Frances) Eshom Arzadon, Senior, Oceanography

Mentor: Kathleen Newell, School of Oceanography

Mentor: Arthur Nowell, Oceanography

Plastic pollution in the marine environment is an increasing concern leading to the need for more studies. Microplastics (0.3-5 mm in size) are the most concerning because they cannot be easily spotted, last the longest, and are easily ingested by marine organisms and make their way through the food chain. These microplastics are generated by many industries from cosmetics to laundry, to traffic erosion of tires. This study examines the distribution of microplastics found on Seattle beaches and on beaches to the north and south of the city. I collected sediment from three 1 m² quadrants on each beach of my 10 sample sites using the Beach Sampling Protocol from the Port Townsend Marine Science Center to

ensure comparison of data with other studies. Samples were taken directly below the wrack line left by the previous high tide. In the lab, after a subsample was weighed out, density separation and wet peroxide oxidation were performed, in addition to other standardized analyzes. My results show the levels of microplastics and changes in concentration of microplastics found in sediments close to Seattle and at greater distance on the beaches. As the beaches erode, these microplastics are transported into Puget Sound and the larger Pacific Ocean. It is important that marine plastics are studied so that preventative measures can be put in place to limit microplastic pollution, in addition to having a baseline study for future research.