Centre for Health from Environment
Ionad Sláinte ó Chomhshaol

Our Environment, Our Health:

One Health

Conference Programme

and Book of Abstracts

National University of Ireland, Galway

28th September 2018

NUI Galway
OÉ Gaillimh

epa Research
Climate - Water - Sustainability

Ryan Institute

Contents

Welcome Address

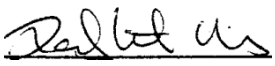
Welcome to the Ryan Institute Centre for Health from Environment **"Our Environment, Our Health: One Health"** conference, supported by the Environmental Protection Agency.

The critical link between the health of humans, animals and the environment is seen as increasingly important on a very crowded planet. This is captured in the global concept of 'One Health' promoted by UN agencies, including the World Health Organization, the World Organisation for Animal Health and the Food and Agriculture Organisation. Adopting a 'One Health' approach is key to managing existing and emerging risks to human health. There is an urgent need to discuss and plan actions to address the challenges, and also the opportunities, of 'One Health'.

This exciting one-day conference brings together national and international experts across the areas of human health, animal health and the environment, and provides an ideal forum to promote intersectoral engagement, discussion and networking.

I hope you enjoy the day!

Regards,



Dr. Dearbháile Morris

Deputy Director, Centre for Health from Environment, Ryan Institute, NUI Galway.

Organising Committee

Dr. Dearbháile Morris (Chair)

Dr. Louise O'Connor (Co-Chair)

Ms. Norah O'Halloran (Ryan Institute Operations Team)

Dr. Liam Burke

Ms. Niamh Cahill

Ms. Debbie Monroe

Ms. Bláthnaid Mahon

Dr. Aoife Joyce

Ms. Brigid Hooban

Conference Sponsor

This conference is supported by the Irish Environmental Protection Agency

Conference Information

Locations

The conference will take place in the Orbsen Building (No. 15 on Campus Map - See page 5).

Name Badge Collection:	The Atrium of the Orbsen Building
Tea/Coffee/Lunch:	The Atrium of the Orbsen Building
Conference Sessions:	Orbsen Seminar Room (Room 214)
Poster Viewing Sessions:	The Atrium of the Orbsen Building

Parking

Parking at NUI Galway is heavily restricted on the main campus and clamping is in operation.

Free parking for conference delegates will be available on the day of the conference in the Dangan Carpark, North Campus (North West of Corrib Village) – See page 5 for attached Campus Map. Dangan Carpark can be accessed via Upper Newcastle Road.

All conference delegates will receive a parking permit for Dangan Carpark via email, which must be displayed on your car. Please park only in designated parking bays, and not in Pay and Display spaces.

A free shuttle bus service is available to all users of the Dangan Carpark. This shuttle bus runs at regular intervals to the Orbsen Building (conference venue).

Please note Dangan Carpark closes at 19:30.


NUI Galway
OÉ Gaillimh
Léarscáil den Champas
Campus Map
Campas Thuaidh, an Daingean North Campus, Dangan
Na Foirgnimh The Buildings
24 Eolaíochtaí Bithleighis Biomedical Sciences
25 Cúrsa Saoil Lifecourse
Áras Spóirt, an Daingean
The Sports Pavilion
Páirc Ghnó an Daingin A
Dangan Business Park A
Anailísíochta Sonraí Insight
Insight Centre for Data Analytics
Páirceáil agus Taisteal
Park and Ride
Baile na Coiribe
Corrib Village
An Naíolann
The Crèche
Bóthar Thomáis Uí Eidhin
Thomas Hynes Road
Campas Thuaidh, an Daingean
North Campus, Dangan
Bóthar an Chaisleáin Nua Uachtarach
Upper Newcastle Road
Droichead na gCúig Chéad
Quincentenary Bridge
N6
M6
Chuig an Aerfort & Bóthar Bhaile Átha Cliath
To Airport & Dublin Road
Bóthar na Drioglainne Distillery Rd
An Séipéal
Chapel
Bóthar an Chaisleáin Nua Íochtarach
Lower Newcastle Road
Bóthar na hOllscoile University Road
Coirnéal Wards
Wards Corner
An Ardeaglais
Cathedral
Ospidéal Choláiste na hOllscoile, Gaillimh
University College Hospital, Galway
Bóthar an Chaisleáin Nua Newcastle Road
Bóthar Mhic Coisteala Costello Road
Na Foirgnimh
The Buildings
1 Institiúid na hEolaíochta Cliniciúla Clinical Science Institute
2 Institiúid Lambe don Taighde Aistritheach Lambe Institute for Translational Research
3 Oileán Ealtanach Nuns Island
4 Ionad na hÉireann do Chearta an Duine Irish Centre for Human Rights
5 Oileán an Iarla Earls Island
6 Scoil Scannán & Meán Digiteach Huston Huston School of Film & Digital Media
7 Áras Mháirtín Uí Riain Ryan Institute (Martin Ryan Building)
8 An Chearnóg Quadrangle
9 Áras na Mac Léinn (Sciathán Bailey Allen) Áras na Mac Léinn (Bailey Allen Wing)
10 Bitheolaíocht Dhaonna Human Biology
11 Áras Uí Chathail (S.I.D.) Áras Uí Chathail (S.I.D.)
12 Áras Uí Argadáin The Hardiman Building
13 Áras Dán na Mílaoise Arts Millennium Building
14 Foirgneamh na nDán/na hEolaíochta Arts/Science Building
15 Áras Oirbsean Orbsen Building
16 Foirgneamh IT IT Building
17 Oifig Slándála Security Office
18 An tIonad Spóirt Sports Centre
19 An tIonad Taighde agus Nuálaíochta Research & Innovation Centre
20 Áras Mhaighe Seola Moyola Building (Áras Moyola)
21 Innealtóireacht Engineering
22 Áras Cairnes Cairnes Building
23 An tIonad Taighde don Chothú Sláinte Health Promotion Research Centre
26 Áras na Gaeilge Áras na Gaeilge
27 Ionad Drámaíochta, Amharclannaíochta agus Taibhléirithe Uí Dhonnchú O'Donoghue Centre - Drama Theatre & Performance
Eochair Legend
Príomhbhealaí isteach d'fheithiclí Main vehicular entrances
Príomhbhealaí isteach do choisithe Main pedestrian entrances
Slí inrochtana trasna an champais (do dhaoine maolghluaiste) Accessible route across campus (for the mobility impaired)
Foirgnimh do sheisiúin eolais na chéad bhliana Buildings for first year undergraduate orientation
Forbairtí nua ar an gcampas New campus development sites
Ardaitheoirí Elevators
Caiféanna agus bialanna Cafés and restaurants
Beár an Choláiste Bar
Áiteanna Páirceála ar an gCampas
Parking Locations on Campus
R Spásanna Roinnte Comhaltaí Foirne & Mic Léinn Staff & Student Shared Spaces
S Spásanna Foirne Staff Spaces
P Spásanna Íoc & Taispeáin (Í & T) Pay & Display Spaces (P&D)
M Spásanna Mac Léinn Student Spaces
V Spásanna do Chuairteoirí Amháin Reserved Visitor Spaces
Cuasa do Dhaoine faoi Mhíchumas Disabled Access Bays

Name Badges

Name badges will be available for all conference delegates in the Atrium of the Orbsen building on Friday September 28th from 08:30. All delegates are encouraged to wear name badges during the conference.

Refreshments

Tea/coffee and lunch will be served in the Atrium of the Orbsen Building at the following times:

- **10:30 - 11:00 (Tea/Coffee)**
- **13:00 - 14:00 (Buffet Style Lunch)**
- **15:30 - 16:00 (Tea/Coffee)**

Please speak to a member of staff from Moffett's restaurant in the Orbsen Building if you have any specific dietary requirements and they will be happy to cater for your needs.

Posters

The poster presentation viewing area will be in the Atrium of the Orbsen building.

All posters must be put up on Friday September 28th only, before 09:00.

Please do not remove your poster until the last poster viewing session has finished at 16:00.

Posters can be mounted on any empty poster board in the Atrium of the Orbsen building. Poster mounting stickers will be provided on the day.

There will be three poster viewing sessions throughout the day.

- **10:30 - 11:00**
- **13:00 - 14:00**
- **15:30 - 16:00**

More Information

	Webpage	http://www.nuigalway.ie/cheonehealth/
	Email	onehealthconference@nuigalway.ie
	Phone	091 542686
	Twitter	@onehealthnuig

Conference Programme

08:30 - 09:00 Registration

09:00 - 09:15 Opening Address: Professor Ciarán Ó hÓgartaigh, President of NUI Galway.

Session 1: Health and the Environment Chair: Dr. Dearbháile Morris

09:15 - 10:00 Dr. William Gaze, European Centre for Environment and Human Health.
"The environmental dimension of AMR".

10:00 - 10:30 Dr. Stephanie O'Keeffe, National Director of Strategic Planning and Transformation in the HSE.
"Enabling Citizens and Communities to Play Their Part in Healthy Ireland"

10:30 - 11:00 Coffee, Tea and Poster Viewing

11:00 - 11:30 Prof. Martin Cormican, HSE National Lead for Healthcare Associated Infection and Antimicrobial Resistance.
"Environment and health – did you get the memo?"

11:30 - 12:00 Dr. Patrick Munk, Technical University of Denmark.
"Using metagenomics for global surveillance of antimicrobial resistance"

Session 2: CHE Thematic Areas Chair: Professor Martin Cormican

12:00 - 12:10 Water and Sanitation
Prof. Enda Cummins, University College Dublin.
"Environmental exposure modelling for antibiotic resistant bacteria-methods and musings"

12:10 - 12.20 Environmental Policy

Prof. Kevin Leyden, National University of Ireland, Galway.

"The Built Environment, Health and Well-being: The Role of Planning and Public Policy"

12:20 - 12:30 Food and Soil

Dr. Kaye Burgess, Teagasc.

"Foodborne pathogens: taking a One Health approach"

12:30 - 12:40 Air Quality

Dr. Marie Coggins, National University of Ireland, Galway.

"Brominated Flame Retardants (BFRs) in Human Breast milk collected from first time Irish Mothers, 2016 – 2018 – ELEVATE"

12:40 - 12:55 Dr. C. Carlin, Dr. G. Kindermann, Dr. E. Britton, National University of Ireland, Galway.

"Our environment, our health - how connecting to nature benefits health and wellbeing?"

12:55 – 13:00 Discussion

13:00 - 14:00 Lunch and Poster Viewing

Session 3: Emerging Issues and One Health Initiatives Chair: Dr. Andrew Fogarty

14:00 - 14:45 Dr. Sharon McGuinness, Chair European Chemicals Agency Management Board and CEO Health and Safety Authority.

"Healthy Living, Healthy Working – current considerations and emerging issues"

14:45 - 15:30 ***One Health Initiatives and Funding Opportunities***

14:45 - 15:00 Dr. Lisa Sheils, Environmental Protection Agency.

15:00 - 15:15 Dr. Kay Duggan-Walls, Health Research Board.

15:15 - 15:30 Dr. William Byrne, Department of Agriculture, Food and the Marine.

15:30 - 16:00 **Coffee, Tea and Poster Viewing**

Session 4: **Focus on DeTER: Detection, Toxicology, Environmental fate and Risk assessment of nanoparticles in the aquatic environment**

16:00 - 16:15 Dr. Dearbháile Morris, National University of Ireland, Galway.

"DeTER – Overview of why, how and what we need to do next"

16:15 - 16:30 Dr. Eoin McGillicuddy, Dublin Institute of Technology.

"Development of a capture method for silver nanoparticles from the aquatic environment"

16:30 - 16:45 Dr. Andrew Fogarty, Athlone Institute of Technology.

"Assessment of the toxicological properties of metal nanoparticles on aquatic life"

16:45 - 17:00 Mr. David Shevlin and Prof. Enda Cummins, University College Dublin.

"Risk assessment of the environmental fate of silver nanoparticles through the aquatic environment"

17:00 - 17:15 Summary and Closing Remarks

Speaker Profiles

Dr. William Gaze, European Centre for Environment and Human Health, University of Exeter

Dr. William Gaze is an Associate Professor (Reader) in The European Centre for Environment and Human Health, part of the University of Exeter Medical School. William has a diverse background in biological sciences including marine biology, aquatic ecology, microbial ecology and clinical microbiology and has collaborated with mathematicians, psychologists, environmental chemists, clinicians, hydrologists and mineralogists amongst others. He works on complex interactions within microbial communities in human, animal and environmental microbiomes in the context of antimicrobial resistance (AMR). Current and recent research income of ~£2 million includes NERC, MRC and BBSRC funding on evolution, dissemination and transmission of AMR. He has been invited to speak on AMR on 5 continents in the last 2 years and has advised UK and overseas governments, UNEP / WHO, European Environment Agency, UK Environment Agency and Defra. He was recently awarded a NERC Knowledge Exchange Fellowship on "The Environmental Dimension of Antimicrobial Resistance: informing policy, regulation and practice".

Dr. Stephanie O'Keeffe, National Director of Strategic Planning and Transformation in the HSE

Dr. Stephanie O'Keeffe is a social psychologist and has worked for 17 years in the health sector. She has specific expertise in national health strategy development, implementation and change management. Dr. O'Keeffe is a former Director of the Crisis Pregnancy Programme where she worked for 10 years. Dr. O'Keeffe was the first Director of a new Health and Wellbeing Unit in the Department of Health where she led out on the development of Ireland's first intersectoral population health framework, Healthy Ireland, published in 2013. Dr O'Keeffe was the first National Director of Health and Wellbeing in the HSE from mid 2013 to 2017. Dr. O'Keeffe is currently the National Director of Strategic Planning and Transformation in the HSE. Dr O'Keeffe's current role involves leading a new function which is designed to build capacity and capability for longer term planning and sustainable and effective implementation of service design in the HSE. In this new role Dr. O'Keeffe will oversee the implementation of a more streamlined and responsive approach to planning, performance and management with a particular focus on supporting enhanced integration of services and improving population health. The prevention and management of chronic disease and working to improve population health and wellbeing remain an integral part of Dr. O'Keeffe's new role in the health service.

Dr. O'Keefe has a Bachelors Degree in Psychology from Trinity College Dublin, a MSc. in Psychological Research Methods and Assessment and a PhD in Psychology from the University of Surrey in the UK.

Prof. Martin Cormican, HSE National Lead for Healthcare Associated Infection and Antimicrobial Resistance

Prof. Martin Cormican graduated from NUI Galway Medical School in 1986. He trained in Ireland, UK and USA and was appointed Professor of Bacteriology at NUI Galway and Consultant Microbiologist in 1999. He is director of the GUH National Microbiology Reference Laboratory services which include services for Carbapenemase Producing Enterobacteriaceae (CPE) and has recently been appointed as National Clinical Lead for HCAI and AMR to support an urgent response to the epidemic spread of CPE. His research interests include antibiotic resistance and food borne infection. With colleagues he established a Centre for Health from Environment at NUI Galway to promote research and advocacy on the central role of the environment in enabling people to live fulfilling and joyful lives.

Dr. Patrick Munk, Technical University of Denmark

Dr. Patrick Munk, B.Sc., M.Sc., Ph.D. is a computational microbiologist and postdoc in the Research Group for Genomic Epidemiology at the Technical University of Denmark (DTU). He obtained his Ph.D. from the National Food Institute at DTU in 2018 and is working on the livestock gut and environmental microbiomes. Of specific research interest is using metagenomics as a tool to monitor and quantify antimicrobial resistance in metagenomes. Establishing workflows and methods for analyzing the data, determining risk factors for AMR proliferation and predicting efficient interventions are goals of his research.

Prof. Enda Cummins, University College Dublin

Enda Cummins is Associate Professor in the UCD School of Biosystems and Food Engineering and Visiting Professor at KU Leuven. He is Programme Director for the Masters of Engineering Science in Food Engineering. His main research area is risk assessment and predictive modelling, with a particular focus on implications for human health and environmental contamination. He has developed his research area to encompass exposure and risk/benefit assessment from chemicals (including acrylamide, beta-glucans, phytochemicals, antimicrobial residues and nanoparticles) and microbes/protozoa (including *E. coli*, *Salmonella*, *Listeria*, *Cryptosporidium* and antimicrobial resistant organisms) in different media. He has developed a significant and innovative research portfolio in predictive modelling and risk assessment funded by external peer-reviewed grant agencies. He is currently UCD School of Biosystems and Food Engineering Head of Research and Innovation and Chair of UCD School of Biosystems Engineering Research Committee. He has published over 100 peer reviewed journal papers and 123 conference papers. He currently has a strong multidisciplinary research team focusing on predictive modelling and risk assessment. He led an EU ERASMUS programme (Life Long Learning programme) on Predictive Modelling and Risk Assessment and is Scientist in Charge for two Marie Skłodowska-Curie awards.

Prof. Kevin Leyden, National University of Ireland, Galway

Kevin M. Leyden is a Professor of Political Science at the National University of Ireland, Galway. He also serves as Co-Director of the Creative, Liveable and Sustainable Communities Cluster of the Whitaker Institute. He was previously the Director of West Virginia University's Institute for Public Affairs and an Honorary Research Professor of Social Science & Public Policy at the Whitaker Institute.

Professor Leyden's research focuses primarily on the relationship between urban design, social capital, health, and urban liveability. His research has been published in the American Journal of Public Health, Environmental Health Perspectives, Environment International, Social Science & Medicine, and British Journal of Political Science. Urban Affairs Review, Health & Place, the American Journal of Health Promotion, American Journal of Preventive Medicine, Proceedings of the Institute of Civil Engineers: Urban Design and Planning, and Policy Studies Journal, among others. He previously served as a partner with the World Health Organization's Large Analysis and Review of European Housing and Health Status (LARES), and as a Research Fellow with the Global Metropolitan Forum which examined the quality of life in ten major international metropolises. Professor Leyden recently led the research workgroup associated with an EU funded COST Transit & Urban Development grant titled "People Friendly Cities in a Data Rich World". In addition, he was a member of the core team (Phase 1) of Galway's bid to become the European Capital of Culture in 2020 which was successfully awarded in July 2016. From 2004 to 2009, he served as the Director of the Institute for Public Affairs and Coordinator of the Local Government Leadership Academy at West Virginia University. Both the Institute and the Academy worked with public officials with the purpose of improving public policy.

Dr. Kaye Burgess, Teagasc

Dr. Kaye Burgess, B.Sc., Ph.D. is a molecular microbiologist and Senior Research Officer at Teagasc Food Research Centre in Ashtown, Dublin. Kaye's research focus is on understanding the behaviour and virulence of microbial pathogens, in particular Gram-negative pathogens along the farm to fork chain. She is particularly interested on the role that stresses encountered in the food chain may have on the virulence and persistence of foodborne pathogens, in particular Verocytotoxigenic E. coli (VTEC). She was involved in the ProSafeBeef project, a 41 partner FP6 project that focused on improved the quality and safety of beef. She currently coordinates a number of FIRM and Teagasc funded projects and is a work group leader in the EU FP7 project AQUAVALENS, which is focused on detection of pathogens in water. She is also a work package leader in the EPA funded AREST project, where she is investigating AMR transmission and persistence in grass and soils following animal manure spreading.

Dr. Marie Coggins, National University of Ireland, Galway

Dr. Marie Coggins, is a lecturer in Exposure Science at the School of Physics, NUIG and a member of the Centre for Health from Environment at the Ryan Institute, NUIG. She has worked in research, industry and academia. Her research interests include occupational and environmental exposure assessment, including human biomonitoring for historic and emerging pollutants. Currently she is leading 4 work-packages on the EPA research project ELEVATE, Elucidating Levels and Pathways of Human Exposure in Ireland to POP-BFRs and PFOS (ELEVATE) http://www.nuigalway.ie/elevate/. She will present preliminary results from the human biomonitoring element of ELEVATE at the NUIG One Health Conference.

Dr. Caitriona Carlin, National University of Ireland, Galway

Dr. Caitriona Carlin B.Sc. (Environmental Biology), Ph.D. (Zoology) is a Postdoctoral Researcher in NUIG's Applied Ecology Unit with an interest in connecting people with nature, which is the focus of her current research. She is the Principal Investigator on a jointly funded EPA/HSE three year project to assess how nature and environment can attain and restore (NEAR) health. She contributes to the SHEER wellbeing project. She previously worked on an EPA-funded postdoctoral project "Health Benefits from Biodiversity". Her interest in this area began when she worked as a species specialist in the statutory nature conservation sector in England (Natural England) where she provided training and advice on ecology, biodiversity policy, legislation and mitigation. She has led workshops for professional ecologists and has devised and taught third level modules on conservation and behaviour. She is a member of the Applied Ecology Unit since 2008. Her research interests include nature conservation, biodiversity, impacts of human activity on habitats and species, behavioural ecology, high nature value farming, sustainable development and mitigation practices and connectivity.

Dr. Easkey Britton, National University of Ireland, Galway

Postdoctoral research fellow at the Whitaker Institute and member of the research cluster for Social Innovation, Participation and Policy (SIPP), Dr. Easkey Britton co-leads the interdisciplinary NEAR-Health work package on nature-based solutions: a framework to use coastal blue and green space to restore health and wellbeing. Easkey also holds an honorary visiting research fellowship in Sport and Leisure Studies at the University of Waikato. A marine social scientist with a Ph.D. in Environment and Society from University of Ulster, Easkey is channelling her passion for surfing and the sea into social change. Her parents taught her to surf when she was four years old and her life has revolved around the ocean ever since. Easkey is co-founder of the non-profit Waves of Freedom which uses the power of surfing as a creative medium for social good in places like Iran and she co-organised the world's first Surf for Social Good Summit in 2015. A recent graduate from THNK's School of Creative Leadership, Easkey's work is deeply influenced by the ocean and the lessons learned pioneering women's big-wave surfing at spots like Mullaghmore, Co. Sligo, which led her to be invited to give an inspiring TEDx talk in 2013: Just Add Surf.

Dr. Gesche Kindermann, National University of Ireland, Galway

Dr. Gesche Kindermann B.Sc. (Environmental Science), M.Sc., Ph.D. (both Ecosystem Conservation and Landscape Management) is an environmental scientist with an interest in the interrelationships between the environment and human activity. She holds a PhD in Environmental Science and has extensive experience in researching stakeholder engagement with Irish environments. As postdoctoral researcher with the jointly EPA/HSE funded NEAR Health project she leads on the work package investigating stakeholders' values, motivations and barriers to using nature for health and wellbeing. In her current role as researcher with the Sheer Wellbeing project she is working on stakeholder engagement in and access to green and blue environments for their health and wellbeing. She is also coordinates and lectures on the MScs in Biodiversity and Land Use Planning and in Environmental Leadership at NUI Galway.

Dr. Sharon McGuinness, Chair European Chemicals Agency Management Board and CEO Health and Safety Authority

Dr. Sharon McGuinness is the new Chief Executive of the Health and Safety Authority and has been Chair of the European Chemicals Agency (ECHA) Management Board in Helsinki since 2016. Sharon has been the Irish representative to the ECHA Management Board since September 2014 and prior to her CEO role, she was Assistant Chief Executive for the Chemicals and Prevention Division in the HSA since 2006. Prior to joining the Health and Safety Authority, she worked in government affairs and global chemical regulations for Hewlett-Packard and also with the European Chemicals Bureau as a Scientific Officer in relation to classification and labelling. She has also previously completed postdoctoral toxicology fellowships in academia and industry in the USA.

Dr. Lisa Sheils, Environmental Protection Agency

Lisa Sheils has been working in the EPA Catchments Unit and the EPA Research programme since 2006. She has managed the EPA Water, Environmental Technologies & Cleaner Production programmes, over the last number of years. She also worked as Project Coordinator in the South Eastern River Basin District (SERBD), in the first Water Framework Directive cycle. She also worked in GIS with Waterford City Council in water conservation management and for many years as a Water/Pollution Inspector and Catchment Manager for Northern Ireland Environment Agency (NIEA). Previously she carried out soil research with CIPAV and CIAT in Colombia, South America and Climate Change research in the University of Lisbon, Portugal. She holds qualifications in Environmental Science, Soil Science and Physics, Geographical Information Sciences (GIS), Environmental Impact Assessment (EIA) and Project Management-PMBOK. Lisa is currently representing EPA Ireland in the EU Initiative the Water Joint Programming Initiative (JPI), as a Board Member and coordinates a number of Water JPI activities. Lisa is leading the revision of the current and Water JPI Vision and Strategic Research and Innovation Agenda (SRIA) and aligning it with national, EU and global programmes such as Horizon2020 and UNSDGs.

Ms. Kay Duggan Walls, EU Programmes Officer at HRB and Horizon 2020 NCP for Health

Kay Duggan-Walls B.Sc. (Microbiology), H.Dip. (Ed), M.Sc. (Science and Society), is Ireland's Horizon 2020 National Contact Point (NCP) for health at the Health Research Board. She offers hands-on support and advice to researchers submitting proposals to Horizon 2020 health. Kay is also a Board Member of the EU Joint Programming Initiative on Antimicrobial Resistance (JPI AMR), an international collaborative platform that supports collaborative actions for filling knowledge gaps on antimicrobial resistance with a One Health perspective.

Dr. William Byrne, Department of Agriculture, Food and the Marine

William Byrne MVB, PhD, is a Senior Research Officer in the Bacteriology Division of the Department of Agriculture, Food and the Marine (DAFM) Veterinary Laboratory in Backweston, Celbridge. This laboratory undertakes the testing for official monitoring programs for zoonotic bacteria and antimicrobial resistance in animals and feed derived samples and the National Reference Laboratory (NRL) roles for Campylobacter, Antimicrobial Resistance, Parasites and Salmonella (in food, feed or animals). He is the national contact person for the European Reference Laboratory for Salmonella, is a member of the EFSA Network on Echinococcus and represents the NRL (and DAFM) on the One Health European Joint Programme (EJP).

Dr. Dearbháile Morris, National University of Ireland, Galway

Dearbháile Morris is a Lecturer in Bacteriology at the School of Medicine, National University of Ireland, Galway. Dearbháile graduated from DCU with a B.Sc. in Biotechnology in 1997 and went on to complete a Ph.D. in Bacteriology at NUI Galway in 2002. Dearbháile gained postdoctoral experience at The Children's University Hospital, Temple Street, Dublin before returning to take up a lecturer post at the Discipline of Bacteriology, NUI Galway in 2004. Dearbháile is Deputy-Director of the Centre for Health from Environment at NUI Galway, and established the Antimicrobial Resistance and Microbial Ecology Group in 2010. Dearbháile's research group works closely with national and international research groups focusing on antimicrobial resistance mechanisms and epidemiology, food and water borne pathogens and other contaminants, and the wider societal impact of infection.

Dr. Eoin McGillicuddy, Dublin Institute of Technology

Dr Eoin McGillicuddy is an Assistant Lecturer in the School of Chemical and Pharmaceutical Sciences, Dublin Institute of Technology where his teaching focuses on physical and environmental chemistry. His research focuses primarily on environmental chemistry, conducting research in atmospheric chemistry, particularly atmospheric aerosols and aerobiology, and novel pollutants, nanoparticulate pollution, in the aquatic environment. Eoin has developed an expertise in a wide range of environmental analytical techniques during his research. Eoin obtained his B.Sc. Hons in Chemistry (2009) and was awarded a Ph.D., Atmospheric Chemistry, (2015) from the Department of Chemistry, University College Cork. Following the completion of his Ph.D. Eoin has conducted research in University College Cork, National University of Ireland, Galway and Dublin Institute of Technology.

Dr. Andrew Fogarty, Athlone Institute of Technology

Dr Andy Fogarty lectures Ecotoxicology and Microbiology in the Department of Life and Physical Science, Athlone Institute of Technology. He was a council member of the Environmental Science Association of Ireland and was co-convener of Environ in 2017. He is a senior researcher in the Biosciences Research Institute, AIT. He is a Microbiology and Ecotoxicology graduate of University College Galway and The Ohio State University. His main research interests are multi-trophic ecotoxicity assessment of environmental toxicants and effluents; histopathological analyses of the effects of toxicants in fish and ecotoxicological assessment of novel wastewater treatment technologies and microbiological investigations of Catheter Acquired UTIs (CAUTIs). He serves as external examiner for several universities and is a Toxicology technical advisor to the Irish National Accreditation Board. Dr Fogarty co-ordinates the ab initio B.Sc. (Hons) in Microbiology at AIT and currently lectures at several European universities including Aalborg University, Denmark and University of Applied Sciences, Oestfriesland, Germany. He has published extensively and is a passionate science communicator having contributed to several TV and radio documentaries on environmental issues.

Our Environment, Our Health: One Health

National University of Galway

28th September 2018

Poster Presentation Abstracts

Poster Presentation Titles	***Authors***
A human biomonitoring exposure assessment study among amenity horticulturists using glyphosate based pesticide products	A, Connolly, I. Basinas, K. Jones, K.S. Galea, L. Kenny, P. McGowan, M. Coggins
Novel Antimicrobial for the Treatment of Bovine Mastitis	C. Abberton, C. Larkin, R. Friel, V. O'Flaherty
Waterborne Enteric Infection and Surface Water Flooding in Developed Countries: An overlooked pathway for pathogen transmission to groundwater supplies	L. Andrade, P. Hynds, E. O'Neill, J. O'Dwyer
Persistent Organic Pollutants in Irish Landfills: A Nationwide Assessment of BFRs and PFAS	M. Sharkey, D.S. Drage, S. Harrad, H. Berresheim
The Detection, Toxicology, Environmental fate and Risk assessment of nanoparticles in the aquatic environment (DeTER) project: an overview	E. McGillicuddy, I. Murray, D. Shevlin, L. Morrison, M. Cormican, A. Fogarty, E. Cummins, P. Dockery, P. Dunlop, N. Rowan, D. Morris
Silver nanoparticles in the environment	L. Morrison, E. McGillicuddy, D. Morris
Silver nanoparticle removal from aqueous samples using activated charcoal	E. McGillicuddy, L. Morrison, M. Cormican, D. Morris
Designing an ecotoxicological toolbox for silver nanoparticles in the freshwater environment	I.M.T Murray, N.J. Rowan, A.M. Fogarty
Mapping and Analysing the Sources and Transmission Routes of Antimicrobial Resistant Organisms in the Environment using Geographic Information Systems	C. Chique, J. Cullinan, B. Hooban, D. Morris

Poster Presentation Titles	***Authors***
Elucidating Levels and Pathways of Human Exposure in Ireland to POP-BFRs and PFOS (ELEVATE)	N. Wemken, D.S. Drage, M. Abdallah, S. Harrad, M. Coggins
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A human biomonitoring exposure assessment study among amenity horticulturists using glyphosate based pesticide products

Alison Connolly[1], Ioannis Basinas[2], Kate Jones[3], Karen S. Galea[2], Laura Kenny[3], Padraic McGowan[4], Marie Coggins[1]

[1]Centre for Climate and Air Pollution Studies, School of Physics and the Ryan Institute, National University of Ireland, University Road, Galway, H91 CF50, Ireland.

[2]Centre for Human Exposure Science (CHES), Institute of Occupational Medicine (IOM), Edinburgh, EH14 4AP, UK.

[3]Health and Safety Laboratory (HSL), Harpur Hill, Buxton, SK17 9JN, UK.

[4]Irish Commissioners for Public Works, Jonathon Swift Street, Trim, Co Meath, C15 NX36, Ireland.

Keywords: Exposure science, Biomonitoring, Glyphosate, Dermal sampling

Background

Glyphosate, the highest used herbicide globally, is under international debate following its classification as 'probably carcinogenic to humans' by the International Agency for Research on Cancer (IARC). A dearth of information exists for glyphosate exposures and this study's objective was to evaluate the total body burden and determine the pathways of glyphosate exposures among amenity horticulturalists.

Methods

A human biomonitoring study, a dermal and inadvertent ingestion exposure study was completed for glyphosate users in the amenity horticultural sector in 2017. Workers were grouped into 3 similar exposure groups based on the application method used. The biomonitoring study involved the collection of at least three urine samples per task. Dermal samples were collected of both hands and the perioral region using Ghost wipes™, before and after the work task. In addition, worker gloves were also collected after the work task. A supplementary potentially contaminated work surfaces study was completed, collecting wipe samples of work vehicle steering wheels, pesticide product containers and worker's mobile phones. Detailed contextual information was collected to support all samples.

Results

The human biomonitoring study involved collecting 125 spot urine samples and 343 wipe and glove samples over 29 work tasks. Detectable glyphosate concentrations were found in 93% of the tasks sampled in this study, ranging from non-detectable to 7.36 µg L^{-1}. All hand and glove samples and a large proportion of the post-task perioral region samples (79%) had detectable glyphosate concentrations. Strong positive associations were seen between the contamination levels on the perioral region and glyphosate urine concentrations, as well as between hand and perioral region glyphosate concentrations.

Conclusion

The human biomonitoring study had urine glyphosate concentrations comparable with agricultural studies and higher than European environmental studies. Detectable glyphosate concentrations was seen on work surfaces which could potentially cause exposures to non-pesticide users in the workplace and para-occupational exposures.

Corresponding Author Email Address: a.connolly22@nuigalway.ie

Novel Antimicrobial for the Treatment of Bovine Mastitis

Cathy Abberton[1], Conor Larkin[1], Ruairi Friel[1], and Vincent O'Flaherty[1, 2]

[1]Westway Health, Unit 204, Business Innovation Centre, National University of Ireland Galway, Ireland

[2]Microbiology, School of Natural Sciences and Ryan Institute, National University of Ireland Galway, Ireland

Keywords: Bovine Mastitis, Novel Antimicrobial, Antimicrobial-Resistance

Background

The occurrence of antibiotic-resistant bacteria is an increasingly prevalent societal issue globally. The fact that many antibiotics are no longer effective against bacteria is of particular concern in the veterinary sector, the largest consumer of antibiotics. Bovine mastitis is the most critical infectious disease affecting the dairy industry, leading to recurrent treatment failures, long periods of poor milk quality, loss of income to farmers, and, in many cases, the premature culling of animals. Due to the shear number of causative organisms and their ubiquitous presence, mastitis eradication is unattainable.

Methods & Results

An antimicrobial has been developed based on the naturally occurring peroxidase system. Antimicrobial activity was tested, *in vitro*, against a panel of mastitis isolates (including *E. coli*, *S. aureus*, and *Strep*. spp). Minimum inhibitory concentrations (MICs) were determined to be comparable to many antibiotic treatments, and time-kill assays demonstrated an equivalent kill profile to a product currently on the market. Induction of resistance to hypoiodite was attempted over 12 days; *E. coli* developed resistance to all antibiotics tested within the experimental time frame, yet no resistance developed against hypoiodite. A model-udder system was designed to examine dispersal and dosage of the antimicrobial as the udder fills with milk; and subsequently, cows were identified for *in vivo* clinical trials based on high somatic cell counts (SCC) and the presence of clinical mastitis.

Conclusion

Trials have been conducted on a multitude of farms across Europe, where SCCs and iodine residues have been measured over time and bacterial analysis has been carried out. The treatment was well tolerated by the cows and individual SCCs decreased in response to treatment, associated with clinical and bacteriological cures. Long-term follow-up of the animals indicated no adverse effects. We're now working towards regulatory approval of a novel mastitis treatment.

Corresponding Author Email Address: cathy@westwayhealth.com

Waterborne Enteric Infection and Surface Water Flooding in Developed Countries: An overlooked pathway for pathogen transmission to groundwater supplies

Luisa Andrade[1], Paul Hynds[2], Eoin O'Neill[1], Jean O'Dwyer[3, 4]

[1]School of Architecture, Planning & Environmental Policy, University College Dublin, Dublin, Ireland

[2]Environmental Health and Sustainability Institute, Dublin Institute of Technology, Dublin, Ireland.

[3]School of Biological, Earth and Environmental Sciences, University College Cork, Cork, Ireland

[4]Environmental Research Institute, University College Cork, Cork, Ireland.

Keywords: Waterborne Pathogens; Groundwater Contamination; Flooding; Climate Change

Background

Pathogen-contaminated groundwater represents a potentially significant source of infection for the 2.2 billion people reliant on this resource worldwide. Compounding this, changes in the hydrogeological cycle, brought about by climate change, have been shown to increase groundwater exposure to contamination. Within that context, the escalating frequency and severity of flooding events, and associated mobilization of microbially-rich material to surface and subsurface environments, is of particular concern. However, prior to the current study, no comprehensive synthesis of the interface between surface flooding, groundwater contamination, and enteric disease incidence has been attempted.

Methods

A scoping review of relevant epidemiological and hydro(geo)logical studies was undertaken using the source-pathway-receptor-consequences model. Selection criteria included peer-reviewed studies, published between 1980 and 2017, which focused on drinking groundwater supply contamination with pathogenic organisms as a suspected (or confirmed) consequence of flooding.

Results

Of 3,589 initial records, just 14 studies were included in the review, all of which were significantly different in terms of study design and data reporting procedures. Compounding this, recurring absence of flood- and pathway-specific data hinders the detection of clear trends and patterns. Nevertheless, direct ingress of floodwaters and groundwater recharge were the most common flood-generated contamination pathways. Estimated outbreak lag-periods (i.e. time between flooding and first infection case) fluctuated between 1 and 28 days and approximately 945 flood-related enteric disease cases were confirmed across all studies, with outbreak durations of 11 to 84 days.

Conclusion

The low number of identified studies represents not only a limitation, but also the primary study finding, as it highlights the wide-spread paucity of information connecting the flooding-groundwater-gastroenteritis nexus. However, the existing evidence confirms the reoccurring nature and significance of this frequently overlooked phenomena. It also emphasises the need for multi-disciplinary hydro(geo)logical and epidemiological interaction and for a more holistic one-health approach when undertaking similar contamination/outbreak investigations in the future.

Corresponding Author Email Address: luisa.andrade@ucd.ie

Persistent Organic Pollutants in Irish Landfills: A Nationwide Assessment of BFRs and PFAS

Martin Sharkey[1], Daniel S. Drage[2], Stuart Harrad[2], Harald Berresheim[1].

[1]School of Physics, national University of Ireland Galway, Galway City, Republic of Ireland, H91 CF50

[2]School of Geography Earth and Environmental Sciences, University of Birmingham, Edgbaston, West Midlands, B15 2TT, United Kingdom.

Keywords: POPs; Landfills; PFAS; BFRs.

Background

Due to the ubiquitous use of brominated flame retardants (BFRs) in domestic plastics and perfluoroalkyl substances (PFAS) in fabrics and textiles, large volumes of waste are being produced containing excessive concentrations of these persistent organic pollutants (POPs). Though landfilling in Ireland is declining, large volumes of hazardous wastes have been disposed of at these sites since their inception. The first fully lined landfill in Ireland began operations in 1991; prior to this, sites were either partially or fully unlined, meaning that leachate removal from these sites occurred via “dilute and disperse” methods. Thus, large concentrations of BFRs and PFAS may have been leaching into the environment surrounding these sites.

Methods

1 L samples of leachate were collected from 40 MSW landfills around Ireland during autumn of 2017. Landfills were geographically distributed to show variations between regions, in addition to encapsulating varying years of operation, tonnage of waste accepted, and lined/unlined landfill cells. These samples were split into two aliquots for extraction of targeted compounds: 500 mL being extracted via gravity filtration for isolation of polybrominated diphenyl ethers and hexabromocyclododecane; 50 mL being subjected to solid phase extraction for the isolation of PFAS. Quantification of target compounds was then carried out via established GC-MS and LC-MS/MS methods.

Results

Concentrations of POP-BFRs and PFAS are reported for leachate samples collected from the 40 sites around Ireland (see poster). Concentrations of target compounds vary substantially, likely largely influenced by the age of landfills and thus the dilution of leachate over time.

Conclusion

Historical disposal of waste containing POP-BFRs and PFAS has been carried out throughout the country, thus leading to the potential large-scale contamination of the Irish environment from these compounds. Further fieldwork is currently underway, establishing concentrations of targeted compounds in soil and groundwater surrounding sites whose leachate samples show substantial levels of POPs contamination.

Corresponding Author Email Address: m.sharkey6@nuiglaway.ie

The Detection, Toxicology, Environmental fate and Risk assessment of nanoparticles in the aquatic environment (DeTER) project: an overview

McGillicuddy E.[1,2,3], Murray I.[4], Shevlin D.[5], Morrison L.[6], Cormican M.[1,2], Fogarty A.[4,7], Cummins E.[5], Dockery P.[8], Dunlop P.[9], Rowan N.[4,7], Morris D.[1,2]

[1]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, NUIG.

[2]Centre for Health from Environment, Ryan Institute, NUIG.

[3]School of Chemical and Pharmaceutical Sciences, DIT.

[4]Bioscience Research Institute, AIT.

[5]School of Biosystems and Food Engineering, UCD.

[6]Earth and Ocean Sciences, NUIG.

[7]Department of Life & Physical Science, AIT.

[8]Discipline of Anatomy, School of Medicine, NUIG.

[9]Nanotechnology and Integrated Bioengineering Centre, Ulster University.

Keywords: Silver nanoparticles, Capture and detection, Ecotoxicology, Environmental Fate

The impact of silver nanoparticles (AgNPs) on the environment has become a topic of interest recently due to the incorporation of AgNPs into numerous nano-functionalised consumer products. These products include; textiles and fabrics, kitchen appliances, cosmetics, deodorants, water filters, toys medical devices and food-contact materials such as containers. The incorporation of AgNPs into these products poses a potential risk to the aquatic environment as AgNPs may be released throughout the products lifetime from manufacturing to end-of-life disposal.

The concerns surrounding the potential environmental impact of AgNPs have led to the EPA funded: Detection, Toxicology, Environmental fate and Risk assessment of nanoparticles in the aquatic environment (DeTER) project. The aims of the DeTER project are to develop and implement methods for the detection, characterisation and quantification of AgNPs in water, investigation of the potential toxicological effects of AgNPs on aquatic microorganisms and the development of risk assessment protocols which can be used to evaluate the environmental fate and likely risk from AgNPs through aquatic pathways. The detection and characterisation of AgNPs was investigated by examining suitable capture methods and characterisation techniques. AgNP toxicity was evaluated using acute, chronic and sub-lethal endpoints to evaluate toxicological concerns to the natural flora and fauna of aquatic ecosystems at environmentally relevant concentrations. The possible exposure of AgNPs to the aquatic environment were examined through modelling studies.

Corresponding Author Email Address: eoin.mcgillicuddy@dit.ie

Silver nanoparticles in the environment

L. Morrison[1], E. McGillicuddy[2, 3, 4], D. Morris[2, 3]

[1]Earth and Ocean Sciences, NUIG.

[2]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, NUIG.

[3]Centre for Health from Environment, Ryan Institute, NUIG.

[4]School of Chemical and Pharmaceutical Sciences, DIT.

Keywords: Silver nanoparticles, Chemical analysis, Environmental fate

Background

The incorporation of AgNPs into consumer products poses a potential risk to the aquatic environment as AgNPs may be released throughout the products lifetime from manufacturing to end-of-life disposal. These concerns have led to the DeTER Project which aims to develop methods for the detection, characterisation and quantification of AgNPs in water, investigation of the potential toxicological effects of AgNPs on aquatic microorganisms and the development of risk assessment protocols.

Environmental Speciation

The detection and characterisation of AgNPs in environmental waters is difficult due to the many different reactions that the AgNPs can undergo. In the environment AgNPs may; stay in suspension, aggregate or agglomerate, dissolve or react with different species present in the aquatic system. The speciation of the AgNPs in aquatic system is affected by several factors including; organic matter content, concentration of ligands, pH, ionic strength, temperature, particle coating, size, concentration and morphology. The complicated fate of AgNPs in the environment leads to difficulty in determining actual concentrations in the environment. Based on modelling the expected concentrations of AgNPs in surface waters are in the low ng/L range. The low expected concentrations and complicated fate of AgNPs in the environment complicate the measurements as there is difficulty in differentiating Ag present in the particulate and ionic phase.

Conclusion

AgNPs, due to their many applications are likely to be emitted into the environment this hastens the need for the development of inventories of AgNP containing products. The levels in the environment are difficult to determine as they are present at low concentration and AgNPs undergo complicated reactions. To measure AgNP levels in the aquatic environment there is a need for the development of appropriate methods for their capture. Appropriate capture methods would allow the chemical quantification of the particulate silver present in the environment.

Corresponding Author Email Address: liam.morrison@nuigalway.ie

Silver nanoparticle removal from aqueous samples using activated charcoal

E. McGillicuddy [1, 2, 3], L. Morrison [4], M. Cormican [1, 2], D. Morris [1, 2]

[1]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, NUIG.

[2]Centre for Health from Environment, Ryan Institute, NUIG.

[3]School of Chemical and Pharmaceutical Sciences, DIT.

[4]Earth and Ocean Sciences, NUIG

Keywords: Silver nanoparticles, Chemical analysis, Activated charcoal, Nanoparticle capture and detection

Background

The antibacterial activity of AgNPs has led to their incorporation into numerous consumer products. The AgNPs incorporated into these products can be released into the environment during their production, use and end of life disposal. In the aquatic environment, uncertainties surround the concentration, fate and effects of AgNPs. This project examined charcoal as a potential material for capture of silver nanoparticles from the aquatic environment.

Methods

Activated charcoal (Norit® CA1 (Sigma-Aldrich)) was exposed to 100 ppb, 25 nm PVP coated AgNPs (nanoComposix) prepared in Milli-Q water. These solutions were exposed to unaltered charcoal granules for 20 hours after which the decrease of silver in the solution was measured using ICP-MS. To improve AgNP removal, the surface area of the charcoal was increased firstly by grinding with a pestle and mortar and secondly by milling the charcoal. The milled charcoal was prepared using an agate ball mill running at 500 rpm for 5 minutes. The activated charcoal was then exposed to samples containing 100 ppb AgNPs.

Results

In the initial tests, approximately 10% of the silver was removed from the water samples using the unaltered activated charcoal granules. Further experiments were carried out to compare the unaltered granules with the ground and milled charcoal. These tests were carried out similarly to the previous test however lower concentration of 10 ppb was used. After 20 hours of exposure the granule samples, as previously, showed approximately a 10% reduction in silver content with the ground charcoal giving approximately 30% reduction in silver concentration and in the sample exposed to milled charcoal, approximately 60% reduction in silver concentration was observed. These tests found that increasing the surface area of the charcoal increased the silver reduction in the solution.

Conclusion

Data suggest that charcoal may be a suitable material for use in the capture of AgNPs from water samples.

Corresponding Author Email Address: eoin.mcgillicuddy@dit.ie

Designing an ecotoxicological toolbox for silver nanoparticles in the freshwater environment

Iain MT Murray[1], Neil J Rowan[1], Andy M Fogarty[1]

[1]Bioscience Research Institute, Dept., Life & Physical Sciences, Athlone Institute of Technology, Dublin Road, Athlone, Co. Westmeath, Ireland.

Keywords: silver, nanoparticles, ionic, ecotoxicology, multi-trophic

As the number of commercial applications of nanomaterials increases and the understanding of the effects of water chemistry on silver nanoparticles (AgNP) in the freshwater environment improves it has become clear that an adapted approach to the ecotoxicological risk assessment of these materials is urgently needed. A multi-trophic test battery investigating the toxicity of 25nm PVP coated AgNPs suggested that the existing standardised approach may not be suitable for emerging toxicants of concern such as AgNP. In particular, this study showed that the adaptation of test media has a significant effect on toxicity endpoints. The freshwater algae *Pseudokirchneriella subcapitata* was shown to be 10 times more sensitive to AgNPs when treated in an adapted media free of the chelating agent EDTA than when tested in the standard ISO prescribed media. It was also shown that a compromise between test sensitivity and strict adherence to validity criteria may be necessary for a true risk assessment, particularly taking the very low predicted environmental concentrations (PEC) into account.

Further tests in the multi-trophic test battery employed the freshwater invertebrates *Daphnia pulex*, *Daphnia magna* and the cnidarian *Hydra attenuata*. All tests yielded median toxicity values significantly higher than the PECs when the traditional acute endpoints were used however, the implementation of sub-acute and chronic endpoints such a fecundity in the case of *Daphnia magna* and regeneration in the case of *Hydra attenuata* improved test sensitivity significantly. Advancements in nanoparticle functionalised materials to improve the longevity of nanoparticles adsorption suggests that the AgNPs themselves may no longer be the toxicant species of primary concern but instead the ionic form shed from functionalised surfaces and textiles. This study adds weight to that hypothesis as it was also demonstrated that there was little difference between ionic silver and AgNP.

Results presented in this paper suggest that ecotoxicologists need to think outside of the existing toolbox and employ novel approaches that enshrine chronic and sub-lethal assessment at environmentally relevant concentrations.

Corresponding Author Email Address: imurray@ait.ie

Mapping and Analysing the Sources and Transmission Routes of Antimicrobial Resistant Organisms in the Environment using Geographic Information Systems

Carlos Chique[1], John Cullinan[1], Brigid Hooban[2], Dearbháile Morris[2]

[1]Discipline of Economics & Health Economics and Policy Analysis Centre, National University of Ireland, Galway.

[2]Discipline of Bacteriology, National University of Ireland, Galway.

Keywords: Antimicrobial resistance; Sources/transmission routes; Environment; Geographic information systems.

Background

Antimicrobial resistance (AMR), which stems from the overuse of antimicrobials in healthcare and agriculture, is one of the leading threats to human health worldwide. The identification of sources of antimicrobial resistant organisms (AROs) and their transmission routes in the environment is important for improving our understanding of AMR and to inform policy and monitoring systems. Sources of AROs include 'hotspots' of antibiotic usage, while transmission routes refer to the 'medium' facilitating ARO mobility and expansion in the environment. The purpose of this mapping exercise is to analyse the spatial distribution of AMR sources and transmission routes and to identify potential locations suitable for sampling in the context of the EPA-funded 'AREST' project.

Methods

The GIS analysis is undertaken for four local authority (LA) areas, namely Fingal Co., Cork Co., Galway Co., and Galway City. A comprehensive review of relevant (spatial) data in each LA, grouped into themes (e.g. healthcare, agriculture), and categorized into sources and transmission routes, was carried out. Spatial datasets were obtained from Irish authorities (e.g. EPA, CSO), or produced through geocoding, with data selection supported by expert knowledge and a literature review. A range of GIS techniques were used to extract, organize and collate the data into the thematic maps through overlaying key spatial datasets.

Results

Preliminary results highlight the location of 'clusters' at increased risk of harboring AMR in each LA. They also demonstrate the relevance of aquatic transmission routes for ARO mobility and risk of human exposure. Urban centres have a high number of potential sources of ARO. However, potential hotspots of AMR are not necessarily restricted to urban areas.

Conclusion

The integration of a GIS approach with expert knowledge of AMR is shown to be a useful tool to gain insights into the spatial dimension of AMR and to guide sampling campaigns. Potential future applications may inform risk analysis and exposure assessment, and also help pinpoint the source and transmission routes of possible outbreaks.

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Corresponding Author Email Address: carlos.chique@nuigalway.ie

Elucidating Levels and Pathways of Human Exposure in Ireland to POP-BFRs and PFOS (ELEVATE)

N. Wemken[1], D.S. Drage[2], M. Abdallah[2], S. Harrad[2], M. Coggins[1]

[1]School of Physics, National University of Ireland, Galway, H91TK33, Ireland

[2]School of Geography, Earth & Environmental Sciences, University of Birmingham, Birmingham B15 2TT, U.K

Keywords: Hexabromocyclododecane (HBCDD), decabromodiphenyl ethane (DBDPE), polybrominated diphenyl ethers (PBDE), brominated flame retardants (BFR), indoor dust, indoor air, persistent organic pollutants (POPs)

Background

One of the objectives of ELEVATE is to collect and analyse indoor dust samples from common Irish microenvironments for POP-BFRs. The POP-BFRs of interest to the project include: hexabromocyclododecane (HBCDD) and polybrominated diphenyl ethers (PBDEs), which were used as flame retardants in a variety of soft furnishings, building insulation foams, electronic and electrical goods. We have also measured the concentration of one "novel" BFR (NBFR (decabromodiphenyl ethane (DBDPE)) in the same samples, as we hypothesised that restrictions on the use of PBDEs and HBCDD will lead to increased use of NBFRs. To the authors knowledge this is the first comprehensive exposure study evaluating BFRs in different Irish microenvironments.

Methods

Floor dust samples from Irish homes, cars, offices and school were collected from August 2016 to January 2017. Dust samples were collected by vacuuming a measured area of the floor surface. Dust extracts were cleaned up, concentrated and analysed via GC-EI/MS (PBDEs and DBDPE) or LC-MS/MS (HBCDDs).

Results

Dust samples from offices and schools contained relatively low concentrations of BDE-209 (median: 3500 ng/g, range: 550-15000 ng/g; median: 8100 ng/g, range: 200-71000 ng/g respectively), compared to levels found in homes and cars (median: 13000 ng/g, range: 140-650000 ng/g; median: 26000 ng/g, range: 14-680000 ng/g respectively). Highest concentrations of DBDPE were observed in schools (median: 10000 ng/g, range: 620-540000 ng/g respectively), followed by cars, offices and homes (median: 7700 ng/g, range: <LOQ-190000 ng/g; median: 6100 ng/g, range: <LOQ-130000 ng/g; median: 6100 ng/g, range: <LOQ-130000 ng/g respectively).

Conclusion

Concentrations of HBCDD and PBDEs found in this study are comparable with concentrations detected in other European countries. However, concentrations of DBDPE are higher suggesting that it is commonly used in Ireland.

Corresponding Author Email Address: n.wemken1@nuigalway.ie

AREST - Antimicrobial Resistance and the Environment – Sources, persistence, Transmission and risk management

B. Hooban[1], C. Chique[1], J. Cullinan[1], K. Burgess[2], F. Leonard[3], F. Walsh[4], E. Cummins[3], L. O'Connor[1], F. Brennan[2], R. Hendriksen[6], S. Fanning[3], M. Healy[1], B. Mc Mahon[3], X. Zhan[1], G. Duffy[2], L. Morrison[1], R. Gately[7], D. Crowley[8], S. Nolan[1], D. Prendergast[9], M. Cormican[1, 5], D. Morris[1].

[1]National University of Ireland, Galway
[2]Teagasc
[3]University College Dublin
[4]Maynooth University
[5]Health Service Executive
[6]Technical University of Denmark
[7]Galway County Council
[8]Cork County Council
[9]Department of Agriculture, Food and the Marine

Keywords: Antimicrobial Resistance, Environnent, Sources, Transmission

Background

Antimicrobial resistance (AMR) is one of the greatest threats to human health. It is estimated that by 2050, 10 million deaths per year will be attributable to AMR. The "One-Health" concept recognises that the health of humans is connected to the health of animals and the environment. The AREST project aims to examine: 1) what level and type of wastewater treatment is effective for the removal of antimicrobial resistant organisms (AROs); 2) what is the level of AROs in manures from different sources; 3) what treatment is effective at removing them; and 4) what role do wildlife and companion animals play in the transmission and persistence of AMR in the environment. This will be achieved by mapping hotspots of drivers of AMR in selected local authority areas: Galway City Council, Galway County Council, Fingal County Council and Cork County Council; assessing the relative contributions of various sectors (healthcare, agriculture) to ARO in the environment; assessing efficiencies of treatment processes for removal of ARO from drinking water, wastewater and manure; and developing a risk ranking protocol to assess the relative contribution of various sectors on the sources and levels of ARO in the environment. The AREST project will: 1) generate national level data on the key sources, hot spots and drivers of antimicrobial resistance in the environment from various sectors; 2) provide evidence of the extent of contamination of the environment with antimicrobial resistant organisms which will inform relevant policies; and 3) embed the "One Health" concept and build the capacity of Ireland's research community to support Irelands National Action Plan on AMR.

Corresponding Author Email Address: b.hooban1@nuigalway.ie

Silver nanoparticles in surface waters and implications for human health

David Shevlin[1] and Enda Cummins[1]

[1]School of Biosystems and Food Engineering, University College Dublin, Belfield, Dublin 4, Ireland.

Keywords: Silver, nanoparticles, drinking water

Background

Silver nanoparticles (AgNPs) residues entering wastewater networks during the use of AgNP enabled commercial and consumer products presents a challenge for wastewater treatment infrastructures. The efficiencies of treatment processes for removal of AgNPs are likely to be challenged by nanoparticle characteristics leading to unintended releases to surface waters in effluent discharges. Presence of functionalized coatings (Citrate or PVP) on particle surfaces applied to ensure mono-dispersity can equally enhance particle stability in natural surface waters. This leads to considerable uncertainty in relation to likely fate and behaviour of nanomaterials in complex natural waters. The presence of persisting AgNPs in surface waters may be a concern in relation to human health as ~81.6% of drinking water supplies in Ireland are sourced from surface waters.

Methods

A framework probabilistic model investigating the fate of AgNPs through the aquatic environment was developed.

Results

Preliminary results from the exposure model (assuming an initial hypothetical case study with 0.01 µg/L entering the surface water) indicated sub (µg/ L) levels of nano silver in surface waters, with a mean value of 4.26 E^{-4} µg/ L (90th percentile range 1.19 E^{-4} - 7.71 E^{-4} µg/ L) and 4.21 E-4 µg/ L (90th percentile range 1.14 E^{-4} - 7.69 E^{-4} µg/ L) for citrate and PVP coated AgNPs, respectfully for a scenario representing summer environmental conditions. Preliminary results for post treatment drinking water obtained from surface water abstraction for the same season indicated mean values of 4.23 E^{-5} µg/ L (90th percentile range 1.00 E^{-6} - 1.72^{-4} µg/ L) and 4.20 E^{-5} (90th percentile range 1.00 E^{-6} - 1.63 E^{-4} µg/ L) for citrate and PVP coated AgNPs, respectfully.

Conclusion

While exposure is low, AgNP toxicity is still largely unknown with the effects of chronic exposure yet to be determined. As utilization of products and processes incorporating AgNPs increase into the future it is likely that AgNP concentrations will increase in natural waters and may present health concerns following surface water abstraction during drinking water sourcing.

Corresponding Author Email Address: david.shevlin@ucdconnect.ie

Recreational Open Water and Risk of Infectious Disease

Katharine Harkin[1], Aine McNamara[1], Ina Kelly[2], Colette O'Hare[3], Regina Kiernan[1]

[1]Department of Public Health, HSE West, Merlin Park Hospital, Galway.
[2]Department of Public Health, HSE Midlands, Central Office, Arden Road, Tullamore, Co. Offaly.
[3]Department of Public Health, HSE South East, Lacken, Kilkenny.

Recreational events involving open water are gaining in popularity. International evidence shows that recreational water users are significantly more likely to experience illness, particularly gastrointestinal symptoms. The risk is highest if water is swallowed or after poor weather conditions.
A country-wide online survey of recreational water users was conducted in Ireland as part of this study. The survey assessed awareness, behaviours and previous experiences of illness associated with recreational use of open water. In total, 673 respondents were included in the analysis.
Results showed a significant burden of disease among recreational water users with 26.6% having previously experienced an illness related to water contact. Illnesses were severe in many cases with 38.1% having consulted a medical professional and 43.9% taking time off work. Swallowing water and those with longer experience with recreational water are significant predictors of illness. Preventive behaviours have been shown to reduce the risk and this study identified scope to increase these preventive behaviours among participants so that risks can be minimised.
Awareness of the risks associated with recreational open water is high among certain groups (canoeists/kayakers). However, those who have the most intense water contact and report swallowing the most water (swimmers/triathletes) are least aware of the risks. Increased awareness among both recreational water users and health professionals would assist identification of water-borne illness and enable more accurate surveillance. It is also recommended that water users only swim at beaches that meet quality standards and stay alert of recent weather events which could cause water contamination.
This exploratory study, the first of its kind in Ireland, highlights the serious issue of water-borne illness among recreational water users and represents a valuable resource for future research.

Corresponding Author Email Address: katharine.harkin@gmail.com

Our Health, Our Wellbeing and Our Environment

Dr. Christine Domegan[1], Dr. Gesche Kindermann[1], Dr. Caitriona Carlin[1], Dr Easkey Britton[1], Niall Ó Brolcháin[2], Dr. Diarmuid O Donovan[3], Fiona Donovan[3] and Maurice Mulcahy[3]

[1]National University of Ireland, Galway
[2]Insight
[3]Health Service Executive

Keywords: Blue/Green Spaces, Environment, Health & Wellbeing, Socio-economic

Background
The inextricable link between our environment and human health is recognised in the Irish Government's Framework for improved health and wellbeing 2013 - 2025 - 'Healthy Ireland' and the **EPA's** Strategic Plan 2016 – 2020 – 'Our Environment, Our Wellbeing'. The **EPA** and **HSE** acknowledge that Ireland has much to contribute from its unique local level capabilities to "explore potential associations between health and exposure to environmental stressors" and to answering, "How the combined trends, demographics, urbanisation, regional environment pressures and socio-economic status, influence our exposure, vulnerability and resilience in Europe?"

Methods
This study aims to complement the EEA's broad assessment and to explore possible impact in greater national, regional and local depth through data analytics, visualisation and mapping the key socio-economic, environmental and health forces and patterns at work in relation to Access to Blue/Green Spaces and Water Quality in Ireland. It uses a highly participatory, multi-disciplinary systems methodology to identify, categorise and structure forces.

Preliminary Findings
Initial findings reveal 221 barriers and 118 enablers divided into 36 themes or forces currently at work in relation to the use of blue/green spaces for our health and wellbeing in Ireland. These forces capture the interacting factors and incorporate diverse perspectives, experiences and structural issues. They identify the complex, diverse dynamic interconnections between the micro- individual variables and the macro organisational and structural elements. The forces are:

1. Uses and values of blue/green spaces
2. Social inequalities
3. Social and community cohesion
4. Risks and fears
5. Participation and engagement
6. Biodiversity quality and value
7. Governance
8. Data and knowledge systems
9. Data stakeholder restrictions

Conclusions
'Uses and values of outdoor spaces' is identified as the 'deep structure' force that underpins the Blue/Green spaces and healthy outcomes. There are two dominant and interconnected themes. One theme relates to 'governance/data' the second theme relates to 'social inclusion/exclusion'.

Corresponding Author Email Address: christine.domegan@nuigalway.ie

Continuous detection of carbapenemase-producing *Enterobacteriaceae* in recreational water, Ireland, 2016-2017

Bláthnaid Mahon[1], Carina Brehony[1], Elaine McGrath[2], Martin Cormican[1, 2], Sinead Ryan[1], Phelim Ryan[1], Paul Hickey[3], Shane Keane[3], Ann Dolan[4], Dearbháile Morris[1]

[1]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, National University of Ireland, Galway, Ireland
[2]Carbapenemase-Producing Enterobacteriaceae Reference Laboratory, Department of Medical Microbiology, University Hospital Galway, Galway, Ireland
[3] Environmental Health Service, HSE West, Galway, Ireland
[4] Galway County Council, Galway, Ireland

Keywords: Antimicrobial resistance, carbapenemase-producing *Enterobacteriaceae,* recreational water

Background
The rapid, global dissemination of carbapenemase-producing *Enterobacteriaceae* (CPE) poses a significant threat to human health. We recently reported the detection of New Delhi metallo-beta-lactamase (NDM)-producing *Enterobacteriaceae* in Irish recreational waters, July 2016 to January 2017 (Euro Surveill. 2017; 22(15): pii = 30513). Findings indicated that the source of CPE was human sewage. The aim of this study was to investigate if the recreational waters ('Beach A' and 'Beach B') continued to be contaminated with CPE and determine if there were additional sources of CPE at these locations.

Methods
Sampling occurred between February and September 2017. Locations included: Beach A (n=7); Beach B (n=2); the mouth of a river which flows into Beach B (n=2); four points further up the river (each sampled once); and the sewage system (200mL/sample) (n=2). Water samples (30L/sample) were filtered using the CapE filtration system. Water and sewage samples were examined for CPE using Brilliance CRE agar (Oxoid). Following antimicrobial susceptibility testing (via EUCAST criteria), suspect CPE were examined for carbapenemase-encoding genes by real-time PCR.

Results
NDM-producing *Enterobacteriaceae* (*E. coli* and/or *Klebsiella pneumoniae*) were detected in 6/7 of Beach A samples, 2/2 of Beach B samples and 2/2 of sewage system samples. Both samples taken at the mouth of the river were positive for NDM-producing *K. pneumoniae*. CPE was not detected further up the river (upstream of the town).

Conclusion
These findings reveal consistent contamination of recreational water with CPE for a period exceeding 14 months. This study supports the conclusion that human sewage is the single source and it highlights the need to cease discharge of untreated human sewage into the environment

Corresponding Author Email Address: b.mahon1@nuigalway.ie

Whole genome sequence analysis of extended spectrum beta-lactamase-producing *Escherichia coli* isolated from recreational water and sewage

Bláthnaid Mahon[1], Carina Brehony[1], James Killeen[1], Louise O'Connor[1], Martin Cormican[1,2], Paul Hickey[3], Shane Keane[3], James Bray[4], Keith A. Jolley[4], Martin C. Maiden[4], Ann Dolan[5] and Dearbháile Morris[1].

[1]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, National University of Ireland, Galway, Ireland

[2]Department of Medical Microbiology, University Hospital Galway, Galway, Ireland

[3]Environmental Health Service, HSE West, Galway, Ireland

[4]Dept. of Zoology, University of Oxford, United Kingdom

[5]Galway County Council, Galway, Ireland

Keywords: Antimicrobial resistance, extended spectrum beta-lactamase-producing *Escherichia coli*, recreational water, whole genome sequencing

Background

Extended spectrum beta-lactamase-producing *E. coli* (ESBL-PE) are associated with human infections. Studies indicate that they are widespread in the aquatic environment. The aim of this study was to use whole genome sequence (WGS) analysis to characterise and compare ESBL-PE isolated from recreational waters and sewage in the same area.

Methods

In total, 25 ESBL-PE were selected from a collection of 44 environmental ESBL-PE, for WGS (Illumina). Isolates were obtained between May 2016 and March 2017. The sources of the isolates include; seawater; 'Beach A' (n=3) and 'Beach B' (n=3), freshwater; 'Stream A' (n=1), 'Stream B' (n=8) and 'River A' (n=4), sewage; 'Sewage A' (n=3), 'Sewage B' (n=1), 'Sewage Storage Tank' (n=1) and 'Sewage Outflow Point'(n=1). Isolate genomes were hosted in and analysis was performed using BIGSdb.

Results

Overall, 10 seven locus sequence types (ST) were identified. ST131 and ST90 (both 6/25), which are associated with human infection were the most prevalent. The most common $bla_{\text{CTX-M}}$ genes identified were $bla_{\text{CTX-M-15}}$ (11/25) and $bla_{\text{CTX-M-27}}$ (10/25). Considerable diversity was found within the collection, with differences at up to 2417/2513 loci. However, high levels of homology were also found among several ESBL-PE originating from different sources. Three ST131 ESBL-PE (from 'Sewage A', 'Sewage B' and 'Beach B') were identical at all 2513 loci. Two ST2003 ESBL-PE (from 'Sewage Storage Tank' and 'Beach A') matched at 2512 loci.

Conclusion

These findings suggest that environmental contamination with ESBL-PE in this setting is likely from human sewage, which may contribute to further dissemination of ESBL-PE within the human population.

Corresponding Author Email Address: b.mahon1@nuigalway.ie

Hospital effluent: a reservoir for carbapenemase-producing *Enterobacteriaceae*

Niamh Cahill[1], Louise O'Connor[1], Bláthnaid Mahon[1], Áine Varley[1], Elaine McGrath[2], Phelim Ryan[1], Martin Cormican[1, 2], Dearbháile Morris[1].

[1]Antimicrobial Resistance and Microbial Ecology Group, School of Medicine, National University of Ireland, Galway
[2]Carbapenemase-Producing Enterobacteriaceae Reference Laboratory, Department of Medical Microbiology, University Hospital Galway, Galway, Ireland

Keywords: antimicrobial resistance, carbapenemase-producing *Enterobacteriaceae*, hospital effluent, municipal wastewater

Background

Carbapenemase-producing *Enterobacteriaceae* (CPE) represent a significant health threat as some strains are resistant to almost all available antibiotics. The aim of this research was to examine hospital effluent (HE) and municipal wastewater from an urban area in Ireland for the presence of CPE.

Methods

Samples of HE (n=5), and wastewater pre (n=5) and post (n=4) entry of the effluent to the wastewater stream were collected over a 9 week period (May-July 2017). Samples were examined for the presence of CPE using Brilliance CRE agar (Oxoid). Suspect CPE were identified using MALDI-TOF, and tested for susceptibility to 16 antimicrobial agents, in accordance with EUCAST criteria. All suspect CPE were examined for the presence of carbapenemase-encoding genes; bla_{KPC}, bla_{OXA-48}, bla_{NDM}, bla_{VIM} and bla_{IMP}, by real-time PCR.

Results

CPE was detected in samples of HE (n=5), pre-hospital wastewater (n=1) and post-hospital wastewater (n=3). A total of 15 CPE were detected in HE. 13/15 harboured a single carbapenemase-encoding gene; (3 *Klebsiella pneumoniae* (2 bla_{OXA-48}, 1 bla_{IMP}), 1 *Klebsiella oxytoca* (1 bla_{OXA-48}), 4 *Citrobacter freundii* (2 bla_{KPC}, 2 bla_{OXA-48}) and 5 *Enterobacter cloacae* (3 bla_{OXA-48}, 1 bla_{IMP}, 1 bla_{VIM})), while the remaining 2, (both *Enterobacter cloacae*) harboured two genes; bla_{IMP} and bla_{OXA-48}. During the same period, in the hospital where HE was collected, 8 bla_{OXA-48}, 4 bla_{VIM} and 1 bla_{IMP} were detected in clinical samples. In post-hospital samples, 8 CPE were detected (2 *Klebsiella pneumoniae* (1 bla_{OXA-48}, 1 bla_{IMP}), 1 *Klebsiella oxytoca* (bla_{VIM}), 3 *Citrobacter freundii* (2 bla_{KPC}, 1 bla_{OXA-48}), and 2 *Enterobacter cloacae* (both bla_{OXA-48})). In contrast, only 1 CPE (NDM producing *E. coli*) was detected in pre-hospital samples.

Conclusion

Hospital and post-hospital wastewater routinely contains a diverse range of CPE, whereas, pre-hospital wastewater does not, indicating a contrast between hospital, post-hospital and general urban wastewater. Testing of hospital effluent may have applications in monitoring for unrecognised CPE dissemination in healthcare settings.

Corresponding Author Email Address: niamh.cahill@nuigalway.ie

ONE HEALTH
EJP ASM 2019

One HEALTH EJP

1ST ANNUAL SCIENTIFIC MEETING OF THE ONE HEALTH EUROPEAN JOINT PROGRAMME ON FOOD-BORNE ZOONOSES, ANTIMICROBIAL RESISTANCE AND EMERGING THREATS

Invitation

The conference organising team are delighted to invite you to attend the first Annual Scientific Meeting of the One Health European Joint Programme OHEJP on food-borne zoonoses, antimicrobial resistance and emerging threats. The first One Health EJP ASM will be jointly hosted by Teagasc and NUI Galway in Dublin.

The OHEJP

The One Health European Joint Programme (OHEJP) is a European Commission co-funded scientific collaborative research programme to help prevent and control food-borne and environmental contaminants that affect human health, through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards. The OHEJP of 38 European partners and the Med-Vet-Net Association, brings together a research community across Europe of medical, veterinary and environmental health scientists to work together in interdisciplinary teams with key relevant European regulators and policy makers.

Date & Venue

- Wednesday 22nd to Friday 24th of May 2019 at the Teagasc Conference Centre, Ashtown, Dublin
- Venue is located 20 minutes from Dublin International Airport
- Well serviced by public transport from Dublin City Centre
- Ample car parking onsite
- Shuttle bus provided from selected pick up points in Dublin City Centre

Registration

Early Registration	€360
Standard Registration	€400
PhD Student	€225

The conference fee will include lunches, refreshments, conference materials, a barbeque and a gala conference dinner.

Online registration is available at www.ohejp2019.com

* The registration of students must be accompanied by a letter from their Head of Department.

N. B. OHEJP members should consult with their institute representative regarding registration and accommodation rates.

Céad Míle Fáilte. We look forward to welcoming you to Dublin!

This event is part of the European Joint Programme One Health EJP. This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 773830

For any queries please email: ohejp2019@abbey.ie or call +353 1 6486 130

www.ohejp2019.com

DUBLIN, MAY 22ND–24TH 2019

ONE HEALTH EJP ASM 2019

Organisers

The conference is organised by
Dr Geraldine Duffy, Teagasc (Chair)
Dr Dearbháile Morris, NUIG (Co- chair)
In collaboration with a local organising team at Teagasc, National University of Galway, Department of Agriculture, Food and the Marine, Food Safety Authority of Ireland, University College Dublin, Health Protection Surveillance Centre and the EJP project management team.

Programme

The Programme will include:

- Scientific programme with presentations by renowned international scientists;
- Sessions on food-borne zoonoses, antimicrobial resistance and emerging threats;
- Exciting social programme for networking and enjoying the best culture, food and entertainment that Dublin has to offer;
- Visits to some of Dublin's historic landmarks

Abstracts

Participants are invited to submit abstracts which relate to food-borne zoonoses, antimicrobial resistance and emerging threats. Abstracts for oral or poster presentation should be submitted online (www.ohejp2019.com) and should not exceed 300 words in length. Accepted abstracts will be published in the conference proceedings. A prize will be presented for the best student presentation.

Closing date for receipts of abstracts is 31st January 2019.
Please submit abstracts online at www.ohejp2019.com

Exhibition stands and sponsorship opportunities will be available.
For further information please email ohejp2019@abbey.ie or call +353 1 6846 130


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