EVENT REPORT

Adverse Drug Reactions in Children (ADRIC) – Drug Safety in Children

Date:
Friday 26th April 2013

Location:
Atlantic Tower by Thistle Hotel, Liverpool

The NIHR Medicines for Children Research Network is part of the NIHR Clinical Research Network, which supports research to make patients, and the NHS, better.

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Introduction

The Adverse Drug Reactions in Children (ADRIC) Programme was a five year Programme Grant for Applied Research funded by the National Institute for Health Research (NIHR) carried out in collaboration between the University of Liverpool (UoL) and Alder Hey Children's NHS Foundation Trust. Adverse drug reactions (ADRs) are the unwanted effects of medication and the aim of this research programme was to investigate the prevalence and nature of ADRs in hospitalised children and develop strategies to reduce the burden of ADRs in this population. This programme addressed a significant gap in knowledge about paediatric ADRs.

The programme comprised of a series of studies carried out by a multi-disciplinary team of professionals from both Alder Hey Children's NHS Foundation Trust and the University of Liverpool. The Chief Investigator for ADRIC was Prof Rosalind Smyth, currently Director, University College London (UCL) Institute of Child Health: Co-investigators – Prof Munir Pirmohamed, Prof Tony Nunn, Dr Mark Turner, Prof Matthew Peak, Prof Bridget Young and Prof Paula Williamson. The research programme was overseen by an expert Steering Group comprising ADRIC Senior Investigators, methodologists, international experts in the field and regulators. ADRIC studies that involved recruitment were adopted and supported by the NIHR Medicines for Children Research Network (MCRN).

ADRIC Study 1: Acute Admissions

The aim was to identify the proportion of ADRs experienced among children acutely admitted to Alder Hey Children's Hospital over one year. During the study the ADRIC team were present on wards consulting patients and their families as part of the identification process of possible ADRs.

The ADRIC 1 research team comprised of Dr Ruairi Gallagher (Clinical Research Fellow); Kim Bird (Research Nurse) and Jenny Bellis (Research Pharmacist).

Publications

The analysis has been carried out and the pilot study results have been published:
Adverse drug reactions causing admission to a paediatric hospital – A pilot study; Gallagher et al; Journal of Clinical Pharmacy & Therapeutics 2011; 36(2):194-199
http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2710.2010.01194.x/abstract

The full study paper has been published:
***Adverse drug reactions causing admission to a paediatric hospital; Gallagher et al*, PLoS ONE.**
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0050127

A further publication from the study is*:*
Adverse drug reactions and off-label and unlicensed medicines in children: a prospective cohort study of unplanned admissions to a paediatric tertiary referral center, Bellis et al, British Journal of Clinical Pharmacy (BJCP). http://onlinelibrary.wiley.com/doi/10.1111/bcp.12222/abstract

ADRIC Study 2: Inpatient Study

The year long investigation of ADRs occurring amongst in-patients commenced in October 2009 during which time the study team examined the incidence and nature of ADRs in hospitalized children. This included the drugs that may have caused ADRs and from there risk factors for ADRs were evaluated, including unlicensed and off-label medicines use.

The ADRIC 2 research team comprised of Dr Signe Thiesen (Clinical Research Fellow); Helena Mannix (Research Nurse); Jenny Bellis, Louise Bracken and Jennifer Duncan (Research Pharmacists).

Publications

The full study has been published as:

Incidence, characteristics and risk factors of Adverse Drug Reactions (ADRs) in hospitalised children – a prospective observational cohort study of 6601 admission; Thiesen et al;
BioMed Central Medicine. http://www.biomedcentral.com/1741-7015/11/237

And a further paper has been published as:

Off-label and unlicensed medicine use and adverse drug reactions in children: A narrative review of the literature, Mason et al, European Journal of Clinical Pharmacology and Adverse drug reactions and off-label and unlicensed medicines in children: a nested case-control study of inpatients in a paediatric hospital, Bellis et al:
BioMed Central Medicine http://www.biomedcentral.com/1741-7015/11/238

ADRIC Study 3: Systematic Review

This phase of the programme was a systematic review conducted of studies investigating ADRs occurring in individuals aged 0-16 years. Systematic reviews aim to combine the results of similar studies addressing a particular research question. Looked at individually, each study may offer little insight into either effectiveness or adverse effects and by combining the results from a number of trials a clearer picture developed. The review combined evidence from studies which investigated ADRs in children and described methods used for identifying them.

The ADRIC 3 research team comprised of Dr Rebecca MD Smyth (Research Associate) and Liz Gargon (Research Assistant).

Publication

The ADRIC Systematic Review paper has been published as:

Adverse drug reactions in children – a systematic review, RMDS Smyth et al; PLoS One. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0024061

ADRIC Study 4: ADRIC-QUAL

The study explored families' and clinicians' experiences of paediatric ADRs and the MHRA Yellow Card reporting system. Semi structured interviews following a topic guide were conducted with consenting parents and children (between 7 and 17 years). Families were asked about their child's stay in hospital (if relevant), their health problems and the medicine they had taken. Interviews were audio recorded, transcribed and anonymised. Analysis was informed by the principles of the constant comparative

method. These findings informed Study 5 to improve communication between families and health professionals.

The ADRIC-QUAL research team consisted of Dr Hannah Hesselgreaves and Dr Janine Arnott (Research Associates).

Publications

The conclusions of parents' ADR experiences have been published as:
Enhancing communication about paediatric medicines: lessons from a qualitative study of parents' experiences of their child's suspected adverse drug reaction, Arnott et al, PLoS ONE ***http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0046022*** and the results of parents participation in the yellow card scheme has been published as: ***What can we learn from parents about enhancing participation in pharmacovigilance?, Arnott et al, British Journal of Clinical Pharmacology.***
Further publications include ***Parents' experiences of adverse drug reactions in children: qualitative study (abstract), Arnott et al, Pharmacoepidemiology and Drug Safety Volume 21, Issue 1, pages 110–119. http://www.ncbi.nlm.nih.gov/pubmed/22905902***

ADRIC Outputs

The findings from the first four studies supported the production and evaluation of tools that will help to both identify and communicate ADRs more effectively.

Child and parent information leaflets are currently being developed as communication was consistently identified by parents as a barrier to understanding their child's ADR and the future implications of this for their child's health care. The leaflets have been reviewed by the Paediatric Expert Advisory Group (PEAG) at the Medicines and Healthcare products Regulatory Agency (MHRA) and revised in response to their suggestions for further review. The Royal College of Paediatrics and Child Health host the medicinesforchildren.org.uk website which features information leaflets for parents about medicines. RCPCH were approached with a view to the ADRIC leaflet being hosted on the medicinesforchildren.org.uk website. The leaflet was reviewed and RCPCH agreed to adopt the ADRIC leaflet for inclusion on the website subsequent to minor revisions and formatting.

The Liverpool Causality Assessment Tool (LCAT) was developed and the e-learning tool is complete. A randomised controlled trial to assess the utility of the LCAT e-learning tool was conducted during February and March 2013. This paper is still being written, preliminary results from the initial abstract are as follows:

- **Objectives**: to test the utility and usefulness of the Liverpool ADR Causality Assessment e-learning Tool; a new interactive, web-based e-learning package designed to improve causality assessment by individual practitioners using the LCAT **Design**: pilot, single-blind, parallel-group randomised controlled trial
- **Setting**: hosted by the University of Liverpool, participants completed their allocated arm remotely via the internet
- **Participants:** paediatric medical trainees at Specialty Training Level 1 and above with no advanced experience in causality assessment within the Mersey and North West England Deaneries. Of the 57 randomised, 34 (60.0%) completed the study
- **Interventions**: consenting trainees were randomised 1:1 to either receive or not receive access to the e-learning training tool.
- **Main outcome measure**: The primary outcome was score by correct classification; defined as the total correct classifications out of 20 case studies assessed post intervention

- **Results**: score by correct classification ranged from 4 to 13 out of 20. The e-learning tool increased the number of correct classifications by 1.34 on average (95% CI -0.3 to 3.0). This difference was not statistically significant (t test; Score by correct classification, P=0.10).

The Liverpool Avoidability Assessment Tool (LAAT) was developed and testing/validation is currently underway.

Publications

The following paper was published *as:*

Development and inter-rater reliability of the Liverpool ADR causality assessment tool; Gallagher et al; PLoS ONE. http://www.plosone.org/article/info:doi/10.1371/journal.pone.0028096

For more information about the ADRIC Programme please visit: http://www.adric.org.uk/Index.html

This report outlines the presentations and workshops held on the 26th April 2013, as well as showcasing the achievements of the studies and the legacy left behind, marking the end of the ADRIC Programme.

Presentations

Prof Rosalind Smyth **(Chief Investigator for the ADRIC Programme) welcomed delegates and outlined the schedule of the day. Subsequently the presentations as described below were delivered.**

1. Overview of ADRIC and Key Findings

Prof Rosalind Smyth, (Chief Investigator for the ADRIC Programme)

Prof Rosalind Smyth presented a summary of the ADRIC Programme, outlining the important new findings about incidence, severity and risk factors for ADRs in children. ADRIC comprised of a series of studies carried out in partnership with a multi-disciplinary team of professionals from both Alder Hey Children's NHS Foundation Trust and the University of Liverpool. The studies aimed to provide important evidence about the incidence and nature of ADRs in children and to develop methodologies to aid with pharmacovigilance in paediatrics. Families' and children's experiences of ADRs were also explored to discover what influences clinicians' communication with families following a suspected ADR in a child, with a view to suggesting strategies to address families' unmet information needs. The ADRIC Programme was one of the inaugural NIHR programme grants and addressed an important gap in paediatric medicine research.

2. ADRIC – The Wider Picture for the MHRA and Pharmacovigilance in Children

Dr June Raine, Director of Vigilance and Risk Management of Medicines, MHRA

Dr June Raine discussed the important new findings from ADRIC studies which better characterised the burden of ADRs in children, outlining the significance for pharmacovigilance for the MHRA and for Europe. An overview of the regulatory progress for paediatric pharmacovigilance to date was outlined, which reinforced the critical importance of communication about ADRs with children, parents, carers and health professionals. The MHRA is looking to encourage increased paediatric adverse event reporting by building on the existing Yellow Card strategy, especially for off-label use and medication error.

3. ADRIC – The Wider Picture within International Pharmacovigilance in Children

Prof Michael Rieder, Department of Paediatrics, Children's Hospital of Western Ontario

Prof Michael Rieder presented an overview of the international efforts taking place in pharmacovigilance for monitoring of adverse drug events in children. He acknowledged the contribution that had been made through the ADRIC programme in pushing paediatric research forward and enhancing drug safety in children.

4. NIHR: Improving Health, Creating Wealth

Prof Dame Sally Davies, Chief Medical Officer & Chief Scientific Adviser, Department of Health

Prof Dame Sally Davies spoke of the overall vision of the NIHR to improve the health and wealth of the nation by creating a health research system in which the NHS can support individuals working in world class facilities to conduct leading-edge research focused on the needs of patients and the public. ADRIC was described as an exemplar NIHR programme grant, funded from the first competition which opened in June 2006 and has been the only one awarded under the Medicines for Children Research theme. ADRIC consisted of five integrated studies which have made important new findings about ADRs in children and will help improve care in the NHS.

Discussion Groups

World Café Discussion: What can we learn from ADRIC?

1. **What are the research implications of the burden of ADRs in paediatrics?**
2. **What lessons can be learned about reducing the incidence of ADRs in the future?**
3. **How do we train healthcare professionals better in the avoidance of ADRs?**
4. **What strategies could improve communication about ADRs with families**

The aims of the Discussion Groups were to discuss:

- ***What was learnt from ADRIC***
- ***How can we improve matters and reduce the incidence of ADRs?***

Workshop leads ensured that details of challenges and solutions were noted on flip chart paper. The findings were then presented to the meeting delegates (in no more than 10 min).

1. ***What are the research implications of the burden of ADRs in paediatrics*?**
   Facilitator: Prof Munir Pirmohamed
   Scribe: Elizabeth Conroy

Summary of discussion

- *Approaches to determining medicine doses for children:* Work with industry to develop adaptive licensing. Explore what has been used, what hasn't been used and utility of methodologies for the extrapolation of doses from adults to children. Use findings to develop a gold standard practice for extrapolation and apply to drugs identified as high risk within ADRIC. Take forward drugs highlighted by ADRIC as a focus for further study, monitor the PK/PD of these drugs and aim to develop risk models.

- *Approaches to developing the ADRIC causality and avoidability assessment tool work:* Design an 'app' for assessment tools. Use tools in RCTs to improve ADR reporting. Use tools in real world sense to improve practice – this would give a consistent approach to assessments. Test tool elsewhere e.g. other hospitals and settings. Conduct a larger RCT of LCAT e-learning tool to determine effect of clinician assessment of ADR causality. Use in the real world and medical training could improve how the LCAT is used in practice.

- *Further approaches to the quantification of ADRs:* Explore variation across settings and age at other sites. Explore variation in neonates, theatres and critical care, A&E, long term side effects, post discharge and the home setting, primary and community care. What lessons from the adult studies can be extrapolated to children?

- *Approaches to further ADR monitoring:* ADRIC has highlighted a need to understand better the morbidities associated with anaesthesia and surgery in children. This requires a study which can follow-up and monitor children both in the community and home setting to assess the incidence of ADRs following surgery, compare these according to the anaesthetic and postoperative drugs, surgical procedures and their co-morbidities. An observational study could lead to an assessment of which children should be discharged on the day of surgery and for those who are, RCTs will be able to assess the most appropriate treatment regimens to prevent pain, vomiting and other postoperative

complications. Explore active reporting, passive reporting and the difference between them. Communicate and collaborate with industry in the development and refinement of monitoring systems within paediatric pharmacovigilance.

- *Approaches to risk-benefit evaluation.* There is a need to explore the balance of safety vs. efficacy. Is there too much focus on safety in monitoring at the expense of potential benefit? Is the weight between efficacious outcomes and safety of patients always sensible? This subject is currently less understood in children than adults. For further work in one paediatric area could be focussed on, for example paediatric oncology. What are parental views of risk/benefit evaluation? What are the children's views? How do the decision making differences between children and parents for particular drugs differ? Does the benefit/risk comprehension and decision differ with age e.g. from pre-school to adolescence?

2. What lessons can be learned about reducing the incidence of ADRs in the future?

Facilitator: Prof Rosalind Smyth
Scribe: Louise Bracken

Summary of Discussion

- The ADRIC systematic review highlighted that only 19% (19/102) of studies actually carried out an avoidability assessment.
- No common definitions of avoidability / preventability.
- Education and training.
- ADRIC highlights the incidence of ADRs in children.
- Can we use data from ADR studies to predict who is at risk?
- Risk profiling: children who are at increased risk of ADRs.
- The ultimate in preventability is pharmacogenetics.
- Risk management planning: balance risk/benefit.
- Systems approach: team involvement, making everybody aware.
- This issue of transient versus permanent effects: is there something about the level of potential harm and how long-term it is as to how much effort should be putting in to prevent it?
- Lack of advice on avoidance of ADRs e.g. in drug information leaflets.
- Guidelines (local, national and international) not always available in paediatrics and often contain no information about avoidance of ADRs.
- What about the ADRs which have not been recognised yet, that is why studies like ADRIC are so important.
- Electronic prescribing (EP) use of clinical decision support systems (CDSS), alerts, computerised physician order entry (CPOE).
- Quality improvement processes in the USA use electronic systems to detect ADRs and ADEs (adverse drug events).
- Educating and empowering parents e.g. pre-op information leaflet.
- Risk management plans (RMPs) lay summaries for patients.
- Formal improvement methodologies.
- Drug information leaflets - need to be concise.
- Practicalities of providing information time constraints.

How can we improve matters and reduce the incidence of ADRs?

- Communication: history taking and record keeping, raising awareness of ADRs amongst healthcare professionals.
- Education and training of healthcare professionals at undergraduate and postgraduate levels.

- EP and CDSS have been shown to be beneficial but not entirely perfect systems, there are still issues including alert fatigue.
- Common definitions are a platform to do more.
- Culture within NHS and institutions could factor ADRs into clinical governance meetings.
- Pharmacogenetics can help predict who might be at high risk.

3) How do we train healthcare professionals better in the avoidance of ADRs?

Facilitator: Dr Mark Turner
Scribe: Jenny Bellis

Introductory Comments

- An example of an avoidable ADR: inadequate prevention of constipation during treatment with opioids.
- Use of the LAAT could educate people in the avoidance of ADRs.
- The development of the LAAT revealed that how people carry out avoidability assessment can depend on experience, background knowledge and appreciation of the situation/healthcare system.
- Is the avoidance of ADRs about individuals or systems?
- How can individuals change their practice to avoid ADRs?
- How do we overcome the problems faced by individuals when confronted with multiple problems within a system?
- How to train individuals to identify problems and manipulate the systems being worked with?

Summary of discussion

- Awareness of ADRs amongst healthcare professionals needs to be improved. This could be achieved through: 1:1 reminders, coding of ADRs and feedback to prescribers, telling patient stories and publication of bulletins. ADRs need to be 'kept on the agenda' for example through integration into regular clinical meetings, as part of under and post-graduate education and as part of professional exams and re-validation.

- It is important to educate parents and families by communicating about ADRs, considering the parent's perspective, the language and tools used to communicate. Communication about ADRs needs to become part of routine practice, the development and implementation of guidelines may facilitate this.

- How can teams work better together when it comes to ADRs? Some approaches to this include: a named ADR/Yellow Card champion on each ward or unit, pharmacists taking responsibility for this on ward rounds, integrating ADR scenarios into training simulations and developing training to illustrate the importance of an MDT approach to the management of ADRs.

4) What strategies could improve communication about ADRs with families

Facilitator: Prof Bridget Young
Scribe: Helena Mannix

Introductory Comments

- Findings of ADRIC QUAL showed that families felt that communication about their experienced ADR did not match their needs.
- Communication problems arose both at the prescribing stage and following a suspected ADR occurring
- Families of oncology treated children were very satisfied with how communication about ADRs was managed.

- Clinicians' interviews looked to identify where barriers lie in communicating about ADRs with families and ways in which they could be overcome. The ways clinicians defined ADRs and filtered information may lead to the problems that families described.
- The findings were used to develop leaflets to support families in talking with clinicians when an ADR was suspected.

Discussion Topics

1. **How to enhance communication at the time of prescription and following an ADR?**

- Families had reported being overwhelmed by the verbal information provided as there was a lot going on with their child at the time and how to balance this needs to be addressed.
- Encouraging families to communicate with HCP and inform of any changes that take place with their child. This needs to be instilled at the prescribing stage with families involved in the discussion which they currently don't seem to be part of, and offered choices. Highlighting what to watch out for can avoid potentially serious ADRs from manifesting by approaching at the first signs which parents would be able to identify.
- Even when parents are told "come back if there is a problem", it is quite difficult for them to make the judgement if a significant ADR has actually taken place or not.

2. **How to match communication to families' needs?**

- Guidelines on medical adherence needs to be provided with details of the risk, but without influencing if the drug is administered (through scaring) or not and offering more choice. There is a fear of causing non-compliance by providing a list of possible ADRs.
- Oncology teams communicate well to families who are told of everything expected to happen to their child, relationships are built through long term care, so there is continuity. They communicate the benefit and the risk and the terminology used and relationships built means everything becomes familiar.
- "Layering" is an effective method of informing families allowing them to access more information as and when they need it at a pace in which they are able to absorb
- Electronic prescribing allows parents to receive emails containing the relevant information prior to the medication being commenced.

3. **What is the role of different professionals in communicating about ADRs?**

- Using the ward round as a forum for communication and discussion in which the parents are included in the decision making process.
- Parents need to receive consistent information and the same key message from varying HCPs, (although they all have a different role) which doesn't always take place and families pointed this out during the AQ study.
- Including the pharmacist in all ward rounds would help with communication although they may not have access to lab results for signals that highlight ADRs
- Research nurses involved with clinical trials monitor patients and observe reactions and are in a position to raise awareness. They make the patient aware of how their bodies may respond to the medicine.

Conclusions

In summary, ADRIC hosted a well-attended event on 26th April 2013 in Liverpool bringing together a multi-disciplinary group of individuals from different sectors all involved in the delivery of drug safety for children. The group included Research Nurses, Consultants, Study Co-ordinators, parents and representatives from the MCRN and MHRA.

The day also included 4 discussion groups on what was learnt from ADRIC and how to improve matters and reduce the incidence of ADRs. There were some very useful discussions within these groups which have been summarised in the previous section. There was also interest from the participants in attending future events of this nature and actions raised by the discussion groups will be followed up on in due course.

Meeting evaluation

Following the meeting, presentations and workshops were evaluated using the SurveyMonkey website (http://www.surveymonkey.com/). The questionnaire was completed by 21% of the attendees with all respondents rating the overall event as very good or excellent. Knowledge of the invited speakers and workshops were also rated highly, with the vast majority of respondents indicating that the event was mostly of relevance or highly relevant to their educational needs.

Many of the points raised in evaluation responses are covered in the presentation and workshop notes above, but other feedback received included the following suggestions:

- A follow-up conference or meeting should be held possibly linked with the British Paediatric or British Pharmacology meetings.
- Feedback on if and how the outputs have been captured in any form.
- Separate rooms for breakout discussion groups for similar events.

Appendix 1: Meeting agenda

Friday 26th April 2013	**Drug Safety In Children**
10.15-10.45am Coffee and Registration	
10.45-11.30	**Conference Welcome and Overview of ADRIC and Key Findings** Prof Rosalind L Smyth, Director UCL Institute of Child Health
11.30-11.45am Coffee	
11.45-12.15	**ADRIC – The wider picture for the MHRA and pharmacovigilance in children** Dr June Raine, Director of Vigilance and Risk Management of Medicines, MHRA
12.15-12.45	**ADRIC – The wider picture within international pharmacovigilance in children** Prof Michael Rieder, Department of Paediatrics, Children's Hospital of Western Ontario
12.45-1.45pm Lunch	
1.45-3.00	**World Café Discussion: What can we learn from ADRIC?** • **What are the research implications of the burden of ADRs in paediatrics?** • **What lessons can be learned about reducing the incidence of ADRs in the future?** • **How do we train healthcare professionals better in the avoidance of ADRs?** • **What strategies could improve communication about ADRs with families?**
3.00-3.15pm Coffee	
3.15-3.45	**ADRIC Investigator Panel – Feedback from World Cafe Discussion**
3.45-4.15	**NIHR: Improving Health, Creating Wealth** Prof Dame Sally C. Davies, Chief Medical Officer & Chief Scientific Adviser Department of Health
Close of meeting	

Appendix 2: Attendees

Name	Job Title	Organisation
Prof Dame Sally Davies	Chief Medical Officer	Department of Health
Prof Sir Alasdair Breckenridge	Chair of the Emerging Science and Bioethics Advisory Committee (ESBAC)	Department of Health
Prof Rosalind Smyth	Director	Institute of Child Health, University College London
Prof Munir Pirmohamed	NHS Chair of Pharmacogenetics & Head of Department of Molecular & Clinical Pharmacology	University of Liverpool
Dr Mark Turner	Director of Research and Development and Honorary Consultant Neonatologist	Liverpool Women's NHS Foundation Trust / University of Liverpool
Prof Tony Nunn	Honorary Fellow	University of Liverpool
Prof Matthew Peak	Director of Research	Alder Hey Children's NHS Foundation Trust
Prof Paula Williamson	Head of Department of Biostatistics	University of Liverpool
Prof Bridget Young	Director of Communication Skills	University of Liverpool
Dr June Raine	Director	VRMM Medicine Healthcare products Regulatory Agency (MHRA)
Prof Deborah Ashby	Co-Director of Imperial Clinical Trials Unit, Chair in Medical Statistics and Clinical Trials	Imperial College London
Prof Michael Rieder	Professor of Paediatrics, Physiology & Pharmacology and Medicine	University of Western Ontario
Dr Ruairi Gallagher	Specialist Registrar/ ADRIC Research Fellow	Mersey Deanery
Jennifer Bellis	ADRIC Research Pharmacist	Alder Hey Children's NHS Foundation Trust
Barbara Richards	GRIP Programme Administrator	University of Liverpool
Dr Signe Thiesen	ADRIC Clinical Research Fellow	University of Liverpool
Helena Mannix	ADRIC Research Nurse	Research and Development, Alder Hey Children's NHS Foundation Trust
Louise Bracken	ADRIC Research Pharmacist	Alder Hey Children's NHS Foundation Trust
Dr Janine Arnott	ADRIC QUAL Research Associate	University of Liverpool

Jennifer Duncan	GRIP Research Pharmacist	Alder Hey Children's NHS Foundation Trust
Dr Jamie Kirkham	Lecturer in Biostatistics	University of Liverpool
Elizabeth Gargon	Research Assistant	Department of Biostatistics, University of Liverpool
Beth Conroy	Research Assistant	Department of Biostatistics, University of Liverpool
Dr Hannah Hesselgreaves	ADRIC QUAL Research Associate	ObComplete (formerly University of Liverpool)
Rebekah Hughes	ADRIC Administrator	University of Liverpool
Prof Michael W Beresford	Joint Interim Director	NIHR MCRN
Dr Vanessa Poustie	Assistant Director	MCRN Coordinating Centre
Dr Andrew Rose	Deputy Assistant Director	MCRN Coordinating Centre
Justine Howard	ADR Information Officer	Yellow Card Centre North West
Neil Caldwell	Honorary Lecturer, Liverpool John Moore's University and Consultant Pharmacist	Wirral University Teaching Hospital NHS Foundation Trust
Paul Gringras	Lead Consultant - Sleep and Neurodisability	Children's Sleep Centre, Guys and St Thomas NHS Foundation Trust
Dr Anthony R Cox	Lecturer in Clinical Pharmacy	University of Birmingham
Prof Ian Lewis	Medical Director	Alder Hey Children's NHS Foundation Trust
Dr Lauren Walker	Medical Research Council Clinical Fellow	University of Liverpool
Dr Stephen McWilliam	Medical Research Council Clinical Fellow	University of Liverpool
Dr Vincent Yip	Medical Research Council Clinical Fellow	University of Liverpool
Howard Duff	Director for England	The Royal Pharmaceutical Society
Dr Clare van Miert	NIHR Clinical Doctoral Research Fellow	Alder Hey Children's NHS Foundation Trust
Caryn Chan	Paediatric Clinical Pharmacist	Newcastle upon Tyne NHS Foundation Trust
Dr Amitabh Shankar	Paediatric Trainee	St. Helens & Knowsley NHS Trust

Dr Archana Prasad	Paediatric Trainee	North West Deanery
Dr Chris Barton	Paediatric Trainee	Alder Hey Children's NHS Foundation Trust / Mersey Deanery
Dr Isobel Salter	Paediatric Trainee	Mersey Deanery
Dr Naomi Simmons	Paediatric Trainee	Alder Hey Children's NHS Foundation Trust
Dr Olya O'Connor	Paediatric Trainee	Alder Hey Children's NHS Foundation Trust / Mersey Deanery
Dr Peter Fitzmaurice	Paediatric Trainee	Arrowe Park Hospital
Dr Petr Jirasek	Paediatric Trainee	Glan Clwyd Hospital (out of programme training) Alder Hey Hospital- PICU Grid Trainee from August
Dr Romita Ganguly	Paediatric Trainee	University Hospital Of South Manchester
Dr Virginia Ramos-Martin	Paediatric Trainee	Alder Hey Children's NHS Foundation Trust
Madeleine Wang	Patient Advocate	Paediatric Medicines Expert Advisory Group
Rhian Isaac	Pharmacy Clinical Lead	Birmingham Children's Hospital
Norkasihan Ibrahim	PhD Researcher	University College London, School of Pharmacy
Mohammed Amali	PhD Student in Molecular and Clinical Pharmacology	University of Liverpool
Catherine Birch	Portfolio Operations Manager & Neonatal Network Coordinator	NIHR Medicines for Children Research Network (MCRN)
Farrah Khan	CAG Lead Pharmacist Women & Children	Barts Health, Whipps Cross University Hospital
Prof James McElnay	Pro-Vice-Chancellor for Research and Postgraduates	Queen's University Belfast
Dr Alastair Sutcliffe	Reader in General Paediatrics	University College London
Dr Theo Anbu	Consultant Paediatrician	Alder Hey Children's NHS Foundation Trust
Hannah Leyland	Research Nurse	Clinical Research Facility, Alder Hey Children's NHS Foundation Trust
Sarah Siner	Research Nurse	Alder Hey Children's NHS Foundation Trust
David Delaney	Research Nurse	Alder Hey Children's NHS Foundation Trust

Dr Asia Rashed	Research Pharmacist	King's College London / Evelina Children's Hospital
Chantelle Bailey	Research Student	University of Manchester
Christine Randall	Senior Medicines Information Pharmacist	Yellow Card Centre North West
Maiya Ahmed	Senior Paediatric Pharmacist	Harley Street Clinic
Dan Carr	Senior Research Associate	University of Liverpool
Mrs Linda Williams	Senior Resuscitation Officer	Betsi Cadwaladr University Health Board
Dr Julia Dunne	Special Populations	VRMM Medicine Healthcare products Regulatory Agency (MHRA)
Dr Angelika Siapkara	Unit Manager	Paediatrics Medicine Healthcare products Regulatory Agency (MHRA)