

Forschungsaktivitäten 2023 – Research Report 2023

**Departement für Intensivmedizin und Neonatologie
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Preface

Dear Colleagues,

We are pleased to present the 2023 research report from the Pediatric and Neonatal Intensive Care Research Group (PINNACLE) of the Department of Intensive Care and Neonatology at the University Children's Hospital Zurich and Children's Research Center.

This report showcases the diverse successes and progress of our team, encompassing 85 publications, including some in leading journals such as JAMA Pediatrics, Intensive Care Medicine, NEJM, and more than 40 presentations and posters at both national and international forums over the past year. The breadth of our publications underscores our increasingly interdisciplinary research approach. Notably, the involvement of young researchers is a priority for our team to enhance the capacity and capability in the field. We believe that the report underscores the growing research culture of our Department where research is embedded at the bedside as a pivotal strategy among others to enhance the quality of care provided to our critically ill patients and their families.

We would like to congratulate Philipp Baumann who received his Habilitation at UZH, and Barbara Brotschi who received her Titularprofessor at UZH in 2023!!!!

Our team of study coordinators underwent significant changes in 2023 with the departure of our study coordinators Marion and Kathrin and the arrival of two new study coordinators, Sanella and Anika, who quickly immersed into the trials and new research projects. Across ongoing randomized clinical trials (one of which is an investigator-initiated RCT) and several actively recruiting research projects, nearly 200 patients were recruited in 2023.

2023 kept our team busy leading several competitive grants including 2 SNF (BOND RCT, Swiss Pediatric Sepsis Precision Medicine), one SPHN/PHRT National Data Stream (SwisspedHealth), and co-leads a PHRT grant (RAPIDS). In addition, we participate in several national grants such as ADONIS SPHN, as well as international (DIAMONDS H2020; RESPOND NHMRC).

These projects span from omics biomarker discovery and investigations into rare diseases using multi-omics through pragmatic trials and artificial intelligence into music therapy and family engagement. We are committed to deepen our interdisciplinary partnerships at local, national and international level to help driving innovation and learn from other disciplines and research groups. We are proud to see increasingly proactive patient and public involvement and engagement (PPIE) being developed across all stages of research which is an area that Cornelia will push ahead in coming years.

We would like to thank all PINNACLE team members, the staff of the Department of Intensive Care and Neonatology, the Children's Research Center at University Children's Hospital Zurich, and our partners for their work and support.

We are particularly indebted to families for their willingness to participate in research projects during challenging and stressful periods, and for their invaluable contribution to the improvement of outcomes for children in the future.

Yours

C. Hagmann *Luregn Schlapbach*

Cornelia Hagmann and Luregn Schlapbach



Picture from the 2024 PINNACLE Research Group Workshop, during which Prof. Kristen Gibbons from The University of Queensland, Australia, visited us and led the session.

ORIGINAL ARTICLES

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ACCEPTED PUBLICATIONS (published January - February 2024)

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LETTERS

1. **Lawless, D.**, *Reply to Dages et al: You Ain't using it right-artificial intelligence progress in allergy*. *J Allergy Clin Immunol*, 2024. 153(1): p. 355-356.
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REVIEWS

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4. Menon, K., Sorce, L.R., Argent, A., Bennett, T.D., Carrol, E.D., Kisson, N., Sanchez-Pinto, L.N., **Schlapbach, L.J.**, de Souza, D.C., Watson, R.S., Wynn, J.L., Zimmerman, J.J., Ranjit, S., and Pediatric Sepsis Definition Taskforce, *Reporting of Social Determinants of Health in Pediatric Sepsis Studies*. *Pediatr Crit Care Med*, 2023. 24(4): p. 301-310.
5. Minogue, J., Keogh, S., **Schlapbach, L.J.**, and Long, D., *Long-term outcomes after paediatric sepsis: A narrative review*. *Aust Crit Care*, 2023.
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INVITED EDITORIALS

1. **Schlapbach, L.J.**, Gibbons, K.S., Butt, W., Kannankeril, P.J., Li, J.S., and Hill, K.D., for the Nitric Oxide During Cardiopulmonary Bypass to Improve Recovery in Infants With Congenital Heart Defects Follow-Up (NITRIC) Study Group and the Steroids to Reduce Systemic Inflammation after Infant Heart Surgery (STRESS) Network Investigators, *Improving Outcomes for Infants After Cardiopulmonary Bypass Surgery for Congenital Heart Disease: A Commentary on Recent Randomized Controlled Trials*. *Pediatr Crit Care Med*, 2023. 24(11): p. 961-965.

INVITED KEYNOTE PRESENTATIONS

B. Brotschi

Workshop: Simulation training based on a genuine case study adapted for the course
Annual Meeting of the Swiss Society of intensive Care, Basel, Switzerland, September 2023

C. Hagmann

Creative Music Therapy in Newborns with Congenital Heart Disease: A Randomized Clinical Trial – BOND Study
1st Adaptive Brain Circuits in Development and Learning “AdaBD” Retreat, Zurich, July 2023

N. Lüthi

Sepsis besser behandeln
Scientifica, Zürcher Wissenschaftsfestival, Zürich, September 2023

L. Schlapbach

ESPNIC Research School
ESPNIC, Lausanne, January 2023

Critical Care Congress
Society of Critical Care Medicine (SCCM), San Francisco, January 2023

Sepsis beim Kind
Paediatric session, University Hospital Zurich, Zurich, January 2023

Pragmatic Trials For Children With Congenital Heart Disease - Insights From The NITRIC Trial
Duke University, virtual, February 2023

Lebensbedrohliche Zustände bei Kindern
Paediatric session, University Hospital Zurich, Zurich, March 2023

Machine learning to predict poor school performance in paediatric survivors of intensive care – a population-based cohort study
Australian and New Zealand Intensive Care Society Paediatric Study Group (ANZICS PSG), virtual, March 2023

Targeting quality improvement in sepsis for the needs of children and families

European Sepsis Alliance (ESA), virtual, March 2023

Paediatric Research Updates - RESPOND

Australian and New Zealand Intensive Care Society Paediatric Study Group and Australian College of Critical Care Nurses (ANZICS/ACCCN), virtual, March 2023

Sepsis update 2023

Fluids versus inotropes

Low cardiac output syndrome revisited

14th European Postgraduate Course in Neonatal and Pediatric Intensive Care, Bern, March 2023

Challenges of a national action plan against sepsis in LMIC

Update on sepsis recognition

ILAS Brazil, virtual, May 2023

International Collaborative for Paediatric Critical Care Research

Paediatric Critical Care Society (PCCS), virtual, May 2023

Basic Life Support

4th year medical students, University of Zurich (UZH), May 2023

Editorialist for the OXY-PICU Trials

Critical Care Reviews Meeting 2023, Belfast, June 2023

Controversies in defining paediatric sepsis and the current state of play;

Personalized medicine in PICU in 2023 – challenges and opportunities

Sepsis recognition – more than needles in the haystack

The European Society of Paediatric and Neonatal Intensive Care (ESPNIC) Congress, Athens, June 2023

Critical Care Trials for Children – Not just Small Adults?

Australian and New Zealand Intensive Care Research Centre (ANZIC-RC), Prato, June 2023

Media conference: Swiss Sepsis National Program

Eidgenössische Qualitätskommission (EQK), Bern, July 2023

Sepsis in children

Cantonal Hospital Graubünden (KSGR), Chur, July 2023

Life after PICU- How our work impacts long term trajectories

Paediatric Intensive & Critical Care (PICC), India, virtual, July 2023

Sepsis und invasive bakterielle Infektionen

Pediatric Emergency Medicine Switzerland (PEMS), Lugano, September 2023

Pediatric Sepsis – 2023 Update

Pediatric Infectious Diseases Group of Switzerland (PIGS), virtual, September 2023

Fluid Therapy

Schweizerische Gesellschaft für Intensivmedizin (SGI), St. Gallen, September 2023

World Sepsis Day – Austria - Swiss Sepsis National Action Plan

BAG AT, virtual, September 2023

Current concepts of postoperative cardiac intensive care

Schweizerische Gesellschaft für Pädiatrische Kardiologie (SGPK), Basel, November 2023

From Bits to Breakthroughs

1st National Symposium on Data-Driven Approaches in Sepsis and Infectiology, ETH, Bern, November 2023

“Antibiotics save lives in septic kids” vs “Less Antibiotic treatment at the beginning of life”

PICU Bootcamp, Pediatric and Neonatal Intensive Care Interest Group (IGPNI), Gunten, November 2023

ORAL PRESENTATIONS

Henkel J.

“Betreuung des kreislaufinstabilen, ödematösen Patienten”

Annual Meeting of the Swiss Society of intensive Care, Basel, September 2023

Henkel J.

“Frühmobilisation auf der pädiatrischen Intensivstation”

15th Scientific Meeting of the Swiss Society of Pediatric Cardiology and Nursing Interest Group, Basel, November 2023

Kennedy U.

“Sex and gender in pediatrics – Wege zur Wahrheit”

Forschungszentrum für das Kind (FZK) Symposium, November 2023

Lawless D.

“Uncovering novel genetic factors of pediatric sepsis through new tools for precision genomic medicine”

Forschungszentrum für das Kind (FZK) Retreat, November 2023

POSTER PRESENTATIONS

Kennedy U., Moulin J., Schlapbach L., Menon K., Lee J. H., Bühler L., Held U.

“Sex differences in Pediatric Sepsis- A systematic review and meta-analysis”

Forschungszentrum für das Kind (FZK) Retreat, October 2023

AWARDS

Luregn Schlapbach Society of Critical Care Medicine (U.S.) Presidential Citation Award, San Francisco 2023

MEDIA ACTIVITIES (LINKS)

L. Schlapbach:

SRF Interview: Blutvergiftungen: neues Programm für bessere Diagnostik; July 2023

<https://www.srf.ch/news/schweiz/praevention-gegen-infektionen-schweiz-will-im-kampf-gegen-blutvergiftungen-aufholen>

BAG Medienmitteilungen: Die Eidgenössische Qualitätskommission fördert Best Practices im Gesundheitswesen; July 2023

<https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-96317.html>

ACTIVE GRANTS AS CHIEF INVESTIGATOR 2023

Grant	Project	Investigator	Budget
COALAR	Improving the lives of Latin American children with sepsis through clinical trial capacity building (CIB)	L. Schlapbach	AUD 22,237
HORIZON2020	DIAMONDS: Diagnosis and Management of Febrile Illness using RNA Personalised Molecular Signature Diagnosis	L. Schlapbach (co-investigator)	CHF 200,000 (for Kispi)
Gaydoul Foundation	BOND-Creative Music Therapy in Newborn Infants with Congenital Heart Disease	C. Hagmann	CHF 300'000
NIH	Novel Pediatric Sepsis Criteria and Clinical Decision Support Tools	L. Schlapbach	\$ 36,835
NHMRC	Resuscitation in Paediatric Septic Shock using Mega-Dose Vitamin C and Hydrocortisone - A Randomised Controlled Multi-centre Trial (RESPOND study APP 2014937) (CIC)	L. Schlapbach	AUD 1,305,172
Nomis Foundation	Artificial Intelligence in the PICU (CIA)	L. Schlapbach	CHF 496,500
PHRT	PHRT-273: Rapid Personalized Diagnosis of Sepsis in Children (RAPIDS) (CIB)	L. Schlapbach	CHF 2,000,000

Research Grant Children's Research Center Zurich	CoCo2 trial (CIA)	R. Mozun	CHF 60,000
SANA Foundation	Artificial Intelligence in the PICU (CIA)	L. Schlapbach	CHF 150,000
SNF	BOND-Creative Music Therapy in New-born Infants with Congenital Heart Disease	C. Hagmann	CHF 900,000
SNF	Derivation of pediatric sepsis phenotypes using machine learning applied to clinical, functional and genomic data from the swiss pediatric sepsis study	L. Schlapbach	CHF 930,302
SPHN	ADONIS (Coinvestigator)	L. Schlapbach	CHF 487,450
SPHN/PHRT	NDS-2021-911 "Pediatric Personalized Research Network Switzerland (SwissPedHealth) – a Joint Pediatric National Data Stream" (CIA)	L. Schlapbach	CHF 5,000,000
Starship Foundation	Follow-up of the NITRIC cohort (SF 4226 CID)	L. Schlapbach	NZD 100,000
Stiftung Naturwiss./techn. Forschung	Artificial Intelligence in the PICU (CIA)	L. Schlapbach	CHF 150,000
Vontobel	BOND-Creative Music Therapy in New-born Infants with Congenital Heart Disease	C. Hagmann	CHF 145,620

HABILITATION 2023

Name	Title	University
Baumann Philipp	PD	Faculty of Medicine, UZH

PROFESSORSHIP 2023

Name	Title	University
Brotschi Aufdenblatten Barbara	Titularprofessur	Faculty of Medicine, UZH

MEDICAL DOCTORAL THESIS AND MASTER THESIS (completed 2023)

Name	Project Title	Supervision	University
Annina Späth	Qualitätssicherungsstudie zur Evaluation der Einführung des neuen Flüssigkeitsmanagements auf den Intensivstationen des Universitäts-Kinderspital Zürich	C. Hagmann E. Kühlwein L. Flückiger	Faculty of Medicine, UZH
Charlotte Lengauer	Transport von Neugeborenen durch das Universitäts-Kinderspital Zürich: Prospektive Elternumfrage zur Erfassung der Bedürfnisse, der Qualität und des Verbesserungspotentials	B. Grass	Faculty of Medicine, UZH
Juliette Moulin	Sex differences in Pediatric Sepsis: A Systematic Review and Meta-Analysis	L. Schlapbach U. Kennedy	Faculty of Medicine, UZH
Navina Sittampalam	Muttermilch Exposition: Qualitätsanalyse der Neonatologischen Abteilung	C. Hagmann	Faculty of Medicine, UZH

CLINICAL STUDIES AND RESEARCH PROJECTS

Randomized Clinical Trials (recruitment concluded in 2023)

REDUCE: REstrictive vs StandarD FIUid Management in Mechanically Ventilated ChildrEn Admitted to PICU - a Pilot Randomised Controlled Trial - REDUCE-1

International, multicenter, Principal Investigator Kispi (partner of the study). Category A, Other clinical trials (ClinO chapter 4).

Recruitment period in Kispi: from July to November 2023

Patient recruited in Kispi vs total recruited: 18/154

Research Projects (concluded in 2023)

DIAMONDS: Diagnosis and Management of Febrile Illness using RNA Personalised Molecular Signature Diagnosis

International, multicenter, Principal Investigator Kispi (partner of the study). Observational, prospective cohort study. Category A, HRO Chapter 2. Funding: HORIZON2020

Recruitment period in Kispi: from November 2022 to December 2023

Tot recruited patient in Kispi: 35

Randomized Clinical Trials (ongoing December 2023)

BOND: Creative Music Therapy in Newborns with Congenital Heart Disease: A Randomized Clinical Trial – BOND Study.

National, monocenter, Investigator Initiated Trial Kispi (head of the study). Category A, Other clinical trials (ClinO chapter 4). Funding: SNF

Recruitment period in Kispi: 11.2022 – 07.2025 (planned)

Planned patient recruitment: TOT 164

Research Projects (ongoing December 2023)

SWISSPEDHEALTH: Swiss Personalized Pediatric National Data Stream

National, multicenter, Principal Investigator Kispi (partner of the study). One of four SPHN NDS projects selected. Aims to build a harmonized datastream for children across the 5 university hospitals. Combines retrospective and prospective projects.

MOMIC: Pediatric Personalized Research Network Switzerland (SwissPedHealth): Development of a multi-omics work-flow to discover rare diseases in children with extreme phenotypes.

National, multicenter, Investigator Initiated research project Kispi (head of the study). HRO Chapter 2.

Recruitment period in Kispi: 09.2022 – 09.2025

Planned patient recruitment: TOT 150 patients and 350 relatives (tot 500)

Vyaire: Observational study of the safety and performance of bellavista ventilator and the iFlow sensor during routine use in the neonatal, pediatric, and adult intensive care unit.

International, multicenter, Principal Investigator Kispi (partner of the study). Prospective post market observational study. HRO Chapter 3.

Data collection period in Kispi: 06.2023 – 05.2024

Planned patient recruitment: TOT 150

PICSS-PF: Post Intensive Care Syndrome in Swiss Pediatric survivors and their Families [PICSS-PF]: A Multi-center Longitudinal Observational Study.

National, multicenter, Principal Investigator Kispi (partner of the study). Prospective, longitudinal observational study. HRO Chapter 2.

Recruitment period in Kispi: 08.2023 – 06.2024

Planned patient recruitment: TOT 100

ADONIS: Accelerating detection of neonatal sepsis (ADONIS): A machine learning-based approach.

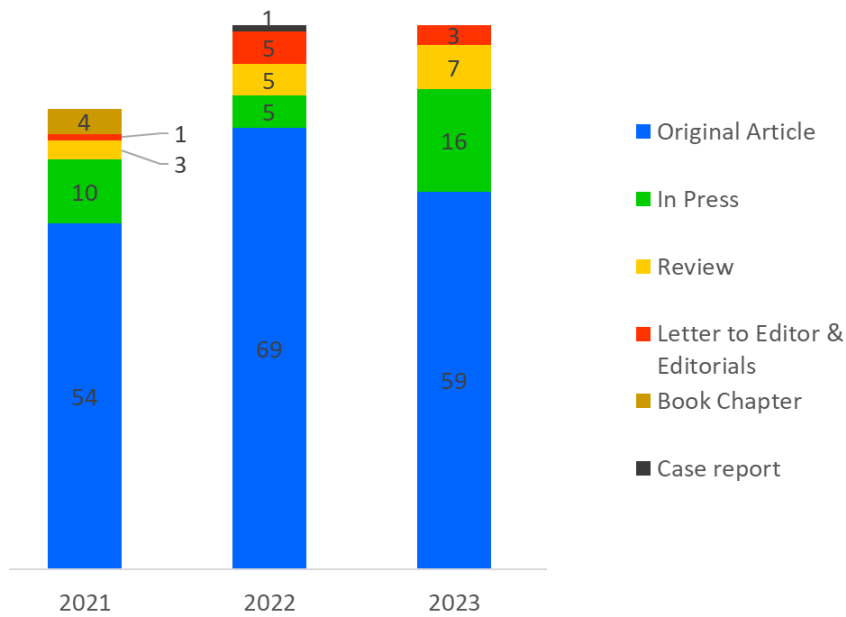
National, multicenter, Principal Investigator Kispi (partner of the study). Retrospective, cohort study with routine clinical patient data. HRO Chapter 3.

RAPIDS: Rapid Pediatric Infectious Disease and Sepsis Assessment. Discovery and validation of novel biomarkers using transcriptomics, proteomics, and metabolomics in cohorts of children evaluated for sepsis (RAPIDS, RESPOND) and undergoing cardiopulmonary bypass surgery (NITRIC). In addition, the aim is to improve understanding of the biology of critical illness and sepsis, and to identify novel phenotypes relevant for future precision medicine approaches.

Kispi is responsible together with ETH to perform additional omics in these cohorts and perform analyses of the datasets, including over 2,000 patients recruited internationally.

SUMMARY RESEARCH ACTIVITIES

Publications 2021 - 2023



Presentations 2021 – 2023

