



ELSI and data protection for rare diseases data

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PharmD, II level post-graduate Master in Regulatory Sciences “G.Benzi” at University of Pavia, internship trainee at Leiden University Medical Center in the FAIR team.

Involved in scientific, ethical and regulatory activities particularly related to clinical studies, data protection and confidentiality, plan and management of patient registries and medicine databases management, health data and accessibilities issues, gender equality and inclusiveness. Collaboration in several national and international projects dealing with ethics in biomedical research.



Funded by
the European Union

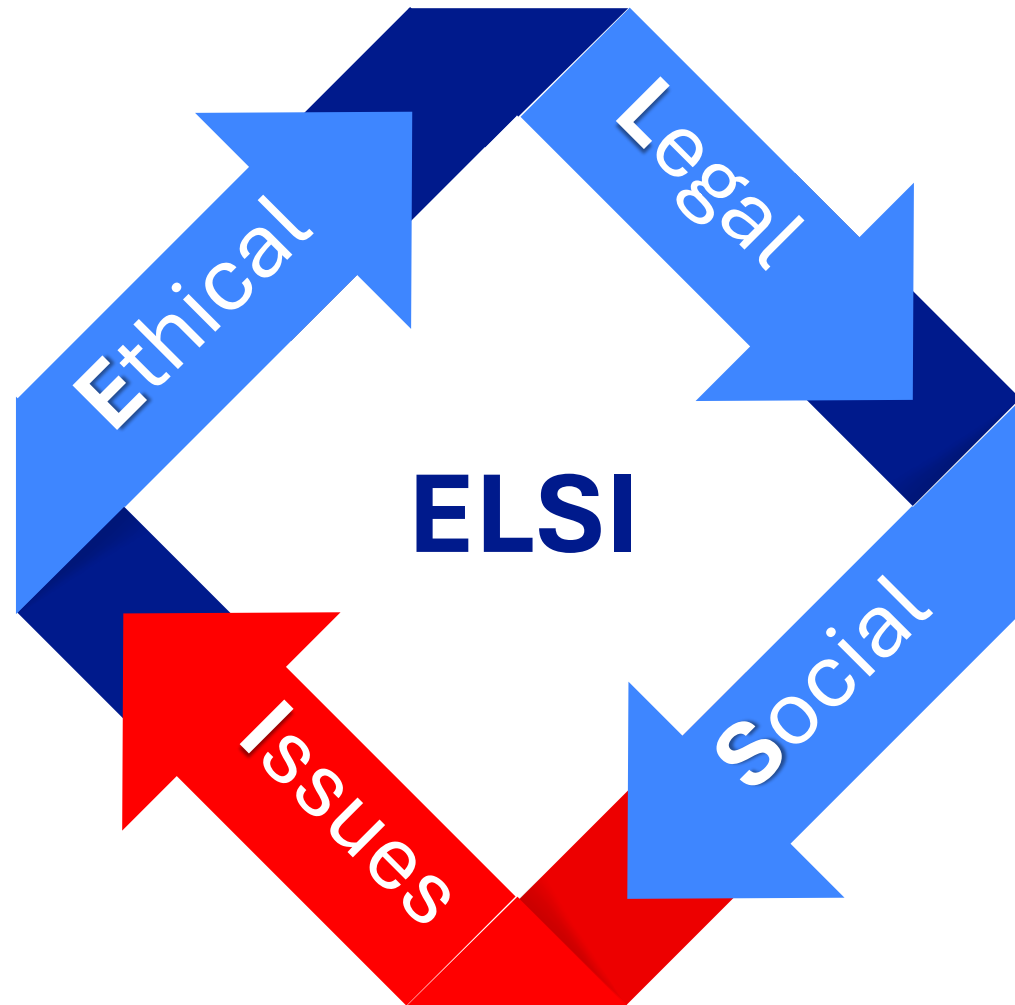
AGENDA

- ❖ *ELSI definition & relevance*
- ❖ *Health data value*
- ❖ *Benefit and challenges of data use for research*
 - ❖ *Rare Diseases data use for research*
 - ❖ *ELSI related to the management of RD data*
- ❖ *Focus on rare inherited haemoglobinopathies*
 - ❖ *Focus on protection of RD data & AI*
 - ❖ *Benzi Foundation experience*
- ❖ *Take home messages*



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ELSI definition



- It includes **all non-technical issues** that arise when developing emerging science and technologies and implementing them in society
- Originally focused on **genomics**, now applied across several fields such as **healthcare** and **Artificial Intelligence (AI)**

What is ELSI ? | [Research Center on Ethical, Legal and Social Issues, Osaka University](#)
(PDF) Ethical, Legal, and Social Issues

ELSI relevance



To protect patient rights: informed consent, privacy, fairness

To address equity and access to healthcare

To guide healthcare policy and legal frameworks

To ensure responsible innovation in AI and genetic medicine

Health data value

*Health data constitutes a
significant resource
and makes economic and
ethical sense to use this
data as much as possible to
improve population health
and the effectiveness and
the efficiency of health care
systems¹*



*Health data are a
**real value for scientific
research**
and nowadays there is an
urgent need to reconcile
the benefits of data sharing
with privacy rights and
constraints and ethical and
legal requirements²*

1. Secondary Analysis of Health Data to Generate Health Care Quality Information. Potential, Barriers and Best Practices in Data Linkage. Organisation for Economic Co-operation and Development, OECD DELSA/HEA/HQC(2011)11
2. Landi, A, Thompson, M, Giannuzzi, V, Bonifazi, F, Labastida, I, da Silva Santos, LOB, Roos, M. 2020. The “A” of FAIR—as open as possible, as closed as necessary. Data Intell. 2(1–2):47–55.

Health data types



Clinical Practice

- *Electronic Health Records (EHRs)*
- *Screening initiatives*
- *Prescriptions*
- *Data related to biological samples*
- *Patient-reported outcomes (PROs)*
- *Real world data (RWD)*

Clinical studies

- *Data related to biological samples*
- *Patient-reported outcomes (PROs)*
- *Interventional data*
- *Adverse events reporting*
- *Real world data (RWD)*

Patient registries

- *Patient-reported outcome (PROs)*
- *Real world data (RWD)*
- *Demographic and Clinical Data*

Benefits of data use for research



Increases the knowledge of the disease/condition & the impact of the research



Reproduce research, encourages the validation of hypothesis & reinforces open scientific enquiries



Allows new discoveries and findings



Promotes personalised treatments



Avoids unnecessary repetition of studies, accelerates medicines development & reduces costs



Improves the quality of life of patients



Allows the analysis on a large amount of data



Promotes the development and validation of artificial intelligence models to predict new interventions efficacy

Benefits of data use for research



The coolest thing to do with your data will be thought of by someone else

Rufus Pollock, Cambridge University and Open Knowledge Foundation, 2008

Benefits of data use for research: secondary use of data

Secondary use of data
refers to the use of data for
a different purpose than
the one for which it was
originally collected



EMA <https://www.ema.europa.eu/en/about-us/how-we-work/big-data#hma/ema-big-data-steering-group-section>; Bahr A et Al. Code of practice on secondary use of medical data in European scientific research projects. International Data Privacy Law, Volume 5, Issue 4, 1 November 2015, Pages 279–291; EMA presentation



Data Access or Data Sharing!

TO NOTE: The term **“secondary use”** is different from the term **“further processing”** included in the GDPR since “further processing” refers not only to the secondary use of data but also to a different data processing activity (e.g., data sharing) made on the data collected for the same primary purpose



Support Centre for Data Sharing (SCDS)

Challenges of data use for research

- ✓ *Ethical, legal, and social issues*
- ✓ *Data protection specific considerations*
- ✓ *Technical issues*
- ✓ *Data quality issues*
- ✓ *Lack of recognition or financial return/
social rewards for data owners*

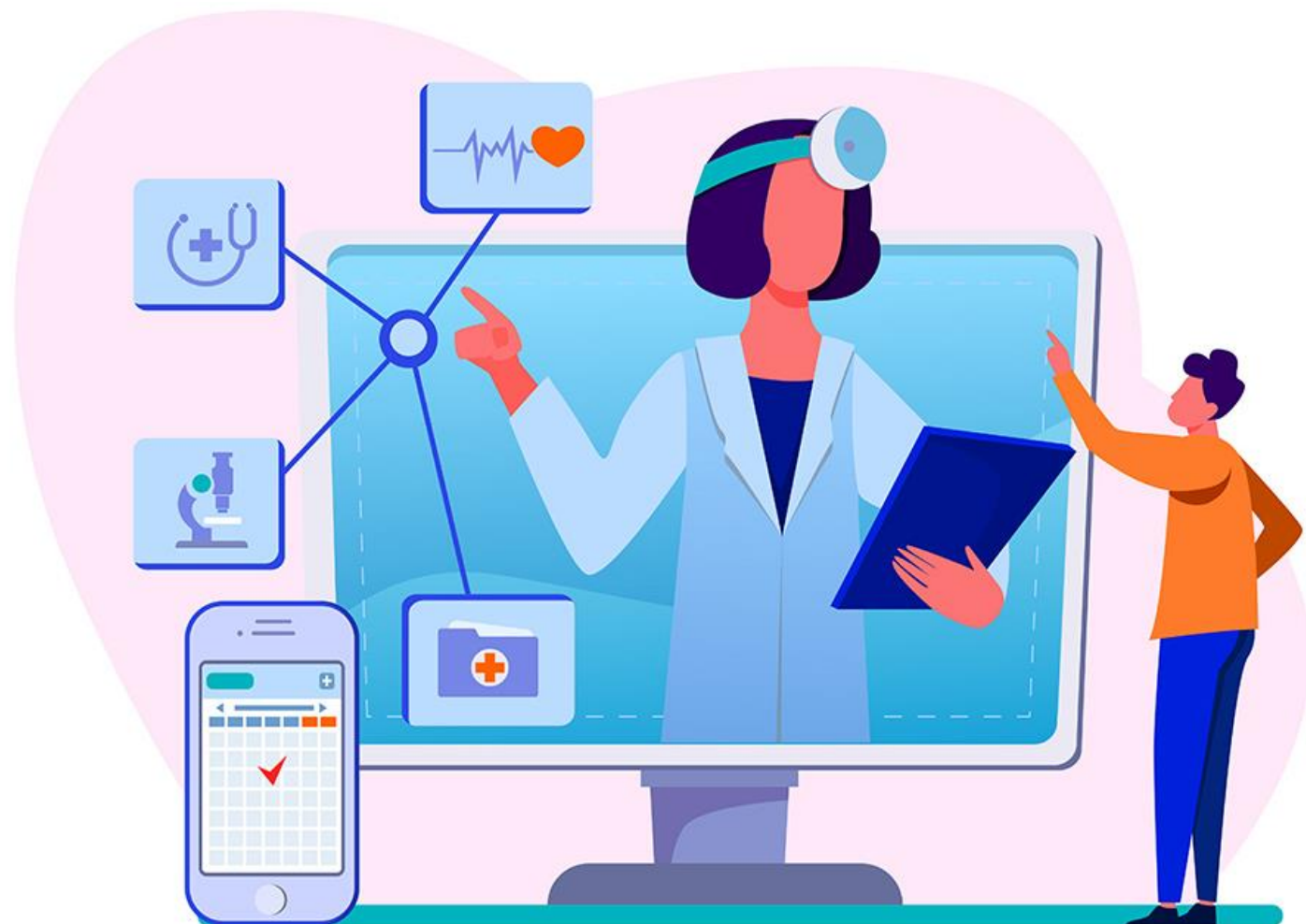


*Health data represent a
significant resource for
research, especially for
Rare Diseases!*



*The need to balance the benefits
of data sharing/access and the
related risks is urgent...*

Landi, A, Thompson, M, Giannuzzi, V, Bonifazi, F, Labastida, I, da Silva Santos, LOB, Roos, M. 2020.
The “A” of FAIR—as open as possible, as closed as necessary. *Data Intell.* 2(1–2):47–55.



Rare Diseases data use for research

“Rare disease patients, regardless of the severity of their disease and their socio-demographic profile, are clearly supportive of data sharing to foster research and improve healthcare. However, rare disease patients’ willingness to share their data does come with specific requirements in order to respect their privacy, choices and needs for information regarding the use of their data”

Research | [Open access](#) | Published: 12 July 2019

Share and protect our health data: an evidence based approach to rare disease patients' perspectives on data sharing and data protection - quantitative survey and recommendations

[Sandra Courbier](#) , [Rebecca Dimond](#) & [Virginie Bros-Facer](#)

[Orphanet Journal of Rare Diseases](#) **14**, Article number: 175 (2019) | [Cite this article](#)

15k Accesses | **79** Citations | **76** Altmetric | [Metrics](#)

[LINK](#)

Rare Diseases data use for research

Major benefits

*Few patients, few data,
heterogeneous and
complex, scattered
and fragmented*



Collection of a larger amount of geographically dispersed data

Exchanges and interactions between expert centres in rare diseases worldwide

A valid alternative to clinical trials that are not always feasible due to the low number of patients

Rare Diseases data use for research

*Few patients, few data,
heterogeneous and
complex, scattered
and fragmented*



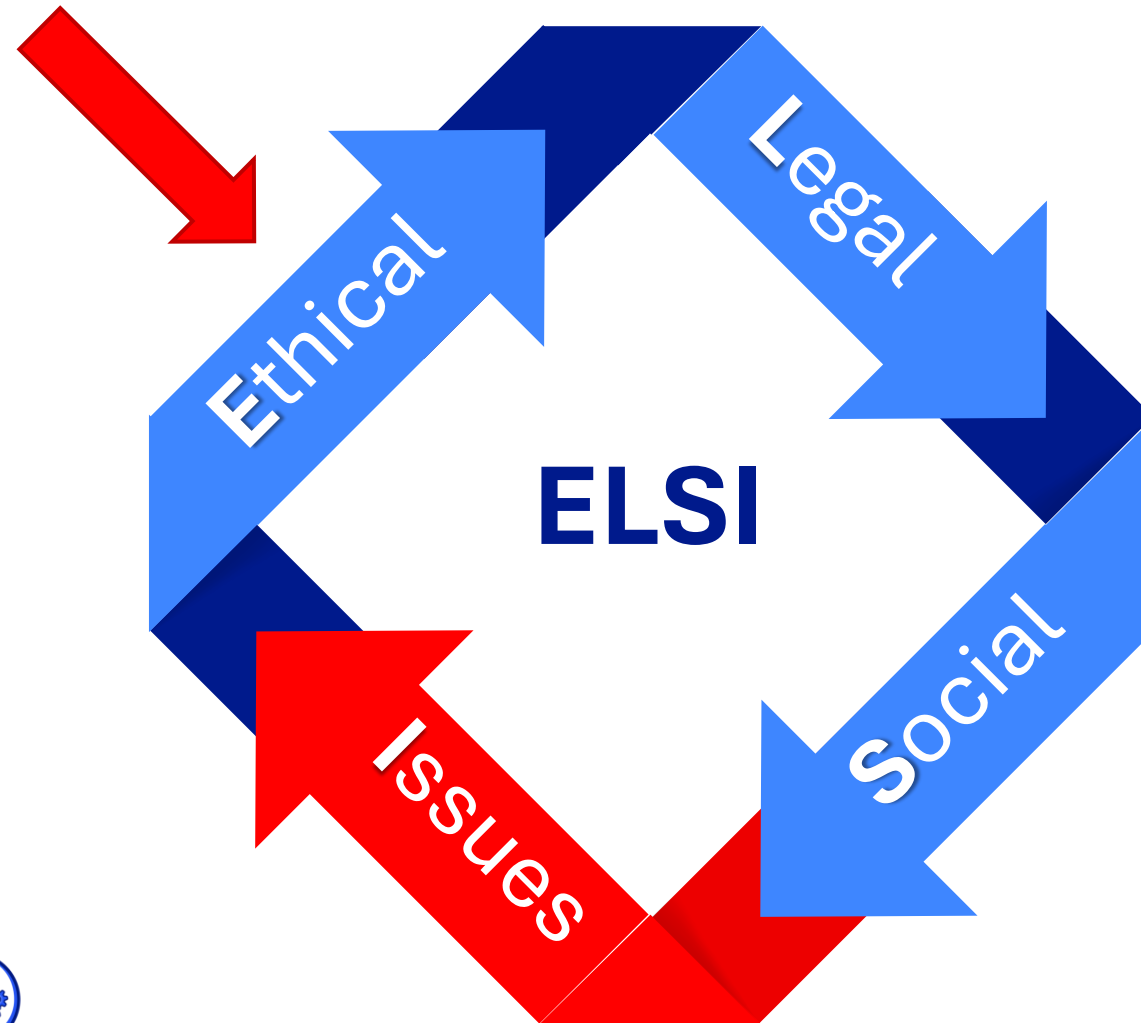
Major challenges

Increased risk of identification

Vulnerable populations involved

*Processing of genetic data, with the potential
risk of incidental findings*

ELSI related to the management of RD data



Ethical Issues



01. | *Informed consent*

02. | *Vulnerable Populations*

03. | *Implications of genetic data*

04. | *Ethics Committee's approval*

05. | *Data Access*

06. | *Access to research results*

E01. Informed consent

*The **informed consent process** is a **dynamic and continuous process** which begins when the **recruitment of subjects** starts **but** does **not end** with the **signature of the subject**...*

Information

Comprehension

Voluntary decision

Comprehension monitored and maintained

Availability of new information

E01. Informed consent

F
E
A
T
U
R
E
S

Freely given

Informed

Clear and comprehensive

Transparent

Explicit

Easy to withdrawn

E02. Vulnerable populations

*Rare diseases research often involves small or particularly **vulnerable populations** (e.g., minors; individuals with intellectual disabilities), who are not able to give their consent*



*The **risks** to participants must be carefully considered compared to the **potential benefits** of the research*

E02. Vulnerable populations



PAEDIATRIC POPULATION

Parents/Legal designated representatives must provide authorisation to the research

Informed assent should be obtained from minor participants

Age-appropriate information should be adapted to the language skills and understanding of the minor

*The use of **visual strategies** is encouraged (drawings, pictures, cartoons), but also other media and formats may be used*

Cultural differences should be considered

E03. Implications of genetic data

72% of Rare Diseases are genetic and discoveries about one patient can have implications for his/her family

Consent for genetic testing separated from the consent for the main research

Information of expected or possible unexpected results should be provided

An **incidental findings policy** should be agreed

Possible implications for **family members**

Genetic counselling should be foreseen

Findings should be fed back **when they are of immediate clinical relevance from a preventive, diagnostic and therapeutic level, and for reproductive choices**

E04. Ethics Committee's approval

*The need for the **Ethics Committee's approval** according to the national and local applicable provisions **must be checked before starting the research!***



E05. Data Access

Access to data might be regulated by accessibility conditions and restrictions..

*“A Data Access Committee represents an institutional safeguard charged with applying rules meant to ensure an **ethically** permissible balance between data protection and accessibility”*

The **purpose** is to assess if the **proposed use of the data** is...

- ✓ within the bounds of the **data's permitted uses**
- ✓ in line with the **data user's qualifications**
- ✓ in compliance with the **applicable laws, regulations and practices!**



E06. Access to research results

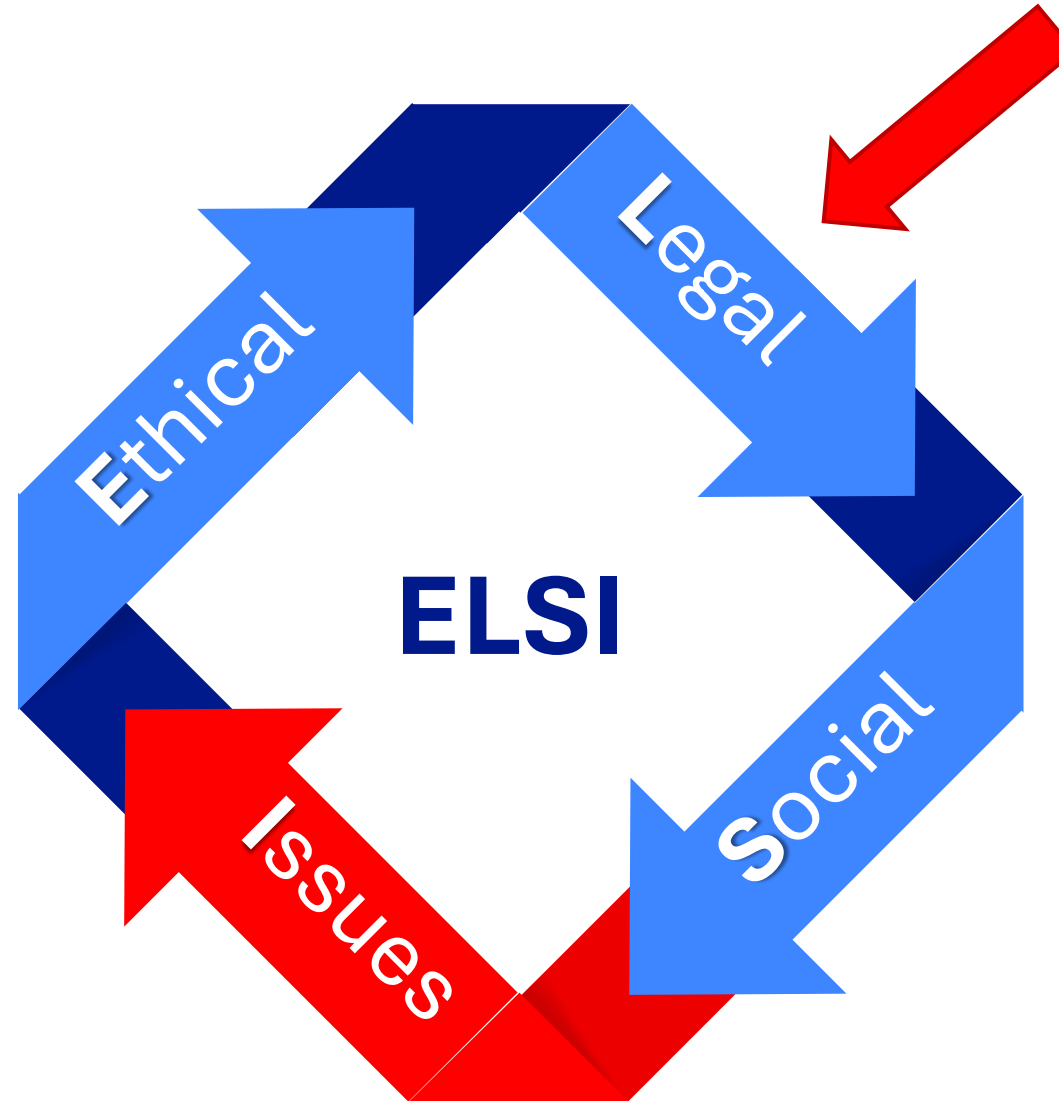
*Clear and comprehensive
research results should
be provided to study
participants!*

INCREASE
TRANSPARENCY

BUILD TRUST



ELSI related to the management of RD data



Legal Issues

01. | *Data protection*

02. | *Legal bases for data processing*

03. | *Respect of the participants' rights*

04. | *Intellectual property & data ownership*

05. | *Regulatory compliance*

L01. Data protection

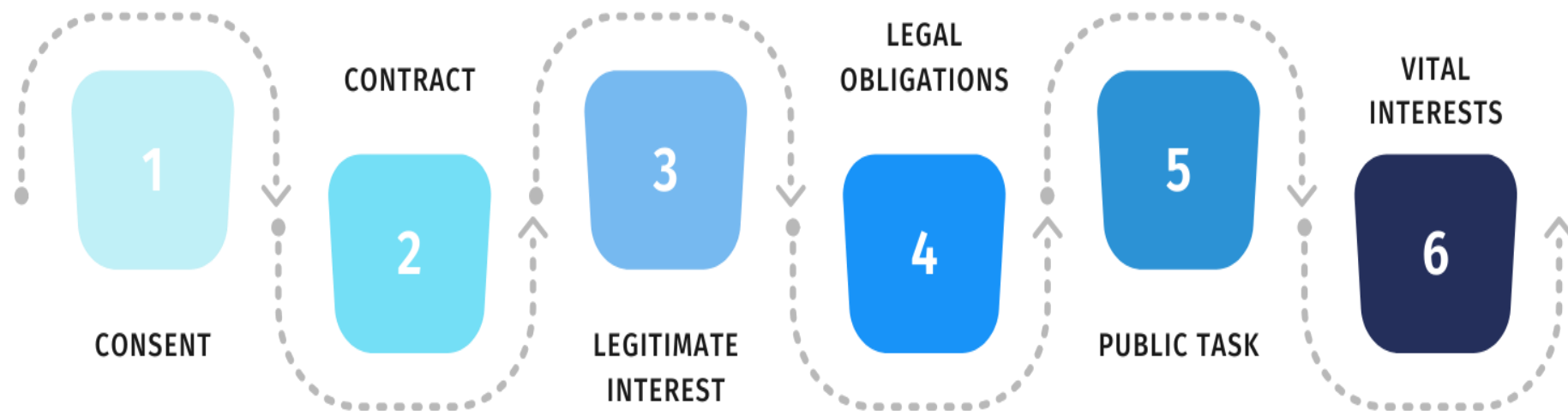
Compliance with the applicable **Data Protection Regulations** (e.g., **European General Data Protection Regulation, GDPR**) must be ensured!

Within **international projects** and **collaborations**, data processing activities must comply with the legal frameworks regarding cross-border data flows/access



L02. Legal bases for data processing

Informed consent is only one of the ***legal bases for data processing according to the EU GDPR....***



L03. Respect of the participants' rights

The right to be informed

The right of access

The right to rectification

The right to object to processing

The right to restrict processing

The right to data portability

The right to be forgotten

Rights in relation to automated decision making and profiling



L04. Intellectual property & data ownership

*Clarification on the **ownership** of the data, research findings and any products that may be generated by the research must be provided!*

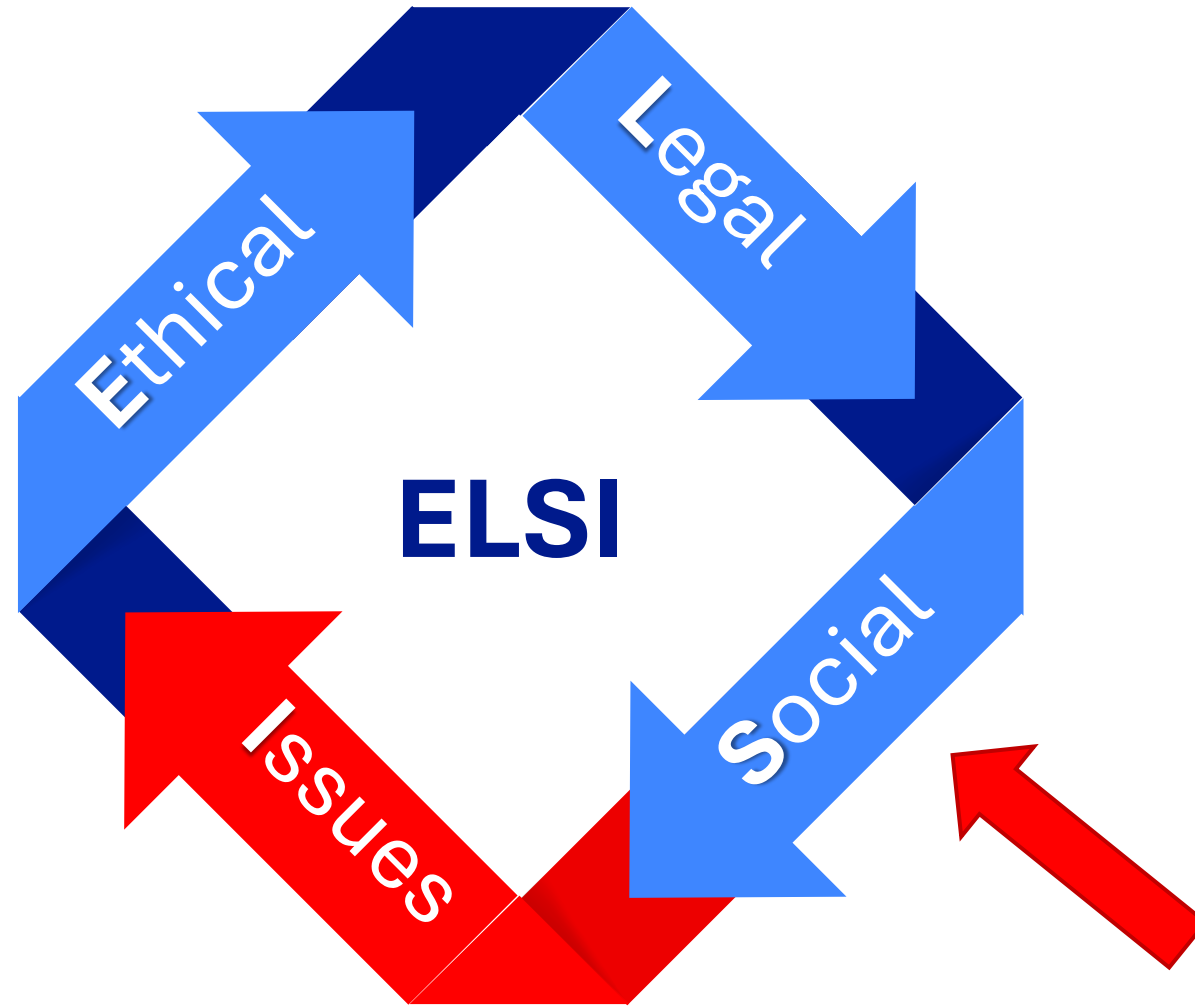


L05. Regulatory compliance



*Researchers may need to obtain approval from relevant **Regulatory Authorities** (e.g., the **European Medicines Agency (EMA)**)*

ELSI related to the management of RD data



Social Issues



01. | *Access to treatment and care*

02. | *Discrimination and stigmatisation*

03. | *Autonomy and informed consent*

04. | *Equity and justice*

Social Issues

01. Access to treatment and care

- *Availability of new treatments and findings for all patients*

02. Discrimination and stigmatisation

- *Emotional, social, and psychological implications of the findings related to the patients and their families should be considered*

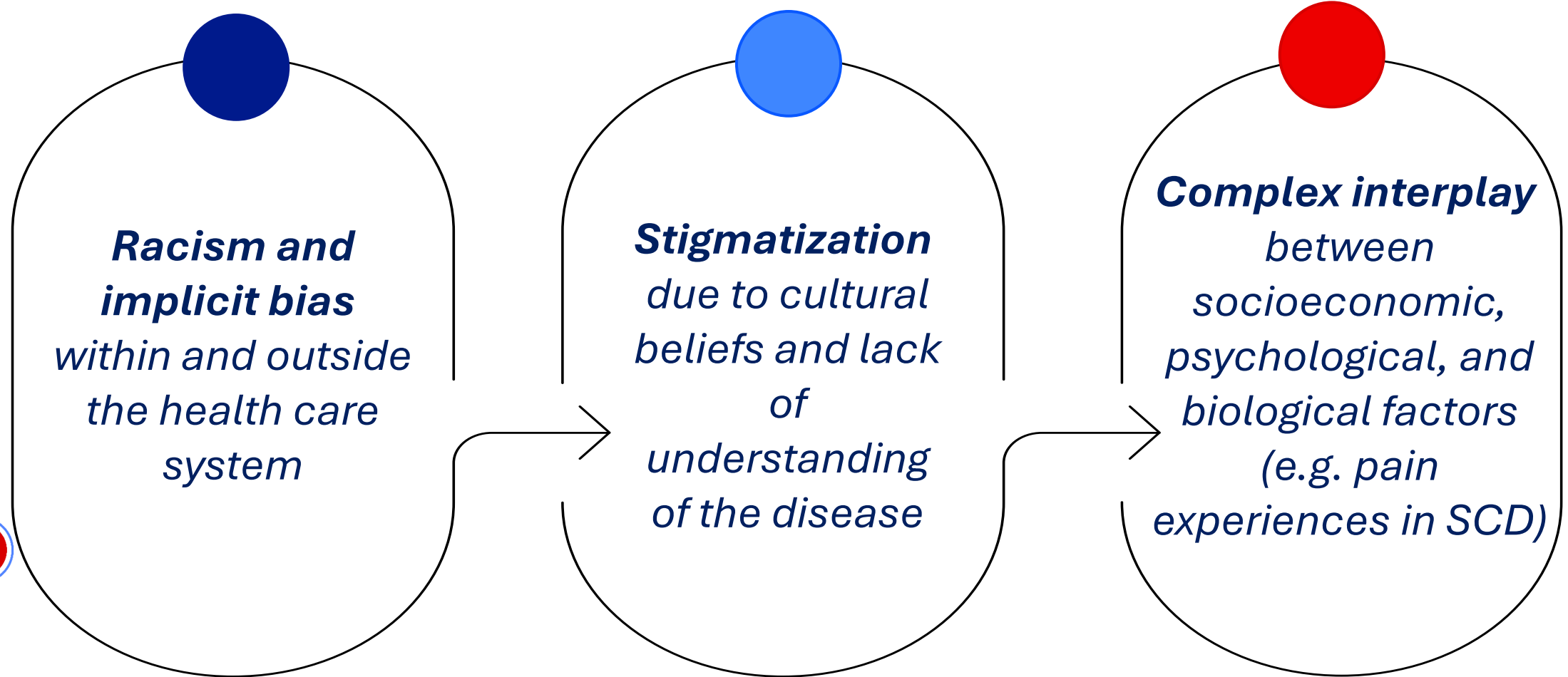
03. Autonomy and informed consent

- *Participants must voluntarily agree to participate in the research*

04. Equity and justice

- *Inclusive participation in the research*

Focus on rare inherited haemoglobinopathies



Focus on rare inherited haemoglobinopathies

Example - Use of Hydroxyurea in children

Health Provider

- *Lack of expertise in hydroxyurea use*
- *Concerns about safety profile during pregnancy and lactation*
- *Fear of male infertility*
- *Fear of blame in case of adverse outcomes*
- *Patient compliance*
- *Drug availability and cost*
- *Absence of appropriate paediatric formulation*
- *Lack of time and resources to explain the risks and benefits*

Health Facility

- *Availability and cost of laboratory monitoring*
- *Lack of formal guideline for use in children*
- *Ineffective follow-up*
- *Lack of adequate clinician and experience with hydroxyurea*

Patient/Family

- *Lack of awareness of SCD and hydroxyurea*
- *Patient compliance*
- *Doubts about the effectiveness of hydroxyurea*
- *Need of frequent follow-up*
- *Drug costs and availability*
- *Fear of carcinogenic and teratogenic potential*
- *Fear of increased risk of infections*

Adaped from

[Barriers to utilization of hydroxyurea for children with SCD.](#) | [Download Scientific Diagram](#)



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the European Union**

Focus on protection of RD data & AI

*Personal and special categories of data (e.g., health and genetic data) must be **kept confidential***

***Access to data** shall be provided only to authorised people*

***Data breaches and loss** must be prevented by implementing ad-hoc safeguards measures (e.g., secure storage)*

*The **data minimisation principle** should be followed thus collecting only the data that is necessary for the purposes of the research*

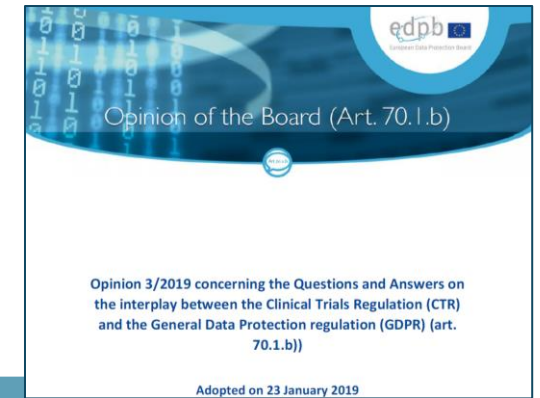
***De-identification measures** (e.g. pseudonymisation) shall be put in place to reduce the risk of re-identification of participants*

*Information related to the **retention period** and to what will be done with the data after the end of this period must be provided*



Focus on protection of RD data & AI

*Besides the consent to the research, participants **must** provide the researcher with the consent to the processing of their personal data...*



The lack of consent to data processing may compromise the participation in the study!

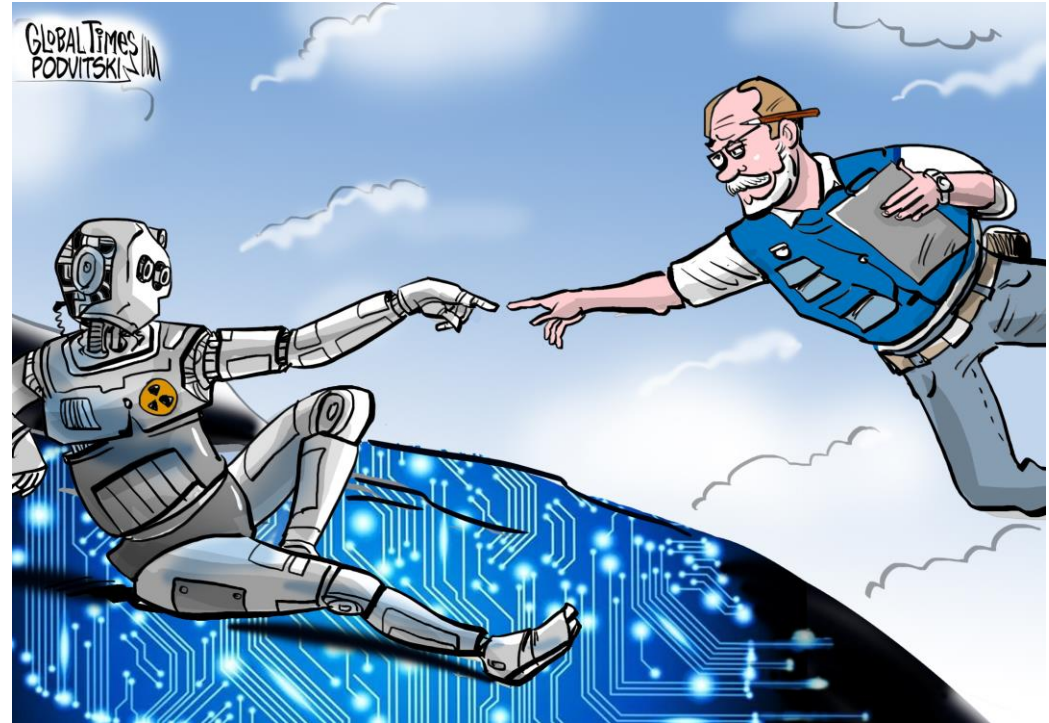
Information to be provided to the data subject when processing personal data (GDPR, Articles 13-14)

- ✓ TYPE OF DATA PROCESSED
- ✓ THE PURPOSES/FUTURE PURPOSES OF THE PROCESSING
- ✓ THE DURATION OF DATA STORAGE OR THE CRITERIA TO DETERMINE IT
- ✓ ANY TRANSFER OF PERSONAL DATA TO A THIRD COUNTRY AND THE APPROPRIATE SAFEGUARD MEASURES
- ✓ ANY AUTOMATED DECISION-MAKING
- ✓ THE RESPONSIBLE FIGURES FOR DATA PROCESSING
- ✓ THE MAIN RIGHTS OF THE SUBJECT

Focus on protection of RD data & AI

*If **AI systems** are used in the context of research with RD data, additional ELSI should be considered...*

- ❖ **Ethics Guidelines for Trustworthy AI** (EU standards) should be followed
- ❖ **Trustworthiness and compliance** must be ensured
- ❖ **Potential AI risks** must be identified and mitigated



Focus on protection of RD data & AI

Requirements for Trustworthy AI

- ✓ *Human oversight*
- ✓ *Technical robustness and safety*
- ✓ *Privacy and data governance*
- ✓ *Transparency*
- ✓ *Accountability*
- ✓ *Societal and environmental well-being*
- ✓ *Diversity, non discrimination and fairness*



Ensuring AI aligns with ethical principles:

- ✓ **Human autonomy** → AI should not undermine decision-making.
- ✓ **Harm prevention** → Strong data governance.
- ✓ **Fairness & transparency** → Avoid bias, ensure

Focus on protection of RD data & AI

Responsibility and implementation

Key AI governance actions:

- ✓ **Training & awareness** → Educate stakeholders on Trustworthy AI
- ✓ **Clear accountability** → Processes to review AI decisions and seek redress
- ✓ **AI traceability** → Ensure proper testing, validation and monitoring



European initiatives for the use of health data

European Commission



- *European Health Data Space (EHDS) Regulation*

European Medicines Agency



- *Data Analysis and Real-World Interrogation Network (DARWIN EU®)*



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Benzi Foundation experience

*The Benzi Foundation is a **not-for-profit scientific research organisation** with a focus on **rare disease patients and children.***

It was founded in 2007, inspired by the work of Professor Gianni Benzi, a respected scientist and one of the first regulatory expert who joined the European agency for medicines.

The Foundation works to make sure that innovative and safe medicines become part of the European pharmaceutical system.

*The **key areas of work** include:*

ETHICS AND
REGULATORY
SCIENCE

RESEARCH
METHODOLOGY

DATA SCIENCE
AND INFORMATION
TECHNOLOGY

Benzi Foundation experience

Research and Innovation

We play a key role to develop a European ecosystem of research, global data sharing and collaborations finally promoting prevention, diagnosis, and treatment for rare diseases.



Through innovative methodology tool based on clinical data and in-silico models, we contribute to improve a regulatory-sounded development of paediatric and orphan medicines.



We contribute to improve the development of innovative medical devices for children affected by rare diseases.



We are involved in a national project which aims to integrate biosamples and data from biobanks, registries, and health records through modelling and networking.

better



Advancing in the field of rare haemoglobinopathies



ARISE



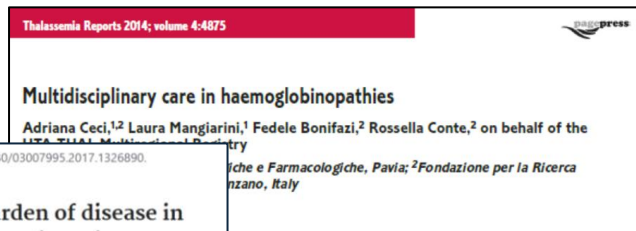
Focusing on haemoglobinopathies, we work together in international networks, projects and initiatives to drive research forward.



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Benzi Foundation - HTA-Thal experience

Italian Multiregional Thalassaemia
registry including epidemiological,
clinical, diagnostic and therapeutic data
on about **2.000 thalassaemia patients**
and technology assessment data on
methods to evaluate iron overload useful
for planning of services in a cost-
efficacious way



> Curr Med Res Opin. 2017 Aug;33(8):1525-1533. doi: 10.1080/03007995.2017.1326890. Epub 2017 Jun 7.

Pattern of complications and burden of disease in patients affected by beta thalassaemia major

Fedele Bonifazi¹, Rosa Conte¹, Paola Baiardi², Donato Bonifazi³, Mariagrazia Felici⁴, Paola Giordano⁴, Viviana Giannuzzi¹, Angela Iacono⁵, Rosa Padula³, Alessia Pepe⁶, Maria Caterina Putti⁷, Lucia Ruggieri¹, Giovanni Carlo Del Vecchio⁸, Aldo Filosa⁹, Aurelio Maggio¹⁰, Adriana Ceci¹, HTA-THAL Multiregional Registry

Affiliations + expand
PMID: 28471307 DOI: 10.1080/03007995.2017.1326890

Abstract

Objectives: Despite the correct application of blood transfusions and chelation treatment, thalassaemia patients have many complications. Systematic population analyses on the frequency of these complications are very few. The aim of this study is to characterize complications, their risk factors and their clinical and economic impact.

there is a new challenge

ISSN: 1024-5332 (Print) 1607-8464 (Online) Journal homepage: <http://www.tandfonline.com/loi/ijhem20>

The Italian Multiregional Thalassaemia Registry: centers characteristics, services and patients' population

R. Conte, L. Ruggieri, A. Gambino, F. Bartoloni, P. Baiardi, D. Bonifazi, F. Bonifazi, M. Felici, V. Giannuzzi, R. Padula, A. Pepe, M.C. Putti, G.C. Del Vecchio, A. Maggio, A. Filosa, A. Iacono, L. Mangiarini & A. Ceci

To cite this article: R. Conte, L. Ruggieri, A. Gambino, F. Bartoloni, P. Baiardi, D. Bonifazi, F. Bonifazi, M. Felici, V. Giannuzzi, R. Padula, A. Pepe, M.C. Putti, G.C. Del Vecchio, A. Maggio, A. Filosa, A. Iacono, L. Mangiarini & A. Ceci (2016): The Italian Multiregional Thalassaemia Registry: centers characteristics, services and patients' population, Hematology

To link to this article: <http://dx.doi.org/10.1080/10245332.2015.1101971>

Funded by the Italian Health Ministry and by Fondazione 'Leonardo Giambrone'

Voluntary managed by FGB after the end of the public funds period

Collaboration with other data collection initiatives aimed to create a common source of electronic data system

Including a map of the existing Italian thalassaemia centres with details on services and tools available at each participating centre

Useful instrument to conduct analyses and follow-up on the disease outcomes and emerging issues

Benzi Foundation - c4c experience

Desk research on existing CTs data-sharing repositories/platforms containing paediatric data

Collection of the repositories/platforms' main features

Analysis of the collected information

Assessment of the suitability for sharing paediatric data through a set of indicators

Surveys & Interviews with the representatives of the repositories/platforms

❖ *To identify existing initiatives that have developed electronic archiving programs or repositories, to store, share and reuse data from (paediatric) clinical trials (CTs) and to describe their features and impact on paediatric research*

Open Access Review

Mapping of Data-Sharing Repositories for Paediatric Clinical Research—A Rapid Review

by Mariagrazia Felisi¹, Fedele Bonifazi², Maddalena Toma², Claudia Pansieri^{1,*}, Rebecca Leary³, Victoria Hedley³, Ronald Cornet^{4,5}, Giorgio Reggiardo¹, Annalisa Landi², Annunziata D'Ercole², Salma Malik⁶, Sinéad Nally⁷, Anando Sen³, Avril Palmeri³, Donato Bonifazi¹ and Adriana Ceci²

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² Fondazione per la Ricerca Farmacologica Gianni Benzi Onlus, Via Giulio Petroni 91/D, 70124 Bari, Italy

³ John Walton Muscular Dystrophy Research Centre, Translational and Clinical Research Institute, Newcastle University and Newcastle Hospitals NHS Foundation Trust, Newcastle upon Tyne NE1 3BZ, UK

⁴ Department of Medical Informatics, Amsterdam Public Health Institute, Amsterdam UMC (Academic Medical Center)—University of Amsterdam, Medical Informatics, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands

⁵ Amsterdam Public Health, Methodology & Digital Health, 1081 HV Amsterdam, The Netherlands

⁶ The European Clinical Research Infrastructure Network (ECRIN), 30 Bd Saint-Jacques, 75014 Paris, France

⁷ Novartis Pharmaceuticals, 203 Merrion Rd, Dublin 4, D04 NN12 Dublin, Ireland

* Author to whom correspondence should be addressed.

Data 2024, 9(4), 59; <https://doi.org/10.3390/data9040059>

Submission received: 18 December 2023 / Revised: 13 March 2024 / Accepted: 17 April 2024 /

Published: 20 April 2024

LINK

Benzi Foundation - EPIICAL experience



✓ *Insightful recommendations on how challenging data and samples sharing in paediatric clinical research can be transformed into science-driven opportunities → fostering collaboration and innovation within the field*

Benzi Foundation - EJP RD experience

common Informed Consent Form (ICF) for Rare Disease registries

To adapt for: **The whole ERN; National level; Site level;**
Delete this square afterwards

Please insert the ERN/ERN Registry Logo

PATIENT INFORMED CONSENT FORM

Dear Patient,

We invite you to take part in a patient registry for **<please precise disease/group>**. Participation is voluntary and requires your written consent as a legal basis to use your information carefully and ask your medical doctor for explanation if you have any questions.

EUROPEAN REFERENCE NETWORK REGISTRIES

• Please include a brief description of the disease/group of diseases and the current bottlenecks for their management (resources and multidisciplinary public health challenge; few regarding patients to launch).

• European Reference Network across Europe working to...

• <Please include (1) an information page of the ERN-... To understand the course...

VALUE & BENEFITS

HOW WILL THE DATA BE USED?

The data collected in this registry is used to improve the delivery of healthcare, including the diagnosis, treatment and prognosis of patients with **<please precise disease/group of diseases as above>**.

<The following sentence on "research on genetic data, population origins or ancestry research" is optional at ERN discretion> Research on genetic data, population origins or ancestry research may be carried out as well. **<Please provide details (i.e., type of data, additional and appropriate safeguard measures, other information, if no such research is foreseen, please delete this part>**

Research is often carried out in collaboration with other researchers. By sharing data, more questions can be answered.

Only users authorised by the **Registry Data Access Committee** can use the data. This Committee is composed of qualified health professionals, patients' representatives as well as members with legal and ethical expertise. **It ensures that the request for data use aligns with the purposes of the registry and its policy.**

The Registry Data Access Committee may provide data access to clinical researchers from within or outside **<please name the ERN>**, patient organisations, and the pharmaceutical industry in order to develop projects, policies or studies aimed to improve the delivery of healthcare for rare diseases. Also, registry data may be shared with health authorities, policy makers and regulators to inform their decisions on rare disease health policy and approval of medicines.

Data use for commercial purposes

Companies might request access to data stored in the registry to perform research aimed to develop new therapies for your condition. For example, the registry can inform companies how many patients live with a certain disease and help find patients in clinical trials of new therapies.

Typically, the results of this research will become property of the company that may also use them for further commercial purposes and to patent. You will not acquire any rights over these results, own them in any way, or be entitled to share any future financial benefit derived from this research.

data for commercial research.

may also be forwarded to researchers working in protection Regulation (GDPR) does not apply. In this case, the data is processed in compliance with the GDPR. Our data to non-EU countries to contribute to projects framework compliant with GDPR.

Additional data in the future. This information will be **<URL of the registry website>**.

Section is optional, at ERN discretion.

For your **<please precise disease/group of diseases>**, registries are of great importance to better understand the disease. Information on the available subregistries can be found on the website.

existing databases/registries, such as **<please name the database>**. You may choose if you want to allow the sharing of your data with these registries.

conditions covered by this registry may be found on the website.

Optional, at ERN discretion

I CONSENT that my pseudonymized data may be linked to existing databases/registries to improve healthcare.

I WOULD LIKE TO BE CONTACTED by my medical doctor about any research project and/or clinical study related to my condition.

I WOULD LIKE TO BE INFORMED by my medical doctor about any incidental finding that is directly relevant to my personal health or to the health of my family members.

PATIENT

Date and Signature:

MEDICAL DOCTOR / AUTHORISED WITNESS

Full name:
Position:
Date and Signature:

Please keep one copy of this Informed Consent Form in case records and hand one copy to the person who has signed this form.

The Informed Consent Form template aims to foster, according to patients' preferences, the reuse of registries data for research purposes in compliance with the applicable laws and standards

Adaptation at:

- ERN level
- National level
- Site level

One version for participants and one for parents/legally designated representatives

frontiers | Frontiers in Medicine

Check for updates

OPEN ACCESS

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RECEIVED 08 February 2024
ACCEPTED 27 March 2024
PUBLISHED 17 April 2024

CITATION
Landi A, Mimouni Y, Giannuzzi V, Schaefer F,
Altavilla A, Gibson S and Julkowska D (2024)
The creation of an adaptable informed
consent form for research purposes
to overcome national and institutional
bottlenecks in ethics review: experience
from rare disease registries.
Front. Med. 11:1384026.
doi: 10.3389/fmed.2024.1384026

The creation of an adaptable informed consent form for research purposes to overcome national and institutional bottlenecks in ethics review: experience from rare disease registries

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Take home messages

- ✓ *Health data are a real value for scientific research*
- ✓ *In the context of research with RD data, benefits and challenges are greatest*
- ✓ *Addressing ELSI is relevant mainly to protect patient rights and to guide healthcare policy and legal frameworks*
- ✓

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Interactive session



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Acknowledgments:
Sabina Sblano

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