Spoločenský dosah 1

Krok 1: Impact case study form

Please read the information regarding the case study form on societal impact.

- The Impact case study form consists of two sections. In Section A, provide basic information about the applicant, the unit of assessment, the title of the case study, the period when the research on which the case study is based was conducted, and information about the submitting institution's staff who are (or have been) involved in the research. The information regarding the underpinning research does not need to be linked to current staff, nor does it need to be linked to the evaluation period (2020-2024) or to the outputs submitted in the previous section.
- Section B has 5 main parts:
- Brief summary of the impact (max. 100 words): briefly state the specific societal impact described in the case study;
- The research on which the impact is based (max. 500 words): provide the key research findings or insights that underpin the societal impact and details of what research has been conducted, when and by whom;
- References to the research (max. 6 references): provide references to the key outputs from the research described in the previous section;
- Details of the societal impact (max 750 words): using supporting evidence, explain how the research has clearly supported or substantially contributed to the declared societal impact, and also the nature and extent of the societal impact, including a description of the societal impact on specific institutions or target groups, including a description of the evidence to support the societal impact;
- Up-to-date contacts to sources supporting the societal impact (max. ten references): provide contacts of those external sources (i.e. sources outside the submitting institution) that have supported the specific claims made in the case study.
- The last part of the form is 'other contextual data', which applicants may fill in if relevant in the context of the application (this information is supplementary and optional; it is not included in the limit of five pages).

Krok 2: Impact case study form - Section A

The fields in this section are compulsory.

Oblasť hodnotenia:
Klinické lekárske vedy

Inštitúcia:
Trnavská univerzita v Trnave

Title of case study*

Transforming Healthcare-Associated Infection Surveillance at Trnava University Hospital: A Case Study

Type of the impact*

Health

Time period when the underpinning research was conducted*

2012 - 2022

Period when the declared impact occurred*

2022 - 2024

Details about the personnel conducting the underpinning research from the submitting unit:

Zamestnanec č. 1

Name/Names*

Jaroslava Sokolová

Roles (e.g. work position)*

Associate professor

Period of employment at the submitting institution*

2012 - till now

Zamestnanec č. 2

Name/Names*

Lenka Reizigová

Roles (e.g. work position)*

Assistant of professor

Period of employment at the submitting institution*

2016; now on maternity leave

Zamestnanec č. 3

Name/Names*

Roles (e.g. work position)*

Period of employment at the submitting institution*

Details about the personnel from the submitting institution who have contributed to the impact:

Zamestnanec č. 1

Name/Names*

Vladimír Krčméry

Roles (e.g. work position)*

professor

Period of employment at the submitting institution*

1994 - 2017

Zamestnanec č. 2

Name/Names*

Anna Strehárová

Roles (e.g. work position)*

professor

Period of employment at the submitting institution*

1994 - 2020

Zamestnanec č. 3

Name/Names*

Janka Prnová

Roles (e.g. work position)*

research fellow

Period of employment at the submitting institution*

2020 - 2022

Zamestnanec č. 4

Name/Names*

Marina Havriško

Roles (e.g. work position)*

assistanf of professor

Period of employment at the submitting institution*

2021 - 2023

Zamestnanec č. 5

Name/Names*

Zuzana Škvarková

Roles (e.g. work position)*

PhD. student

Period of employment at the submitting institution*

2010 - 2013

Zamestnanec č. 6

Name/Names*

Mária Kopilec Garabášová

Roles (e.g. work position)*

PhD. student

Period of employment at the submitting institution*

2013 - 2016

Krok 3: Brief summary of the impact

Please fill in a brief summary of societal impact.

Brief summary of the impact (max. 100 words)

This section briefly outlines the specific societal impact described in the case study.

The case study highlights the critical role of healthcare-associated infection (HAI) surveillance in improving patient safety. By addressing gaps in infection monitoring within Slovak hospitals—such as passive systems and lack of trained professionals—it demonstrates how implementing automated surveillance can reduce preventable infections, improve clinical outcomes, and optimize healthcare resources. The initiative advocates for systemic change and underscores the importance of timely feedback and data-driven interventions as tools for enhancing the quality of care.

Krok 4: Research on which the impact is based

Please provide information about the research from which the societal impact is derived.

2. Research on which the impact is based (max. 500 words)

This part includes the key research findings or insights that underpin the societal impact and details what research has been undertaken, when and by whom. These research details do not need to be linked to current staff, nor do they need to be linked to the assessment period (2020-2024) or to the outputs presented in the previous section. This research may be a body of work developed over a number of years or may be the output of a specific project. Provide references to the specific research outputs that constitute the research described in this section in the next part (part B3).

Provide details of the following data in this part:

- The nature of the research knowledge or findings that relate to the societal impact declared in the case study.

- An outline of the research results (this may refer to one or more research outputs, projects or programmes).

- Any relevant key information about this research.

Healthcare-associated infections (HAIs) have long been a focus of research at the Faculty of Health Sciences and Social Work, Trnava University, especially under Professor Vladimír Krčméry (1). Given that up to 60% of HAIs are preventable, effective surveillance systems are essential for improving patient safety and care quality. However, in Slovakia, passive surveillance and the lack of infection control professionals have limited progress. Official EPIS system data suggest a suspiciously low HAI rate—under 1% of hospitalized patients—highlighting severe underreporting.

The transition from passive reporting to **active surveillance of HAIs**, and the continuous emphasis on improving surveillance quality, has been consistently promoted by Professor Anna Strehárová (2). In 2012, Professor Strehárová initiated collaboration with the management of **Trnava University Hospital** and the faculty leadership, resulting in the creation of the **dedicated position for an infection prevention and control specialist**. This role was filled by Dr. Jaroslava Sokolová, PhD, who simultaneously began serving as an assistant professor. Dr. Sokolová led the hospital's participation in **point prevalence surveys of HAIs in 2012 and 2017** (3,4), actively monitored infections, and regularly presented surveillance results to hospital leadership with the goal of expanding the infection control team—aligned with international standards recommending one infection control professional per 250 beds.

In 2017, the **Department of Hospital Hygiene and Epidemiology** was established at FN Trnava, staffed by Dr. Zuzana Škvarková, PhD, and Janka Prnová MSc.. That same year, Dr. Sokolová founded the **Centre for Microbiology and Infection Prevention (CEMIP) at Trnava unidversity** within the Clinical and Laboratory Disciplines Pavilion at FN Trnava, enabling seamless integration of applied research, clinical practice, and diagnostic microbiology.

CEMIP's activities focus on translational research in HAIs, including the **development, implementation, and evaluation of novel infection prevention methods.** Additional PhD graduates from the faculty joined the Centre, including microbiologists Dr. Martina Havriško, PhD, and Dr. Lenka Reizigová, PhD. In 2020, Dr. Reizigová has served lead coordinator the **Slovak National Reference Centre for the Prevention and Control of HAI Trenčín** since 2023.

In 2022, CEMIP began collaboration with the Czech startup **Datlowe** (https://datlowe.cz/) to implement a **semi-automated HAI surveillance system** into routine clinical practice (5, 6). Datlowe in cooperation with **Hospital Jihlava** and **Trnava University Hospital**—developed a system based on **natural language processing (NLP).** This technology enables automated identification of potential HAIs by analyzing the full text of electronic health records. Detected cases were reviewed by infection prevention specialists, and their feedback was used to refine the algorithm. NLP has proven effective in identifying both microbiologically confirmed and clinically suspected HAIs that would otherwise remain undetected in structured data. In 2019, Trnava University Hospital began transitioning to a new hospital information system, which laid the groundwork for the adoption of **HAIDi -** the semi-automated surveillance system developed by Datlowe, in 2021. Since 2022, FN Trnava has reported approximately **1,200 HAIs annually** through HAIDi, enabling **targeted infection prevention strategies**. The hospital has since become a **reference center for digital HAI surveillance** in Slovakia, serving as a model for other institutions.

Krok 5: References to the research

Please provide up to six references to research from which the societal impact is derived.

3. References to the research (max. 6 references)

In this part, provide references to key outputs from the research described in the previous part. All forms of outputs will be considered equally (no one type of output will be given priority over another). These references will be assessed solely with regard to societal impact.

For each output cited, provide the following details:

- author(s)
- title
- year of publication
- type of output and other relevant data needed to identify the output (e.g. DOI, journal title and issue number)

All outputs listed in this part must be accessible to the evaluation sub-panels. If they are not available publicly, the submitting institution must be able to provide them on request of the appropriate department of the Ministry.

If the optional information on key research grants that supported the research or grant completion reports has been included, provide the following information:

- to whom the grant was awarded
- the title of the grant
- sponsor
- grant period (with dates)
- financial value of the grant.

Word limit: max. 300 words

Koprnova J, Beno P, Korcova J, Streharova A, Krcmery V Jr. et al. Bacteremia due to Pseudomonas aeruginosa: results from a 3-year national study in the Slovak Republic. J Chemother. 2005 Oct;17(5):470-6. doi: 10.1179/joc.2005.17.5.470. PMID: 16323434

Reporting nosocomial infections - do we have a problem with quantity or quality? Brňová, J.; Prnová, J.; Strehárová, A. In: *Vedecko-odborná konferencia Národných referenčných centier pre surveillance infekčných chorôb v SR*: 1. ed. Vol. 15. Bratislava: SZU, 2018. – ISBN 978-80-89797-30-1, s. 36-36 https://app.crepc.sk/?fn=detailBiblioFormChildQ16Q80&sid=CB0690693937F9C0F8824B80&seo=CREP%C4%8C-detail-kapitola-/-pr%C3%ADspevok

Point prevalence survey of healthcare-associated infections in Slovakia: from zero to real data. Štefkovičová, M.; Rovný, I.; Brnová, Sokolová J.; ICPIC 2015 [Geneva]. In: *Antimicrobial Resistance and Infection Control* [elektronický dokument]. London: Springer Nature. BioMed Central. ISSN 2047-2994. No. 4 (2015), p. 1-1 https://app.crepc.sk/?fn=detailBiblioFormChildM133PB&sid=1BDE7804155D4CE71FD07DFEA3&seo=CREP%C4%8C-detail-%C4%8Cl%C3%A1nok

Point prevalence survey of healthcare-associated infections in Slovakia: comparison data from survey in 2012 and 2017. Štefkovičová, M; Litvová, S; Kopilec Garabášová, M; Brňová Sokolová, J; International Conference on Prevention & Infection Control, 5. DOI 10.1186/s13756-019-0567-6. – WOS CC. In: Antimicrobial Resistance and Infection Control. London: Springer Nature. BioMed Central. ISSN 2047-2994. – suppl. Vol. 8, No. Supplement 1 (2019), P174, s. 83-83 https://app.crepc.sk/?fn=detailBiblioFormChildU15FNM&sid=88E7607BB1DED682A2157098A6&seo=CREP%C4%8C-detail-%C4%8Cl%C3%A1nok

Semiautomated surveillance system for health care-associated infections and antimicrobial resistance in university hospital Trnava, Slovakia: a single centre experience. Sokolová, J; Bučková, V; Chebenová, V; Škvarková, Z; International Conference on Prevention & Infection Control. DOI 10.1186/s13756-023-01276-2. In: *Antimicrobial Resistance and Infection Control.* London: Springer Nature. BioMed Central. ISSN 2047-2994. suppl. Vol. 12, No. Supplement 1 (2023), s. 9-9 https://app.crepc.sk/?fn=detailBiblioFormChildE13EJG&sid=0E8977C560C300761C1146DFD3E6&seo=CREP%C4%8C-detail-%C4%8Cl%C3%A1nok

Surveillance of HAI and MDR bacteria using HAIDI software in Trnava University Hospital. Bučková, V; Chebenová, V; Škvarková, Z; Dobiaš, A; Sokolová, J; Nemocniční epidemiologie a hygiena. DOI 10.21101/hygiena.b0158. In: *Hygiena,* časopis pro ochranu a podporu zdraví. Praha: Státní zdravotní ústav, Tigis. ISSN 1802-6281. ISSN (online) 1803-1056. Vol. 69, No. 2 (2024), p. 76-76 https://app.crepc.sk/?fn=detailBiblioFormChildW160RN&sid=E17FC85307AF86FA3ACEB9535D4A&seo=CREP%C4%8C-detail-%C4%8Cl%C3%A1nok

Krok 6: Details of the impact

Please provide details about the societal impact according to the described criteria.

4. Details of the impact (max. 750 words)

In this part, provide a narrative with supporting evidence that explains:

- how the research has supported or made a distinct and substantial contribution to societal impact;

- the nature and extent of the societal impact, including a description of the specific institutions and target groups.

Provide the following details:

- A clear explanation of the process or manner in which the research has led to, supported or contributed to societal impact (e.g. how it has been disseminated, how it has influenced users or beneficiaries, or how it has come to be used, adopted or applied).

- If the submitting institution's research was part of a broader research project that contributed to impact (e.g. in the case of research collaborations with other institutions), identify in the case study the specific contributions of the submitting institution's research and list other key contributions of the research.

- Details of the beneficiaries - who or what community, group or organisation has benefited from, been influenced by or affected by the societal impact of the research.

- Details of the nature of the societal impact - how they have benefited, been affected or in what ways their activities have been affected.

- Description of evidence or indicators of the scale of the social impact described, as appropriate to the example.

- The dates and periods when these societal impacts occurred.

In the ever-evolving landscape of healthcare, combating healthcare-associated infections (HAIs) presents a critical challenge in clinical medicine. As most frequent adverse event in healthcare delivery, HAIs affect millions of patient’s worldwide, causing loss of life, extended hospital stays, and significant financial burdens on healthcare systems. Research on HAIs at Faculty of Health Care and Social Work, Trnava University, has made a **distinct and substantial contribution to the advancement of infection surveillance and patient safety in Slovakia and beyond**. This transformation has occurred over more than decade and has combined academic research, clinical collaboration, digital and artificial intelligence innovation, and national policy engagement.

Foundation for this impact was laid by Professor Vladimír Krčméry, whose pioneering research established a robust evidence base for HAI surveillance in immunocompromised patients. Building on this legacy, subsequent applied research led by Professor Anna Strehárová addressed a critical issue in Slovak healthcare: the passive and underdeveloped state of HAI surveillance systems. Despite legal mandates, national data reported through the EPIS system consistently showed less than 1% incidence of HAIs—an implausibly low figure in comparison to European standards. This underreporting concealed systemic gaps and posed a threat to patient safety. To address this, researchers at Trnava University initiated a strategic transition toward active surveillance, beginning with a partnership with Trnava University Hospital (TUH) in 2012. This collaboration led to the creation of full-time hospital-based infection prevention and control (IPC) specialist position. The hospital began collecting structured prevalence data under the leadership of Dr. Jaroslava Sokolová, PhD, who participated on two national point prevalence surveys in 2012 and 2017. In 2017, the university launched the Centre for Microbiology and Infection Prevention (CEMIP). CEMIP was conceived as a multidisciplinary hub for applied research, clinical diagnostics, and training. It provided an institutional platform to pilot new surveillance tools and train IPC professionals across Slovakia. One of CEMIP's key innovations was the integration of automatization and digital tools into clinical workflows. In 2021, in partnership with the health-tech company Datlowe, the university co-developed HAIDi—a semi-automated surveillance system that uses natural language processing (NLP) to scan electronic health records and identify HAIs with high sensitivity. The impact of this initiative has been profound:

· TUH now reports approximately 1,200 HAI cases annually, reflecting realistic infection rates and enabling evidence-based interventions.

· The hospital was designated a national reference site for artificial intelligence semiautomated HAI surveillance, serving as a model for other Slovak institutions.

· The HAIDi system has demonstrated superior accuracy compared to traditional manual surveillance methods and has been recognized for its innovative use of AI in clinical epidemiology.

· The workforce of trained IPC professionals, including PhD graduates from Trnava University, now lead infection control efforts in other Slovak hospitals and institutions. Among them, Dr. Lenka Reizigová, a CEMIP-trained microbiologist, became the head of the Slovak National Centre for HAI Prevention in 2023, housed within the Regional Public Health Authority in Trenčín.

The societal benefits of this research span multiple levels:

· Clinical: Improved identification and response to HAIs in hospitals, especially among vulnerable patient groups such as those undergoing surgery, or cancer treatment.

· Institutional: Strengthened surveillance infrastructure, including staffing, training, and the introduction of AI-based monitoring tools.

· National: A shift in the national understanding of HAI burden and the establishment of policy frameworks informed by accurate, real-time data.

· Public Health: Enhanced patient safety and reduced morbidity through early detection and targeted prevention of infections.

The university's role was central throughout the impact pathway:

· Developed and piloted active surveillance methodologies.

· Trained the first cohort of new generation non-medical doctor's prevention professionals.

· Created a scalable model of research–practice integration through CEMIP.

· Led national efforts to digitize HAI surveillance with the implementation of HAIDi.

Key milestones along this impact pathway include:

· 2012: First point prevalence survey and appointment of an IPC professional at TUH.

· 2017: Founding of Department of Hospital Hygiene and Epidemiology and CEMIP and formal integration of applied research into clinical hygiene structures.

· 2021: Establishment of the Slovak National Centre for HAI Prevention, led by CEMIP-trained staff in 2023

· 2021–2022: Implementing and assessing of the HAIDi system with startup Datlowe

· 2022–present: Annual reporting of ~1,200 HAIs at TUH and national recognition of the model.

The Trnava University research programme has demonstrated how a local academic initiative can generate measurable improvements in clinical medicine. Through its long-term commitment to research, collaboration, and innovation, the university has significantly contributed to making Slovak hospitals safer places for patients and healthcare workers alike.

Krok 7: Zdroje na potvrdenie spoločenského dosahu

Prosím vyplňte kontakty na zdroje podľa nižšie uvedených kritérií.

5. Zdroje na potvrdenie spoločenského dosahu (maximálne desať odkazov)

V tejto časti sa uvádzajú aktuálne kontakty na externé zdroje okrem žiadateľa, ktoré poskytli potvrdenie konkrétnych tvrdení, uvedených v prípadovej štúdii. Zdroje uvedené v tejto časti sa nenahrádzajú poskytnutie dôkazov o vplyve v časti B4; V tejto časti sa uvádzajú aktuálne kontaktné údaje o zdrojoch, ktoré by mohli potvrdiť kľúčové tvrdenia o dosahu výskumu pracoviska. Podľa potreby môžu zahŕňať nasledujúce externé zdroje potvrdenia (s uvedením, ktoré tvrdenie zdroj potvrdzuje):

- Správy, recenzie, webové odkazy alebo iné zdokumentované zdroje informácií vo verejnej sfére.
- Dôverné správy alebo dokumenty (ak sú uvedené, musia byť predložené príslušnému útvaru do 31. mája 2025).
- Jednotliví používatelia/príjemcovia, ktorých príslušný útvar môže kontaktovať, aby potvrdili tvrdenia*.
- Vyhlásenia, ktoré už používatelia/prijímatelia poskytli žiadateľovi, ktoré potvrdzujú konkrétne tvrdenia uvedené v prípadovej štúdii (ak sú uvedené, musia byť predložené príslušnému útvaru do 31. mája 2025).

Zdroj č. 1

Service Agreement for HAIDI: https://www.crz.gov.sk//data/att/3105576.pdf

Zdroj č. 2

Hospital Financial Report 2022, page 43: https://fntt.sk/wp-content/uploads/2023/03/Sprava-o-hospodareni-za-rok-2022.pdf

Zdroj č. 3

Hospital Financial Report 2023, page 55: https://fntt.sk/wp-content/uploads/2024/05/Vyrocna-sprava-FN-Trnava-2023.pdf

Zdroj č. 4

Hospital Financial Report 2024, page 43: https://fntt.sk/wp-content/uploads/2025/03/vyrocna_sprava_2024.pdf

Zdroj č. 5

Podcast with Dr. Sokolová: How Artificial Intelligence Helps Us Evaluate the Risk of Infection Spread: https://www.youtube.com/watch?v=qjq0OHRojWQ&list=PLKAIkSd9LTz2Fa9LlXVyi-pIEer_FkKGn&index=6&t=32s

Zdroj č. 6

Podcast page at Trnava University – Infection Prevention: https://www.truni.sk/prevencia-vzniku-infekcii-podcast-jaroslava-sokolova

Zdroj č. 7

Health Policy Article: Hospitals Cover Up the Number of Infections; Fines Don't Help, the Problem Lies Elsewhere, Experts Say: https://zdravotnickydennik.sk/2025/05/nemocnice-zakryvaju-kolko-ludi-sa-tam-nakazi-pokuty-nepomozu-problem-je-iny-tvrdia-odbornici/

Zdroj č. 8

Datlowe website Declaring Reference Use: https://datlowe.cz/

Zdroj č. 9

CEMIP website – https://fzsp.truni.sk/pavilon-klinickych-laboratornych-disciplin

Zdroj č. 10

Krok 8: Other contextual data

Fields in this part are additional and optional. This information is provided in a separate form and is not included in the five-page limit.

Name(s) of funder(s):

Global Research Identifier of funder(s) (https://www.grid.ac/):

Name(s) of funding programme(s):

Grant number(s):

Amount of grant (in EUR):

ORCID for each named researcher, where available:

Jaroslava Sokolová

https://orcid.org/0000-0001-6964-6203

Name(s) of formal partner(s):

Countries where the impact occurred: