Poster EE29

Clinical and Economic Impact of Pre-exposure Prophylaxis with Tixagevimab + Cilgavimab in 2022 in Switzerland to Protect Immunocompromised Individuals

Simone Rivolo[1], George Bungey[2], Walter Morris[3], Eszter Nagy[4], Simone Williams[5], Léa Maillat[5], Agnieszka Jańska[6], Sofie Arnetorp[7]

[1]Evidera, a part of Thermo Fisher Scientific, Milan, Italy, [2]Evidera, a part of Thermo Fisher Scientific, London, United Kingdom, [3]Evidera, a part of Thermo Fisher Scientific, Cambridge, Cambridgeshire, UK, [4]Evidera, a part of Thermo Fisher Scientific, Liverpool, Merseyside, UK, [5]AstraZeneca, Baar, Zug, Switzerland, [6]AstraZeneca, Cambridge, Cambridgeshire, UK, [7]AstraZeneca, Gothenberg, Västergötland, Sweden.

Why did we perform this research?

- Immunocompromised individuals (ICIs) remain at high risk of experiencing severe COVID-19 (hospitalisation or death) due to an impaired immune response to vaccinations.[1,2]
- Passive immunisation through pre-exposure prophylaxis (PrEP) can protect ICIs and has been recommended by medical societies including the Swiss Society for Infectious Diseases (SSI)[3,4] for:
  - High-risk individuals with a documented failure to mount a significant antibody response after ≥3 doses of messenger ribonucleic acid (mRNA) COVID-19 vaccines
  - Individuals with an established inability to respond to vaccination.
- PrEP with tixagevimab + cilgavimab (T+C) was available in Switzerland from May 2022 to February 2023 at designated, authorised, recipient hospitals before its withdrawal due to diminished in-vitro neutralisation against emerging Omicron variants.[3,5]

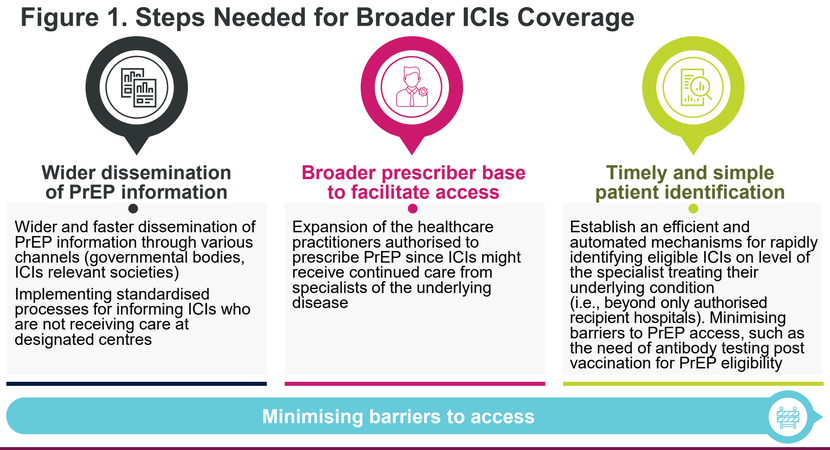
Objective 1: To quantify the clinical and economic impact of one dose of T+C vs. no PrEP (wait and treat) given to 1,500 ICIs who received T+C in Switzerland in May 2022 among 10,000 eligible ICIs estimated in an expert consensus paper by Swiss experts (SSI/EKIF).[3,4]

Objective 2: Assess the impact of three hypothetical PrEP access scenarios for ICIs in a stepwise approach in terms of earlier access, two T+C doses, and broader coverage.

Summary

- Introduction in May 2022 of PrEP for COVID-19 with a single dose of T+C was estimated to have prevented 74 symptomatic cases, seven hospitalisations, 60 bed days, and 14 post-acute COVID-19 sequelae (PACS) cases among 1,500 ICIs in Switzerland.
- Considering hypothetical scenarios with stepwise changes in terms of 1. earlier access, 2. a second T+C dose, and 3. broader coverage among ICIs, led to substantially more adverse COVID-19 outcomes prevented by PrEP, with a reduction of 265–2,280 symptomatic cases, 24-210 hospitalisations, 215–1,848 bed days, and 51–442 PACS cases.
- **Figure 1** summarises the essential steps needed to achieve earlier access and broader ICI coverage for reducing ICI burden in a timely manner.

Figure 1. Steps Needed for Broader ICIs Coverage

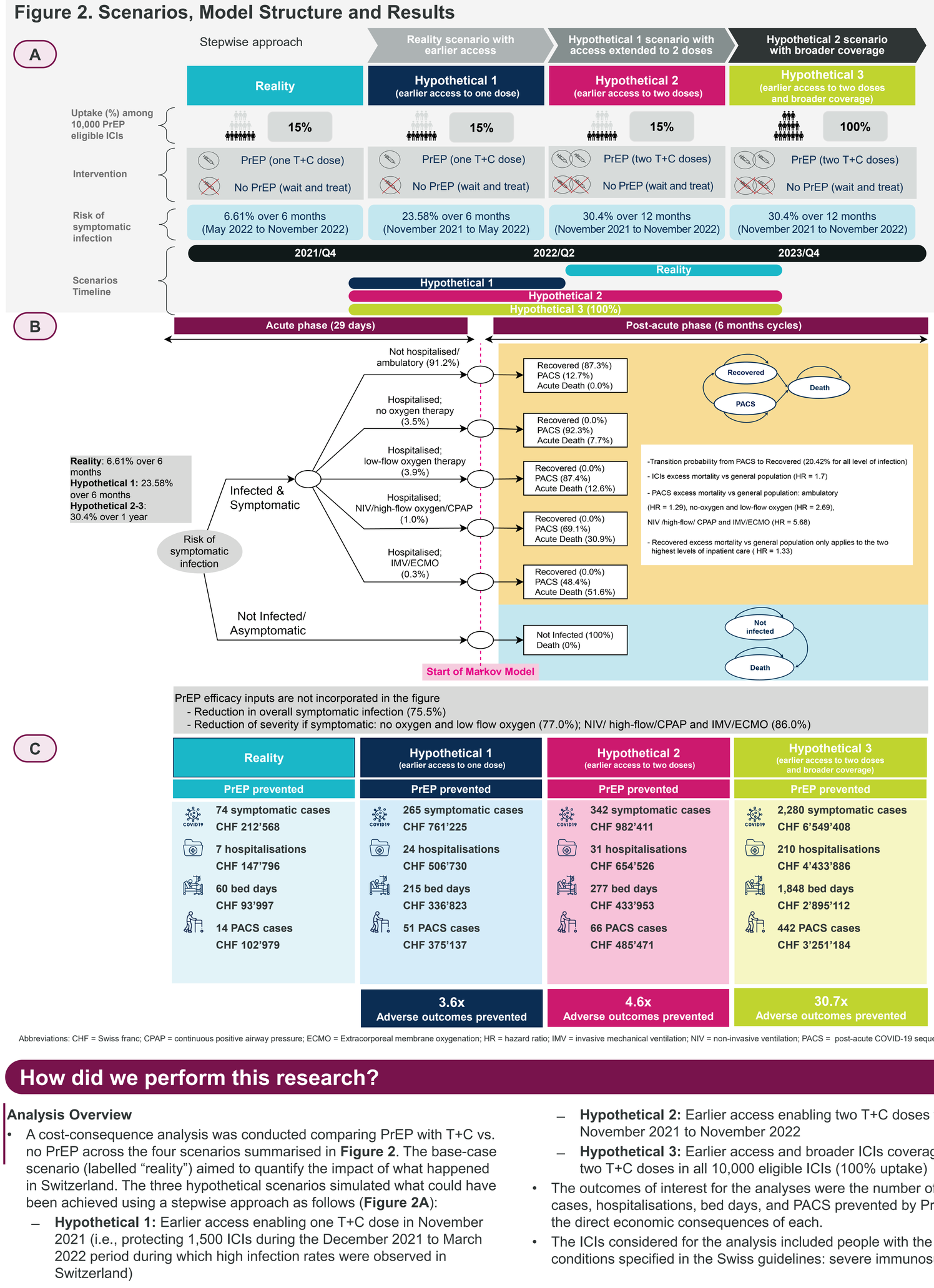


Key takeaway

- Earlier access, two doses, and broader coverage with T+C as PrEP for ICIs could have prevented 3.6 to 30.7 times the number of COVID-19 adverse outcomes and associated costs between November 2021 and November 2022 in Switzerland.
- Wider dissemination of PrEP information, broader PrEP prescriber base to facilitate access, timely and simple patient identification and minimising barriers to PrEP would enable earlier access and broader coverage of PrEP.

What did we find?

Figure 2. Scenarios, Model Structure and Results



Abbreviations: CHF = Swiss franc; CPAP = continuous positive airway pressure; ECMO = Extracorporeal membrane oxygenation; HR = hazard ratio; IMV = invasive mechanical ventilation; NIV = non-invasive ventilation; PACS = post-acute COVID-19 sequelae.

- **Figure 2C** provides a summary of the clinical outcomes and associated costs prevented by PrEP vs. no PrEP. In the reality scenario, one dose of T+C PrEP prevented 74 symptomatic cases, seven hospitalisations, 60 bed days, and 14 PACS cases with associated costs of Swiss franc (CHF) 212’568; CHF 147’796; CHF 93’997, and CHF 102’979, respectively.
- The adverse outcomes and associated costs prevented by T+C PrEP, if earlier access was available, could have been 3.6 times higher if ICIs had received one T+C dose in November 2021 and 4.6 times higher if ICIs had received two T+C doses over one year. Earlier access to two T+C doses and broader ICI coverage combined could have prevented up to 30.7 times higher adverse outcomes and associated costs.
- The rate of symptomatic infection (RoSI) and risk of hospitalisation (RoH) were identified as the key drivers of clinical outcomes prevented by PrEP. Therefore , a range of plausible symptomatic infection risks (± 50%) and hospitalisation risks (2.9%[1] - 18.8%[6]) were explored in scenario analysis.
  - In the reality scenario, varying the RoSI resulted in 37–112 symptomatic cases and 3–10 hospitalisations averted, while changing the RoH led to 2–15 hospitalisation prevented.
  - For the hypothetical 3 scenario, varying the RoSI resulted in 1,140–3,420 symptomatic cases and 105–314 hospitalisations averted, while changing the RoH led to 69–448 hospitalisations averted.

What is the significance of these data?

Introduction of PrEP consisting of a single dose of T+C in May 2022 was estimated to have significantly reduced the COVID-19 disease burden among ICIs in Switzerland.

The impact of PrEP with T+C could have been significantly greater with earlier access, preventing 3.6 times and 4.6 times more COVID-19 adverse outcomes and healthcare-related costs if one T+C dose was given in November 2021 or two T+C doses were given over November 2021 to November 2022, respectively. Combining earlier access (two T+C doses) and broader coverage (10,000 ICIs receiving PrEP) would have resulted in a 30.7-fold increase in COVID-19 adverse outcomes prevented.

To achieve earlier access and broader ICI coverage and therefore reduction of ICI burden in a timely manner, several steps are needed, with the key steps summarised in Figure 1.

How did we perform this research?

Analysis Overview

- A cost-consequence analysis was conducted comparing PrEP with T+C vs. no PrEP across the four scenarios summarised in **Figure 2**. The base-case scenario (labelled “reality”) aimed to quantify the impact of what happened in Switzerland. The three hypothetical scenarios simulated what could have been achieved using a stepwise approach as follows (**Figure 2A**):
  - **Hypothetical 1:** Earlier access enabling one T+C dose in November 2021 (i.e., protecting 1,500 ICIs during the December 2021 to March 2022 period during which high infection rates were observed in Switzerland)
  - **Hypothetical 2:** Earlier access enabling two T+C doses from November 2021 to November 2022
  - **Hypothetical 3:** Earlier access and broader ICIs coverage, enabling two T+C doses in all 10,000 eligible ICIs (100% uptake)
- The outcomes of interest for the analyses were the number of symptomatic cases, hospitalisations, bed days, and PACS prevented by PrEP, along with the direct economic consequences of each.
- The ICIs considered for the analysis included people with the following conditions specified in the Swiss guidelines: severe immunosuppression, receiving chemotherapy for solid cancer, chronic neutropenia, hereditary immunodeficiencies, receiving B-cell depleting or other immunosuppressive therapies, haematological malignancies, and solid organ transplants[4].
- Model inputs were derived from a targeted literature review, focusing on studies specific to vaccinated ICIs adults and to the Omicron variants (see Supplement file for details). In the absence of Switzerland specific data, large ICIs and Omicron specific international studies were leveraged. The model inputs were discussed and validated with Swiss clinical and economic experts. Extensive sensitivity analyses were conducted.

Disclosures

- SR, GB, WM, and EN are employed by Evidera, a part of Thermo Fisher Scientific, which received funding from AstraZeneca to conduct this study.
- SA, AJ, SW are employed by AstraZeneca and hold shares in AstraZeneca. LM is employed by AstraZeneca.

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