



# Characterizing all-cause mortality among patients with generalized pustular psoriasis in the United States

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This study characterizing all-cause mortality in patients with GPP in the US demonstrated a higher risk of mortality in GPP compared with both the matched PsO and general population cohorts



## AIM

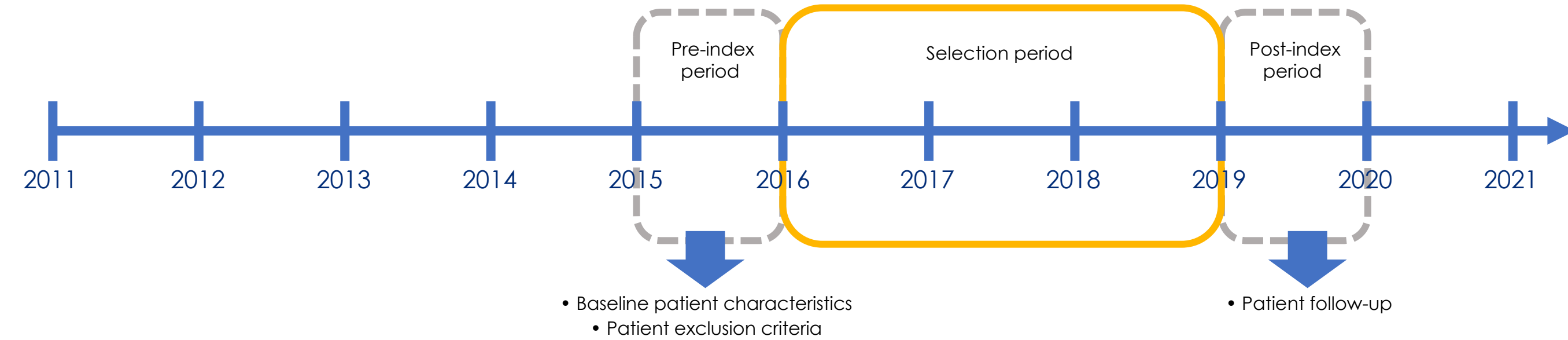
This study aimed to compare all-cause mortality in the US among patients with GPP to matched populations of patients with plaque PsO, and the general population without GPP or plaque PsO

## INTRODUCTION

- GPP is a rare, chronic, neutrophilic skin disease characterized by recurring flares of widespread erythema, edema, coalescing pustules, and possible systemic symptoms
- GPP flares may require hospitalization and can be life-threatening. There are limited data to describe the mortality burden of GPP in the US
- In studies that reported at least 1 death in patients with GPP, mortality rates ranged from 0 to 3.3 deaths per 100 patient years<sup>1</sup>
- Frequently reported causes of mortality in GPP include sepsis, acute respiratory distress syndrome, and heart failure<sup>2,3</sup>

## METHODS

- Inovalon Insights real-world claims data were used to construct 5 cohorts (All GPP, Comorbid GPP + Plaque PsO, GPP Only, Plaque PsO Only, and General Population) based on International Classification of Diseases, 10th Revision codes (in any position) of L40.1 over a 4-year period (1 January 2016 to 31 December 2019)
- The Inovalon Insights database is representative of the insured US population and includes approximately 150 million covered individuals insured with commercial, Medicaid managed care, and Medicare Advantage plans
- GPP Only, Plaque PsO Only, and Comorbid GPP + Plaque PsO were mutually exclusive cohorts. The All GPP group was defined by considering the GPP Only (excluding Plaque PsO) and Comorbid GPP + Plaque PsO cohorts together. The General Population cohort consisted of patients meeting the inclusion criteria without a medical claim for GPP or plaque PsO during the pre- and post-index periods
- All-cause mortality was assessed during 2 periods: a 365-day, post-index diagnosis and a maximum follow-up period for each patient (i.e., until the study period ended or a patient experienced an event)
- Greedy caliper propensity score matching was used to match GPP patients 1:2 to the Plaque PsO Only and General Population cohorts based on index year, age, sex, insurance type, region, and CCI. Risk of all-cause mortality was assessed using Cox proportional hazard models
- The study was compliant with Health Insurance Portability and Accountability Act of 1996 regulations and received institutional review board/ethics approval



## CONCLUSIONS

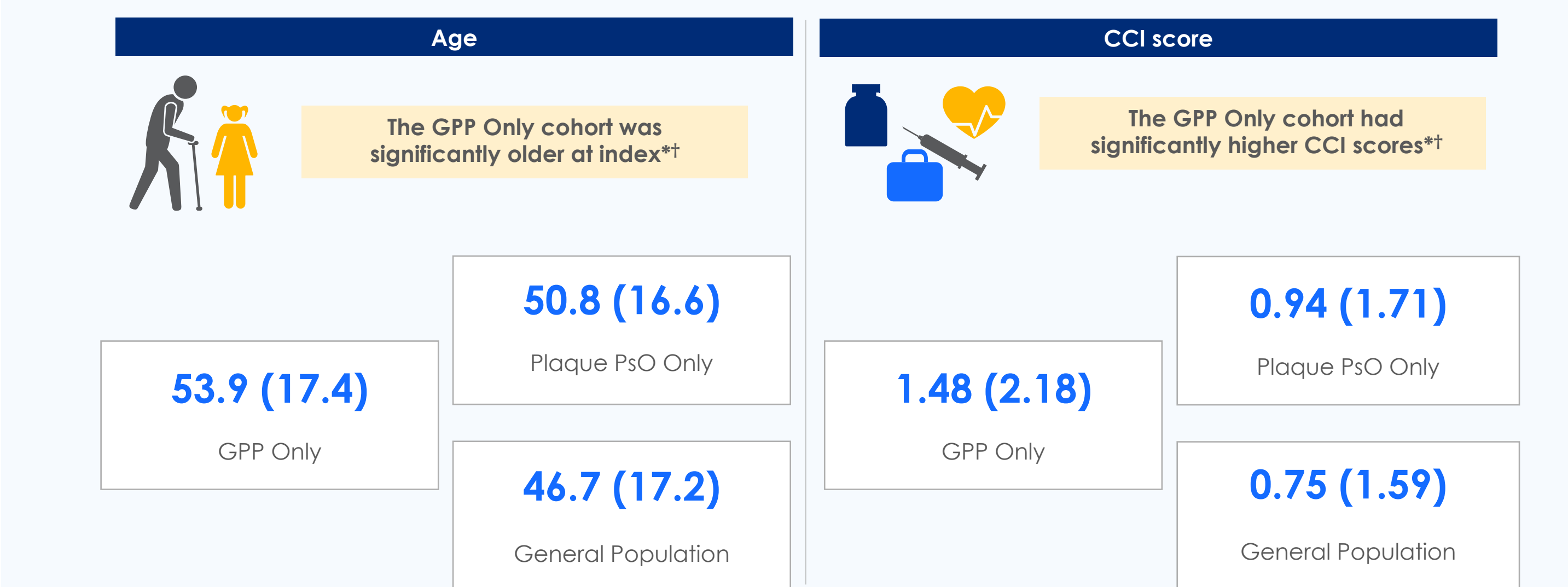
- Compared with the Plaque PsO Only and General Population cohorts, patients in the GPP Only cohort had significantly higher CCI scores at baseline, and after matching had a significantly higher mortality rate when measured with the maximum follow-up even after controlling for various factors (e.g., age, sex, index year, and CCI score)
- These results fill a significant gap in the existing literature and reinforce the need for increased awareness of the mortality burden as well as the comorbidity burden in GPP

## LIMITATIONS

- The causes of mortality were not included in the present study since these data were missing in the database; therefore, it was not possible to determine if mortality was attributable to GPP

## RESULTS

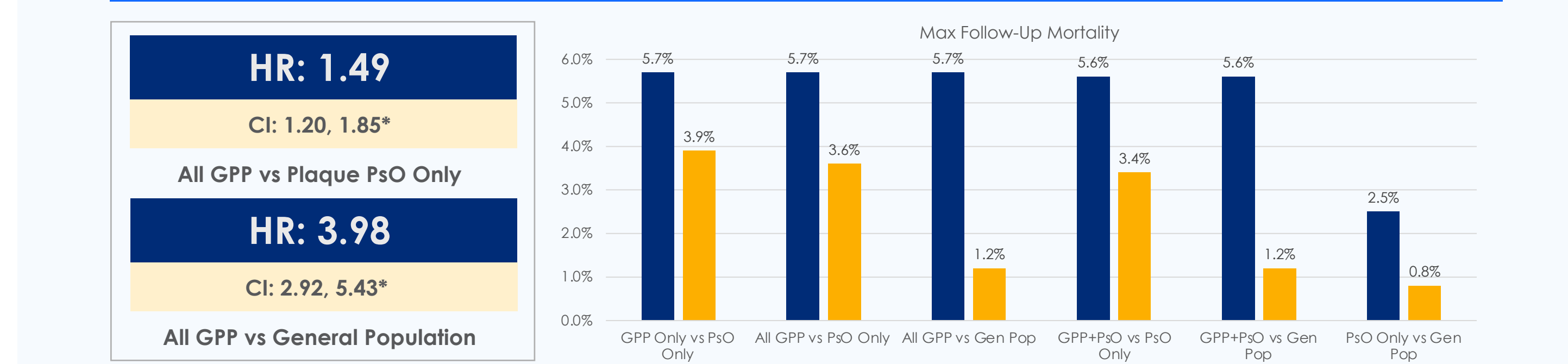
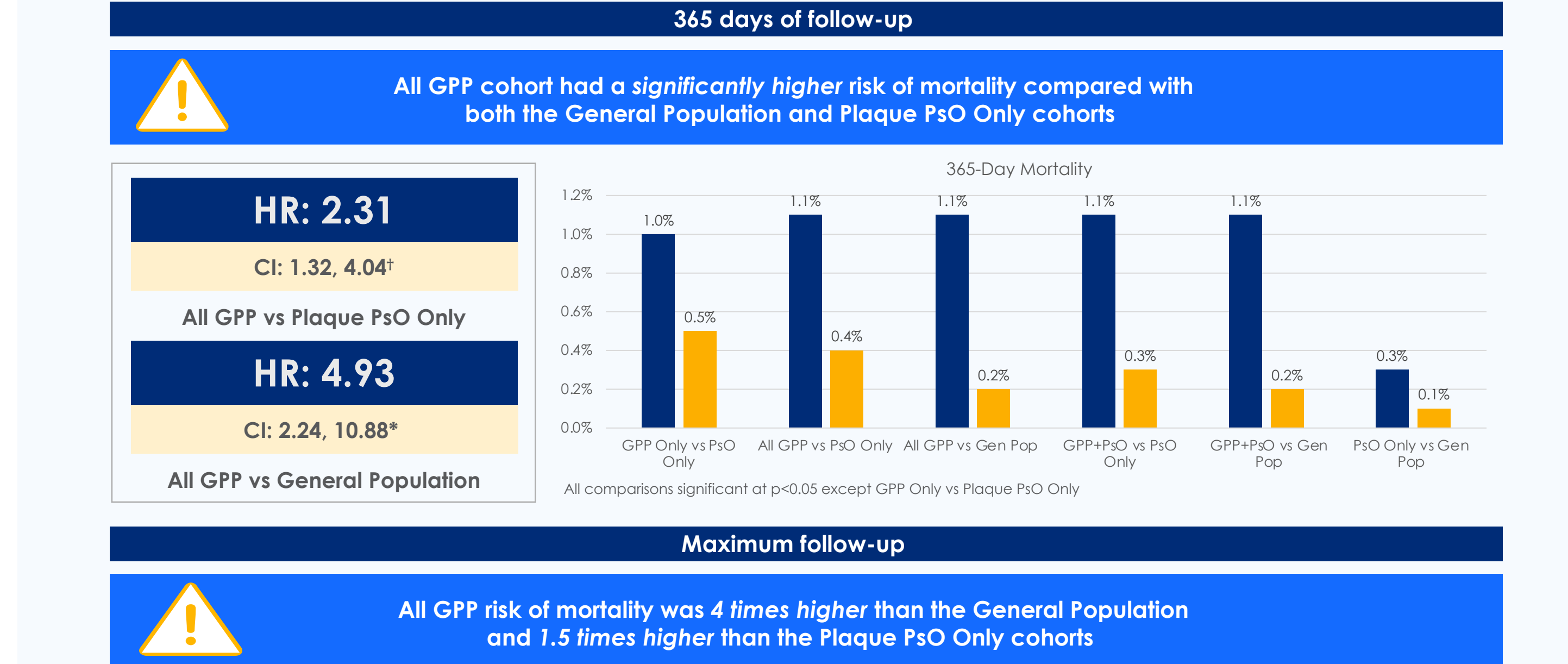
### Cohort demographics



| Variable                     | GPP Only    | Comorbid GPP + Plaque PsO | Plaque PsO Only | General Population | All GPP       |
|------------------------------|-------------|---------------------------|-----------------|--------------------|---------------|
| <b>N</b>                     | 1,246       | 1,384                     | 127,540         | 19,641,441         | 2,630         |
| <b>Index year; n (%)</b>     |             |                           |                 |                    |               |
| 2016                         | 520 (41.7%) | 618 (44.7%)               | 57,234 (44.9%)  | 15,935,507 (81.1%) | 1,138 (43.3%) |
| 2017                         | 259 (20.8%) | 333 (24.1%)               | 30,043 (23.6%)  | 1,288,978 (6.6%)   | 592 (22.5%)   |
| 2018                         | 260 (20.9%) | 233 (16.8%)               | 22,926 (18.0%)  | 656,736 (3.3%)     | 493 (18.7%)   |
| 2019                         | 207 (16.6%) | 200 (14.5%)               | 17,337 (13.6%)  | 1,760,220 (9.0%)   | 407 (15.5%)   |
| <b>Sex; n (%)</b>            |             |                           |                 |                    |               |
| Female                       | 776 (62.3%) | 867 (62.6%)               | 67,548 (53.0%)  | 10,633,411 (54.1%) | 1,643 (62.5%) |
| Male                         | 470 (37.7%) | 517 (37.4%)               | 59,992 (47.0%)  | 9,008,030 (45.9%)  | 987 (37.5%)   |
| <b>Insurance type; n (%)</b> |             |                           |                 |                    |               |
| Commercial                   | 683 (54.8%) | 795 (57.4%)               | 93,308 (73.2%)  | 11,663,868 (59.4%) | 1,478 (56.2%) |
| Medicaid                     | 376 (30.2%) | 430 (31.1%)               | 21,910 (17.2%)  | 5,724,463 (29.1%)  | 806 (30.6%)   |
| Medicare Advantage           | 187 (15.0%) | 159 (11.5%)               | 12,322 (9.7%)   | 2,253,110 (11.5%)  | 346 (13.2%)   |
| <b>Region; n (%)</b>         |             |                           |                 |                    |               |
| Midwest                      | 334 (26.8%) | 337 (24.3%)               | 36,928 (29.0%)  | 4,734,851 (24.1%)  | 671 (25.5%)   |
| Northeast                    | 256 (20.5%) | 279 (20.2%)               | 27,179 (21.3%)  | 3,324,571 (16.9%)  | 535 (20.3%)   |
| South                        | 457 (36.7%) | 533 (38.5%)               | 38,963 (30.5%)  | 6,427,700 (32.7%)  | 990 (37.6%)   |
| West                         | 199 (16.0%) | 235 (17.0%)               | 24,470 (19.2%)  | 5,154,319 (26.2%)  | 434 (16.5%)   |
| <b>Age at index</b>          |             |                           |                 |                    |               |
| Mean (SD)                    | 53.9 (17.4) | 52.9 (16.4)               | 50.8 (16.6)     | 46.7 (17.2)        | 53.3 (16.9)   |
| <b>Age group; n (%)</b>      |             |                           |                 |                    |               |
| 18-24                        | 28 (2.2%)   | 38 (2.7%)                 | 6,923 (5.4%)    | 2,663,752 (13.6%)  | 66 (2.5%)     |
| 25-34                        | 99 (7.9%)   | 115 (8.3%)                | 13,114 (10.3%)  | 2,869,280 (14.6%)  | 214 (8.1%)    |
| 35-44                        | 177 (14.2%) | 226 (16.3%)               | 21,330 (16.7%)  | 3,252,043 (16.6%)  | 403 (15.3%)   |
| 45-54                        | 288 (23.1%) | 326 (23.6%)               | 30,512 (23.9%)  | 3,850,775 (19.6%)  | 614 (23.3%)   |
| 55-64                        | 446 (35.8%) | 464 (33.5%)               | 37,761 (29.6%)  | 4,063,681 (20.7%)  | 910 (34.6%)   |
| 65-74                        | 139 (11.2%) | 166 (12.0%)               | 12,641 (9.9%)   | 1,847,695 (9.4%)   | 305 (11.6%)   |
| 75+                          | 69 (5.5%)   | 49 (3.5%)                 | 5,259 (4.1%)    | 1,094,215 (5.6%)   | 118 (4.5%)    |
| <b>CCI (total)</b>           |             |                           |                 |                    |               |
| Mean (SD)                    | 1.48 (2.18) | 1.53 (2.16)               | 0.94 (1.71)     | 0.75 (1.59)        | 1.51 (2.17)   |

Patients were primarily female and commercially insured. Patients in the GPP Only cohort were significantly older at index with significantly higher CCI scores vs the Plaque PsO Only and General Population cohorts (p<0.001), which highlights the higher severity of GPP

### Mortality risk at 365 days of follow-up and at maximum follow-up



| Comparison Populations                       | HR   | 95% CI      | p-value |
|--|------|-------------|---------|
| <b>365-day follow-up</b>                     |      |             |         |
| All GPP vs General Population                | 4.93 | 2.24, 10.88 | <0.001  |
| All GPP vs Plaque PsO                        | 2.31 | 1.32, 4.04  | 0.004   |
| Comorbid GPP + Plaque PsO vs Plaque PsO Only | 2.67 | 1.15, 6.20  | 0.022   |
| GPP Only vs Plaque PsO Only                  | 1.90 | 0.88, 4.14  | 0.104   |
| <b>Maximum follow-up</b>                     |      |             |         |
| All GPP vs General Population                | 3.98 | 2.92, 5.43  | <0.001  |
| All GPP vs Plaque PsO                        | 1.49 | 1.20, 1.85  | <0.001  |
| Comorbid GPP + Plaque PsO vs Plaque PsO Only | 1.41 | 1.05, 1.90  | 0.023   |
| GPP Only vs Plaque PsO Only                  | 1.49 | 1.10, 2.03  | 0.011   |

- At 365 days of follow-up**
  - The risk of mortality was significantly higher for All GPP vs the General Population (HR 4.93; 95% CI 2.24, 10.88) and the Plaque PsO Only cohort (HR 2.31; 95% CI 1.32, 4.04). The GPP + Plaque PsO cohort had a significantly higher mortality risk than the Plaque PsO Only cohort (HR 2.67; 95% CI 1.15, 6.20)
  - The GPP Only cohort had a numerically higher risk of mortality compared with the Plaque PsO cohort; the higher risk was significant at the later timepoint
- At maximum follow-up**
  - The risk of mortality for the All GPP cohort was almost 4 times higher than the General Population (HR 3.98, 95% CI 2.92, 5.43) and 1.5 times higher than the Plaque PsO Only cohort (HR 1.49; 95% CI 1.20, 1.85)
  - In the GPP + Plaque PsO and GPP Only cohorts, the risk of mortality was almost 1.5 times higher than in the Plaque PsO Only cohort (HR 1.41; 95% CI 1.05, 1.90; HR 1.49; 95% CI 1.10, 2.03, respectively); all comparisons were statistically significant

Abbreviations: CCI, Charlson Comorbidity Index; CI, confidence interval; GPP, generalized pustular psoriasis; HR, hazard ratio; PsO, plaque psoriasis; SD, standard deviation

References: 1. Metz JC, et al. Eur Acad Dermatol Venerol 2023;37:236-273; 2. Choon SE, et al. Int J Dermatol 2014;53:149-154; 3. Wiyatni H, et al. J Am Acad Dermatol 2022;86:1248-1254

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