

Appendix S1.

## SUPPLEMENTARY MATERIALS AND METHODS

### Data

We analysed the Korea National Health Insurance Cohort Data (NHICD), which includes information about approximately 1 million patients. This information was obtained from a random sample stratified according to age, sex, region, health insurance type, income level, and individual total medical costs in 2002. The participants were reassessed and followed until 2013. NHICD includes age, sex, type of insurance, diagnoses according to the International Classification of Disease (ICD-10), medical costs claimed, prescription drugs, and medical history. The Institutional Review Board (IRB) of the Graduate School of Public Health at Yonsei University approved the use of this data and the study design (IRB approval number: 2-1040939-AB-N-01-2014-239).

### Participants

On 31 December 2002, a total of 1,025,340 NHICD participants were selected for the present study. From this initial population, a cohort of subjects younger than 20 years who had been newly diagnosed with AA (ICD-10 code: L63) was chosen for the present analysis, based on the natural history of AA. To improve diagnostic accuracy and reduce the study bias, AA, which was only the main diagnosis of each patient, not any comorbidities observed during outpatient visits to medical specialists, including dermatologists and paediatricians, was included. Because the present study aimed to assess only new cases of AA, subjects with a history of AA from 2002 to 2004 were not included. Furthermore, participants who had been diagnosed with a psychiatric disorder prior to diagnosis of AA or prior to 2004 were also excluded. Then we defined patients with AA, who had been newly diagnosed with AA (ICD-10 code: L63). The control group was defined as participants who had never been diagnosed as AA during the follow-up.

A total of 370,019 participants were enrolled in this study, including 4,707 patients with AA.

### Covariates

Multiple demographic characteristics were assessed, including age, sex, and area of residence. Socioeconomic characteristics, such as income level and type of medical insurance, were also

assessed, and the NHI premium was used as a proxy for measuring exact income, including earnings and capital gains. The income deciles of the NHI members were categorized into the following 4 groups: low (first and second deciles), low–middle (third to fifth deciles), high–middle (sixth to eighth deciles), and high (ninth and tenth deciles).

### Severity of AA

The severity of AA was measured by the affected area of AA or the number of intralesional injection (ILI). For patients with more areas, physicians usually enter a diagnosis code with alopecia totalis (L63.0) or alopecia universalis (L63.1). Thus, we consider that the main illness code for alopecia totalis or alopecia universalis is a proxy for AA severity.

We also consider that the number of invasive treatments is a proxy for AA severity. ILI is one of the standard treatments for AA. If topical steroid does not lead to any improvement, consecutive ILI is strongly suggested. This may also make patients with AA uncomfortable due to substantial pain. When we consider that the participants are all aged under 20 years, this invasive treatment should be used only when AA is not controlled well if ILIs are performed repetitively.

### Outcome measures

The primary outcome measurement was defined as an outpatient visit to a psychiatrist. The evaluated psychiatric disorders included mood disorder (F30–39), neurotic, stress-related and somatization disorder (F40–49), personality disorder and behaviour and emotional disorder (F–60–69, F90–98) occurring in childhood and adolescence.

### Statistical analysis

The demographic characteristics of patients with AA were assessed at baseline. Continuous variables were expressed as means, standard deviations (SDs), or medians and were compared using Student's *t*-tests or Kruskal–Wallis tests. Baseline categorical variables were expressed as numbers and percentages and were compared using a  $\chi^2$  test. In addition, the adjusted hazard ratios (HRs) and 95% confidence intervals (95% CIs) for visits to a psychiatrist were estimated by applying a Cox proportional-hazard regression model. Model fitting was performed using the PHREG command in SAS version 9.3 (SAS Institute Inc.; Cary, NC, USA).