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Looking younger, dying later: General practitioners' intuitive clinical impression predicts mortality

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ABSTRACT

In daily practice, general practitioners (GPs) have to assess the health status of their older patients. One way to do this is to determine how old they look compared to their chronological age, that is, to estimate their apparent age. The objective of this study was to analyse the characteristics associated with this estimate of apparent age and to determine if it is predictive of death in the next 3 years.

This study included 3434 patients from the S.AGES cohort. Patients were classified into 3 categories according to whether they looked their age or older or younger than their age.

Depression was associated with a higher risk of looking older and a lower risk of looking younger. A gradient was observed according to the IADL score: OR 2.43 (1.68–3.52) for IADL scores of 2–3 and OR 5.04 (2.96–8.61) for IADL scores of 0–1, compared with a normal IADL score of 4.

Patients who looked their age or older had a higher risk of death than those who looked younger: hazard ratio (HR) 1.27 (0.93–1.73) and 1.79 (1.16–2.76), respectively ($p = 0.008$).

GPs integrate past medical history and deep knowledge of their patients to ascertain an apparent age for each patient. Its relation to the individual's chronological age was associated with the risk of death during the three-year follow-up. These results support the hypothesis that the apparent age may be considered to be a marker of health status.

1. Introduction

As the population across the globe ages, the number of elderly patients with chronic diseases tends to increase (Parker et al., 2014; Prince et al., 2015). Accurate assessment of these patients' health status is essential for appropriate medical management. It can be difficult, however, for general practitioners (GPs) to assess this health status routinely. The literature contains several tools that can be used for this purpose, including geriatric evaluation scales, health survey questionnaires, and fragility scores; these serve as markers of the risk of subsequent falls, hospitalisation and death (Fried et al., 2001; Rockwood et al., 2005; Campitelli et al., 2016; de Vries et al., 2011; Paulson and Lichtenberg, 2015). Nonetheless these tools are difficult for GPs who manage these older patients on an outpatient basis to use in daily practice because they include dozens of items or require specific clinical testing. Currently, they are used mainly in clinical research or hospital settings. In everyday life, saying that someone looks younger than her age implies that she is in good health, while inversely saying that she looks older implies that her health is less good. Extrapolating these common statements to GPs, we see that this difference between a patient's apparent age and his/her real chronological age expresses a clinical impression. To assess their elderly patients' health status, it is probable that GPs use their clinical impressions, based on their experience and patient knowledge. Specifically, they are likely to assign the patient to one of three categories: looks older or younger than, or the same as, their chronological age. Although GPs have a limited consultation time (Fur, 2009), they follow their patients over time. The assessment of apparent age integrates both biopsychosocial and medical history information.

Our hypothesis is that this classification can be considered a marker of health status: patients who look older are less healthy than those who look their chronological age or even younger, and they are at higher risk of death. Our study thus aimed to analyse among elderly patients consulting in general practice the characteristics associated with the

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classification of their apparent age and to estimate the association between this classification and all-cause mortality over three years of follow-up.

2. Population and methods

The S.AGES (*sujets âgés*, elderly subjects) cohort is a multicentre prospective observational study (Becquemont et al., 2013) aimed mainly at describing the real-life management of non-institutionalized elderly individuals with one of three chronic diseases:

- Chronic pain for more than three months, requiring care ($n = 1379$).
- Type 2 diabetes mellitus treated at inclusion by any hypoglycaemic drug ($n = 983$).
- Atrial fibrillation (defined by ECG or Holter ECG).

All patients were aged 65 years or older at inclusion. An additional inclusion criterion was the ability to understand the goals of the study.

Exclusion criteria were residence in a nursing home at inclusion, inability to be followed up after inclusion (planned move, homeless), participation in another clinical trial, a life-threatening non-cardiovascular disease in the three months before inclusion, or a short life expectancy (less than three months).

Patients were recruited by their GPs throughout France; specifically, all French GPs were asked by letter to volunteer for this study and informed they would be randomised to recruit patients for one of the three S.AGE sub-cohorts. Finally, 760 randomised GPs agreed to participate and began recruiting patients in April 2009; recruitment ended in June 2011. Patients returned to their GP every 6 months (planned follow-up visits) for a three-year period. The study was approved by the relevant Ethics Committee (*Comité de Protection des Personnes Ile de France XI*) and by the French Medicine Agency (*Agence Nationale de Sécurité du Médicament et des produits de santé*). All patients provided written informed consent before participation. Further details about the study have previously been reported[8].

At inclusion, GPs were asked to classify each patient according to his/her apparent age into one of three categories by answering the question: "In your opinion, is this patient's apparent age younger than, the same as, or older than his or her chronological age? In other words, does he or she look younger or older than their real age or the same?" The answer to this question was recorded before any information about medical history, comorbidities, physical examination, or medication was collected.

At the inclusion visit, GPs recorded the following patient characteristics:

- social and demographic: age, gender, educational level, and living environment;
- geriatric characteristics: functional autonomy, assessed by Activities of Daily Living (ADL)(Katz et al., 1963), Instrumental Activities of Daily Living (IADL)(Barberger-Gateau et al., 1993), cognitive status evaluated by the Mini-Mental State Examination (MMSE)(Folstein et al., 1975), mood status evaluated by the Geriatric Depression Scale (GDS)(Marc et al., 2008) and nutritional status, assessed by BMI;
- Smoking, current alcohol consumption;
- Past history of disease and comorbidities;
- Number of medications taken daily.

During follow-up, GPs recorded clinical events including deaths every 6 months.

Some GP characteristics were also collected: gender, age (younger or older than 50 years), length of practice (more or < 20 years), location of practice (rural, semi-rural, or urban), and type of practice (group or solo).

3. Statistical analysis

3.1. Association between apparent age and patient characteristics

For all analyses, mixed logistic models adjusted for age with a random intercept were used to take clustering into account; a cluster is the subgroup formed by a GP (first level) providing care for multiple patients (second level). In a first analysis, we estimated the association between apparent age and all characteristics of GPs and patients. Apparent age, the dependent variable, was split into 2 subvariables: 1) looking younger than chronological age (reference group: looking his/her age), 2) looking older than chronological age (reference group: looking his/her age).

After describing the GPs' and patients' characteristics, we fitted univariate logistic mixed models adjusted for age to assess the association between apparent age and the independent variables. We then fitted several multivariate models: the first model included variables about all social and demographic characteristics, the second included all geriatric characteristics, and the third included medical history, comorbidities, and the most recent number of medications. Variables with $p < 0.05$ in each of these models were entered into the final multivariate model. The results of this analysis are presented as odds ratios with their 95% confidence intervals.

We determined the independent variables associated with looking younger than chronological age first and then those associated with looking older.

3.2. Survival analyses

To assess whether the risk of dying younger was greater among the patients who looked older, we conducted survival analyses with bivariate and multivariate Cox regression models. Apparent age was the main independent variable (in 3 categories: looking older, the same as, or younger than chronological age, which was the reference in this analysis). Adjustment variables were selected from the literature (Lee et al., 2006): chronological age, sex, BMI, autonomy, current smoking, history of heart failure, diabetes mellitus, lung disease and cancer.

The results of this analysis are presented as hazard ratios with their 95% confidence intervals.

The analyses were performed with SAS 9.4.

4. Results

Of the 760 GPs who agreed to participate in the S.AGES study, 624 (82%) were men; 260 GPs participated in the chronic pain subcohort, 213 in the type 2 diabetes subcohort, and 287 in the atrial fibrillation subcohort. Their mean age was 50 ± 7 years and they had been practicing for a mean of 20 ± 8 years. They included 3434 patients (Fig. 1), a mean of 4.5 ± 3.1 per GP: 4.7 ± 3.1 by per male GP and 3.7 ± 2.8 per woman GP ($p < 0.001$).

Apparent age could be determined for 3427 patients, whose characteristics are described in Table 1. Patients with heart failure, those with an IADL score < 4, those with probable or possible depression, and those who were obese tended to look older (Fig. 2). The patients likely to look younger were those with a high educational level (passed school-leaving exam or higher), those with a normal IADL score, those without depression, and those who had no history of vascular disease or chronic hypertension, or who took fewer than 6 drugs daily.

Only two variables, patients' functional ability (IADL score) and depression, were found to be significant in both directions: looking older than chronological age (increased relative risk) and looking younger than chronological age (decreased relative risk). The more dependent the patient, the higher the risk of looking older, with a gradient according to the IADL score: OR 2.43 (95% CI, 1.68–3.52) for an IADL score between 2 and 3, and OR 5.04 (2.96–8.61) for an IADL score < 2, compared with a normal IADL score (score = 4). Patients