Editorial

Young Adults, Cancer, Health Insurance, Socioeconomic Status, and the Patient Protection and Affordable Care Act

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During the last 50 years, the majority of improvements in survival in Americans with cancer have been noted in children and older adults and not in older adolescent and young adult (AYA) patients.[1] When evaluated by 5-year age intervals, the increase in the 5-year relative survival rate in the United States during the 3 decades since 1975 has been lower for all age groups between ages 15 years and 45 years than any of the other groups aged <85 years (Fig. 1 Top).[2,3] Moreover, the AYA deficit has improved less during the second one-half of the 30 years (1989-2003) compared with the first one-half (1975-1988) (Fig. 1 Bottom). The lack of recent progress is particularly evident in those aged 15 years to 25 years, whose survival prolongation has slowed to the point of their being the only group aged <75 years lacking a statistically significant increase in survival (Fig. 1, lowest row of *P* values).

In the United States, the number of deaths due to cancer declined in all age groups during the past decade except in individuals aged 15 years to 29 years and in those 25 years to 29 years it increased.[1] Among those aged 15 years to 39 years, cancer became the most common cause of death due to disease in 1997, accounting since then for 10% of all deaths and 22% of all deaths due to natural causes (excluding accidents, homicides, and suicides).[4]

The reasons for the lack of progress in AYAs has been the subject of national scrutiny since 2005, when the National Cancer Institute and the Lance Armstrong Foundation conducted a Progress Review Group in AYA oncology.[5] A variety of deficits in the AYA age group have been implicated, including clinical trial activity, biospecimens for translational research, the training of medical professionals in AYA oncology, the distinctive array of AYA cancers, and the unique psychosocial and financial challenges faced by AYAs, especially health insurance.

Five years ago, we reported a study of the lag time from the onset of first cancer-specific symptoms or signs to a definitive diagnosis in 270 patients aged 15 years to 29 years at The University of Texas MD Anderson Cancer Center in Houston who were newly diagnosed between June 2001 and June 2003 with 6 common cancer types.[6] On multivariate analysis, insurance status was found to be significantly associated with lag time, whereas race/ethnicity, age, gender, marital status, and surrogate measures of socioeconomic status (SES) were not. The mean lag time was 7 weeks longer in underinsured patients compared with privately insured patients (odds ratio [OR], 1.63; $P < .01$). In all 6 histology-specific cancer types, the mean lag time was found to be longer (between 23 days and 148 days depending on the tumor type) in underinsured patients and in 4 cancer types, the difference was statistically significant. In cancers that were evaluable for stage at diagnosis, an advanced stage of disease was associated with longer lag times. We concluded that inadequate health insurance in AYAs with cancer increases the risk of a delay in diagnosis and advanced disease.

In a study published in this issue of *Cancer* by Smith et al at the University of California at Irvine, the demographics of 7343 incident cases of Hodgkin lymphoma (HL) in the California Cancer Registry that were diagnosed between 1988 and 2006 in patients between the ages of 15 years and 40 years were evaluated for gender, race, birthplace, marital status, SES, and insurance status as potential obstacles to detection at an early stage of disease.[7] On multivariate logistic regression

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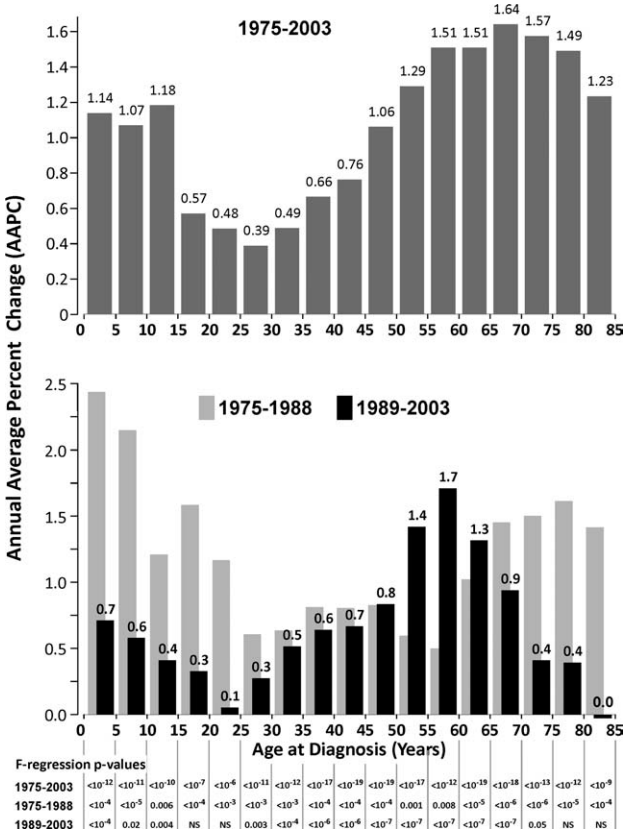

Figure 1. Average annual percentage change (AAPC) in the 5-year relative survival rate from 1975 to 1988 and from 1989 to 2003 is shown by age at diagnosis for all invasive cancers except Kaposi sarcoma and non-Hodgkin lymphoma in males. Data were adapted from the Surveillance, Epidemiology, and End Results (SEER) registries of 17 areas.[2] Kaposi sarcoma and non-Hodgkin lymphoma were excluded in males to avoid the effect these 2 types of cancer had on the incidence of all cancer during the human immunodeficiency virus/acquired immunodeficiency syndrome epidemic in young adult males during the late 1980s and 1990s. The AAPC was determined based on log values of survival rates according to SEER methodology.[3]

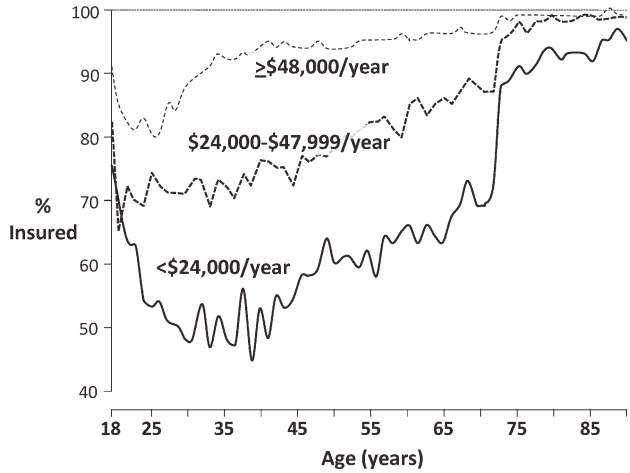

Figure 2. Health insurance in U.S. during 2009 is shown by age and income. Modified from chart of percentage who responded "yes" to Gallop Poll question: Do you have health insurance?[8]

analysis, a significant increase in the odds of having advanced HL was found in males (OR, 1.57; 95% confidence interval [95% CI], 1.42-1.74 [$P < .0001$]), those with a low SES (OR, 1.47; 95% CI, 1.23-1.75 [$P = .0003$]), those who were uninsured (OR, 1.76; 95% CI, 1.34-2.31 [$P < .0001$]), and those with public health insurance (OR, 1.45; 95% CI, 1.23-1.71 [$P < .0001$]). Our study in 15- to 29-year-olds agrees: 12 (67%) of 18 stage III_IV (AJCC 6th Edition) HL patients were uninsured, publicly insured, or male, in comparison to 9 of 24 (38%) stage I - II (AJCC6) patients (Chi square $P = 0.06$). These data and the greater ORs and statistical significance noted with health insurance compared with SES in the study by Smith et al[7] indicate that health insurance status is more predictive of lag time or advanced disease than SES per se.

One question not addressed by Smith et al[7] is whether advanced disease occurred with longer lag times. In our study, the histology-specific types of cancer that could be evaluated for stage of disease at diagnosis each had longer mean lag times in patients with advanced stage disease: HL, 19 days longer (OR, 1.3; $P = NS$); diffuse large cell non-HL, 27 days longer (OR, 1.5; $P = NS$); follicular thyroid carcinoma, 195 days longer (OR, 2.3; $P = NS$); and osteosarcoma, 259 days longer (OR, 3.5; $P < .05$). The question of whether HL progresses from an early to an advanced stage during a delay in diagnosis was not discussed, which is particularly important in patients with HL because symptoms require upstaging. This issue was evaluable among the patients with HL in our study because nearly one-half of them were diagnosed via biopsies of asymptomatic masses. The mean lag time was found to be longer in symptomatic than asymptomatic patients: by 29 days in all 42 patients (OR, 1.55; $P = .10$), by 35 days in patients with stage I to stage II disease, and by 17 days in patients with stage III to stage IV disease. Although not statistically significant, these differences and those of stage-specific lag times described earlier suggest that HL generally does progress to a symptomatic and advanced stage during the time when early detection is currently feasible.

In the United States, the percentage of young adults who have health insurance drops dramatically after the age of 18 years regardless of income (Fig. 2),[8] such that young adult Americans have less insurance and access to health care services than in any other

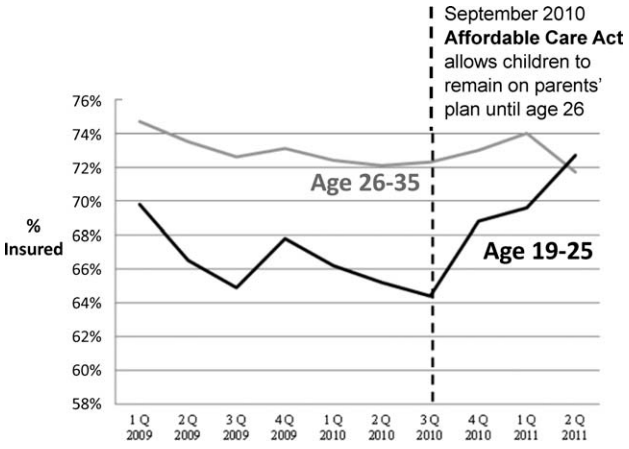

Figure 3. Percentage of young adults with health insurance between 2009 and 2011 is shown by quarter (Q) and age group. Modified from Sommers BD, Schwartz K. 2.5 Million Young Adults Gain Health Insurance Due to the Affordable Care Act. http://aspe.hhs.gov/health/reports/2011/YoungAdultsACA/ib.shtml. Accessed February 20, 2012.[9]

socioeconomically advantaged country. The Patient Protection and Affordable Care Act of 2010 is beginning to change this record low coverage. As mentioned by Smith et al, the Act has enabled 2.5 million more individuals between the ages of 19 years and 25 years to have health insurance during the first 15 months after its passage on September 23, 2010: from 64% covered by their parents' policies to 73% within 9 months (Fig. 3) compared with the number of young adults who would have been insured without the law.[9]

Extrapolating from population trends and from cancer incidence trends in Surveillance, Epidemiology, and End Results (SEER) registries during 2000 through 2008 among those aged 19 years to 25 years by individual years of age and calendar years,[2] we estimate that at least 4150 of the 2.5 million newly insured young adults can be expected to be diagnosed with cancer before 2018, when all of them will have reached their 26th birthday and "age out" of the current extended coverage provided by the Patient Protection and Affordable Care Act. Given that the increase in the number of newly insured young adults is still escalating (Fig. 3),[9] in the near future, considerably more persons aged 19 years to 25 years can be expected to be diagnosed annually with cancer while insured than would have been without the extended coverage provided by the Act. Whether their lag times will be shortened and their prognosis improved or less therapy will be required to achieve comparable survival remains to, and should be, determined. Because the United States is the only socioeconomically advanced country in the world that does not provide health insurance to all of its citizens, the outcomes of AYAs with cancer in the United States should be compared with those in other countries to assess the degree to which a lack of health insurance accounts for the AYA gap. An unpublished comparison of the United States versus Australia is consistent with health insurance being a major partial factor (data from the Australian Institute of Health and Welfare provided by C. Stevenson and J. Denholm in March 2006). Meanwhile, the surviving patients analyzed in our study are now at least 8 years beyond their original cancer diagnosis. Their long-term survival duration and mortality rate relative to lag time and insurance status can now be evaluated.

Why males are more likely to present with advanced HL is harder to understand. More males than females are employed from the ages of 25 years to 44 years, even during the current economic recession,[10] and theoretically they have more access to health insurance via their employers. Our study did not demonstrate a gender difference in lag times, either overall[6] or among patients with HL per se. As pointed out by Smith et al,[7] underuse of screening services by males, even those with health insurance, could be contributing to the gender disparity. Biologic differences between males and females and their cancers also may be contributing to the difference, as suggested by the finding that 3 of every 4 of the nongenitourinary cancers diagnosed in males aged 15 years to 39 years have a higher incidence in males compared with females.[2] However, males also have a worse survival than females for 19 of 21 cancers for which a comparison of survival by gender is feasible,[11] an outcome difference that suggests that male psychosocial traits are more likely to explain their predisposition toward advanced cancer.

What happens after diagnosis of cancer with respect to further delays in staging and treatment initiation may also depend on insurance status. The colleagues of Smith et al at the University of California at Irvine have also shown that the survival of AYAs diagnosed with leukemia in California is influenced by SES.[12] A lack of insurance coverage is associated with less expenditure on medical evaluation and treatment among patients with cancer, suggesting that cancer patients lacking health insurance are more likely to receive less care for financial reasons.[13] In the United States, the degree to which standardized guidelines for cancer treatment are followed depends on the quality of health insurance.[14] Among AYAs with cancer, entry onto a clinical trial has also been shown to be influenced by health insurance coverage.[15]

Smith et al state that survival rates among AYAs with HL "continue to decline."[7] However, SEER data do not support their conclusion. HL is 1 of 8 cancers (of the

21 most common malignancies in AYAs evaluable for survival trend) that have experienced a statistically significant improvement in their 5-year survival rate during the past 20 years.[11] However, HL was ranked seventh of these 8 among those aged 15 years to 39 years, with an annual average percentage increase of only 0.35% from 1985 to 2002.[11] The lesson that the study from Smith et al[7] demonstrates about HL nonetheless can be generalized to most of the cancers occurring in patients within that age group, the majority of which have had no evidence of a survival increase since at least 1985.[11]

We believe the lack of health insurance in young adults in the United States explains much of the delay in the diagnosis of, and more advanced cancer in, young adults and their relative lack of progress in survival prolongation and mortality reduction. Other diseases are likely to be similarly affected. Solutions such as the Patient Protection and Affordable Care Act are needed to improve the health insurance coverage of young people in the United States, particularly those who are intrinsically most vulnerable to delays in the diagnosis of cancer and who have the potential of more patient-years of productive life saved than in any cancer per se except breast cancer[11] and the greatest number of productive life-years. A logical conclusion for future consideration is to raise the upper limit of the age range to as high as our political process allows. Given that young adults are much less expensive to insure than older and elderly adults, the cost-benefit ratio could simultaneously improve their health and productivity and help reduce our national debt.

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