Routine Preventive Care and Cancer Surveillance in Long-Term Survivors (LTS) of Colorectal Cancer: Results from NSABP Protocol LTS-01

Presenter: Hiroko Kunitake, MD
Presenter’s Affiliation: David Geffen School of Medicine at UCLA
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Background
- Over 11 million cancer survivors currently reside in the United States, and this number is estimated to continue to rise at a rate of approximately 3% each year.
  - Among these is a growing population of long-term survivors of colorectal cancer, representing about 10% total cancer survivors living in the US.
- Cancer survivors may be at increased risk for cardiovascular disease, obesity, osteoporosis, and general functional decline when compared to the general population.
- Cancer survivors require attentive medical care after completing cancer treatment, and their comprehensive care should include assessment for recurrent cancer, monitoring for late effects of treatment, and screening for second malignant diseases in addition to general preventive care and care for any chronic medical conditions.
- Despite these important needs, little is known about routine preventive care, cancer screening, and cancer surveillance received by long-term cancer survivors.
- Much current information comes from cancer registry data regarding cancer survivorship. Although a valuable resource, cancer registries may offer relatively little specific information regarding individual survivors, including treatments received, centers of treatment delivery, and co-morbidities. Additionally, use of a cancer registry-based survivor population may result in a study group with extremely varied background with regard to cancer treatments, making definitive conclusions difficult to draw.
- The use of a study cohort drawn from a cancer clinical trial is appealing as it allows investigators to analyze a survivor population about which a great deal of information is known, and which may be somewhat more homogenous than one drawn from a registry population.
- The National Surgical Adjuvant Breast and Bowel Long Term Survivor Project (NSABP-LTS), described here, was designed with these issues in mind, with the objective of understanding use of preventive care, cancer screening, and cancer surveillance by long term survivors of colorectal cancer treated on clinical trials.

Materials and Methods
- The NSABP-LTS trial recruited long-term survivors from five different NSABP adjuvant therapy for colorectal cancer trials.
  - Colon cancer trials included NSABP C-05, C-06, and C-07
  - Rectal cancer trials included NSABP R-02 and R-03
- Aims of NSABP-LTS included assessment of:
  - Quality of Life
  - Functional outcomes
  - Clinical symptoms
  - Health behaviors, including:
    - Routine preventive care, compared with the non-cancer general population
    - Cancer screening, compared with the non-cancer general population
Cancer surveillance.
- Patients were recruited from 60 NSABP study sites across the US.
  - All were 5 year survivors who participated in one of the 5 designated NSABP studies, treated over a 15 year period.
  - All received a computer assisted telephone interview following agreement to participate in the NSABP-LTS study.
- Interviews were conducted between 2007 and 2009.
- A control non-cancer cohort was selected from the National Health Interview Survey (NHIS) 2005 in a 3:1 case-matched manner, with controls matched to survivors based on age, gender, race, and education.
- The NHIS was selected as a resource for the control population as this study included information on use of cancer screening resources.
- Analysis was carried out in a three-part manner:
  - Routine preventive care information for both LTS-01 and NHIS participants was based on questions regarding usual source of care, ER visits, and receipt of influenza vaccination.
  - Cancer screening utilization by both LTS-01 and NHIS participants was based on use of mammography, pap smear, and PSA test.
  - Cancer surveillance information of LTS-01 patients only was based on use of colonoscopy, CEA test, and CT scan.
  - Comparison of the two populations was performed using the Fisher’s exact test, and use of various healthcare modalities examined using logistic regression models.

Results
- Based on the five designated NSABP trials, 2408 potential long-term survivors were identified.
- Of these, 976 were contacted, 744 expressed interest in participation, and 708 completed the telephone interview process.
- These included 24% of eligible patients enrolled on C-05, 30% of those enrolled on C-06, 36% of those enrolled on C-07, 10% of those enrolled on R-02, and 21% of those enrolled on R-03.
- Demographic information was very similar between the study group (n = 708), and the case matched group (n = 2124).
  - 57.1% of patients in both groups were male.
  - Age was less than 50 years in 7.3% of cases, 50-59 years in 19.8%, 60-69 in 32.1%, and > 70 in 40.8%.
  - 2.7% of patients in both groups were African-American, and 97.3 were of other races. The percent of Hispanic patients was 3.8% in the LTS group versus 10.2% in the control group.
  - Significant differences existed in education, marital status, and insurance status between the two groups:
    - LTS individuals were significantly more likely to have graduated from high school than were matched NHIS individuals (53.5 vs. 38.7%, p < 0.0001), although the percent attending college was similar between the two groups (21.8% versus 22%, respectively).
    - LTS individuals were also more likely to be married (75.9% vs. 54.6%, p < 0.0001).
    - LTS individuals were more likely to have health insurance (99.0% vs. 93.3%, p < 0.0001), and to have private insurance (76.1% vs. 66.5%, p < 0.0001).
  - The number of comorbidities did not differ significantly between the two groups.
  - Health behaviors were significantly different between the two groups:
    - LTS individuals were more likely to report having a usual source of medical care (97.7% vs. 93.8%, p < 0.0001), and were also more likely to have received a flu shot in the past 12 months (67.5% vs. 44.3%, p < 0.0001).
  - Factors associated with having received a flu shot included having health insurance and diabetes significantly increased the likelihood of individuals reporting having a usual source of care.
  - On logistic regression analysis, having health insurance and diabetes significantly increased the likelihood of individuals reporting having a usual source of care.
- The groups were equally likely to report 0, 1, or 2 ER visits within the past 12 months (p = 0.1619).
- When cancer screening was examined, LTS individuals were significantly more likely to have undergone pap testing, mammography, and PSA testing in the last 12 months than were individuals in the control group (67.3% vs. 54.8%, 84.4% vs. 70.7%, 84.5% vs. 74.5%, respectively, p < 0.0001 for all comparisons).
- Health insurance was strongly associated with receipt of both pap testing and PSA testing.
- When cancer surveillance was examined, 96.5% of LTS individuals had undergone colonoscopy in the last 5 years, 88%
CEA testing, and 66.4% CT scanning; however, only 74.1% in the control had undergone colonoscopy in the last 2 years, 71.8% CEA testing, and 43.9% CT scanning.

- Surveillance by colonoscopy remained stable with length of survivorship; however, CEA testing and CT scanning rates declined with time since cancer diagnosis.

**Author's Conclusions**
- The authors conclude that LTS-01 patients were more likely to have a usual source of care, receive flu shots, and undergo cancer screening than were NHIS controls.
- In addition, they conclude that rates of surveillance for cancer recurrence are high within this population.

**Clinical/Scientific Implications**
- This study is an extremely interesting addition to the survivorship literature, being one of the first to examine care of survivors receiving cancer treatment as part of clinical trials.
- Although improved outcomes for children with cancer treated on clinical trials, as opposed to those treated off-trial, have been demonstrated (Meadows, 1983; Kramer, 1984), the same results have not been confirmed in adult cancer patients (Peppercorn, 2004).
- Having said this, the data presented here stand in contrast to those previously published examining care of a SEER-based population of colorectal survivors and demonstrating inferior receipt of preventive care and cancer screening compared to a non-cancer control population (Snyder, ASCO 2007). This indicates that patients enrolled on clinical trials may receive better care as survivors than those treated outside of trials. Reasons for this may be multifold, and include increased survivor motivation, goals for follow-up outlined in trials themselves, and care at comprehensive cancer centers where attention to survivor care may be increased. Only 3% of cancer patients are enrolled on clinical trials, and this population may not be representative of the cancer survivor population as a whole.
- Still, it is important to notice that even among a highly motivated group of survivors examined in this study, almost a third did not report receiving influenza vaccine over the past 12 months. This finding indicates that room for improvement certainly remains.
- As the body of survivorship research continues to grow, we will hopefully achieve better understanding of which factors may place survivors at increase risk for inadequate care. Based on the authors’ findings, we may begin to consider survivors treated on large clinical trials possibly at decreased risk; however, all survivors must remain on the radars of clinicians as patients who require and deserve attentive care, and may be subject to not receiving it.

See [Patient Summary](#)