Preventive Medicine Reports 10 (2018) 176–183

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: www.elsevier.com/locate/pmedr

High rates of cancer screening among dialysis patients seen in primary care a cohort study

Bjorg Thorsteinsdottir[a,e,*], LaTonya J. Hickson[b,e], Priya Ramar[c,e], Megan Reinalda[d,e], Nicholas W. Krueger[c,g], Cynthia S. Crowson[d,e], Andrew D. Rule[b,e], Paul Y. Takahashi[a], Rajeev Chaudhry[a], Sidna M. Tulledge-Scheitel[a], Jon C. Tilburt[f], Amy W. Williams[b], Robert C. Albright[b], Sarah K. Meier[c], Nilay D. Shah[c,e]

[a] Division of Primary Care Internal Medicine, Department of Medicine, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[b] Division of Nephrology and Hypertension, Department of Medicine, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[c] Division of Health Care Policy & Research, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[d] Division of Biomedical Statistics and Informatics, Department of Health Sciences Research, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[e] Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[f] Division of General Internal Medicine, Department of Medicine, Mayo Clinic, 200 First Street SW, Rochester, MN, USA
[g] Carnrite Group, 10330-DD Lake Rd, Houston, TX 77070, USA

ARTICLE INFO

Keywords:
Breast cancer screening
Cervical cancer screening
Colon cancer screening
Dialysis
ESRD
Preventive screening
Prostate cancer screening

ABSTRACT

Routine preventive cancer screening is not recommended for patients with end-stage renal disease (ESRD)[1] due to their limited life expectancy. The current extent of cancer screening in this population is unknown. Primary care (PC) reminder systems or performance incentives may encourage indiscriminate cancer screening. We compared rates of cancer screening in patients with ESRD, with and without PC visits. This is a retrospective cohort study using United States Renal Data System (USRDS) billing data and electronic medical record data. Patients aged ≥18 years starting dialysis from 2001 to 2008, Midwest regional dialysis network were categorized with or without a PC visit (defined as an office visit in family practice, internal medicine, pediatrics, geriatrics or preventive medicine during the first two years of dialysis). Cancer screening was based on Current Procedural Terminology codes in USRDS. We identified 2512 incident dialysis patients (60% men, median age 65y). Cancer screening rates were more frequent among those seen in PC: 38% vs 19% ($P = 0.0002$), for breast; 18% vs 10% ($P = 0.047$) for cervical; 13% versus 8% ($P = 0.024$) for prostate; and 18% vs 9% ($P = 0.0002$) for colon cancer. Multivariable analyses found that those with PC were more likely to be screened after adjusting for age, sex, and comorbidities.

In our practice, cancer screening rates among chronic dialysis patients are lower than those previously reported for our general population (64% for breast cancer). However, a sizeable proportion of our ESRD population does receive cancer screening, especially those still seen in primary care.

1. Introduction

Cancer screening rates are some of the most commonly used performance measures in health care, both for pay-for-performance models and for public reporting (2014; Song et al., 2014). As a result, primary care clinicians and practices have incorporated cancer screening as a key component of care with the goal of achieving the highest rates possible. Routine cancer screening may provide little benefit to individuals with limited life expectancy (Royce et al., 2014; Walter and Covinsky, 2001). Patients with end-stage renal disease (ESRD) on hemodialysis (HD) form a high-risk group with average survival of < 10 years for patients over 40 years old (2006). Therefore, unless they are transplant candidates, preventive cancer screening is not recommended for dialysis patients (Holley, 2007, 2013). Recently, the American

* Corresponding author at: Mayo Clinic, 200 First Street SW, Rochester, MN 55905, USA.
E-mail addresses: thorsteinsdottir.bjorg@mayo.edu (B. Thorsteinsdottir), hickson.latonya@mayo.edu (L.J. Hickson), ramar.priya@mayo.edu (P. Ramar), reinalda@mayo.edu (M. Reinalda), nkrueger@carnritegroup.com (N.W. Krueger), crowson@mayo.edu (C.S. Crowson), rule.andrew@mayo.edu (A.D. Rule), takahashi.paul@mayo.edu (P.Y. Takahashi), chaudhry.rajeev@mayo.edu (R. Chaudhry), tulledgescheitel.sidna@mayo.edu (S.M. Tulledge-Scheitel), tilburt.jon@mayo.edu (J.C. Tilburt), williams.amy@mayo.edu (A.W. Williams), albright.robert@mayo.edu (R.C. Albright), smeier@rti.org (S.K. Meier), shah.nilay@mayo.edu (N.D. Shah).
[1] Notable abbreviations: primary care (PC), End Stage Renal Disease (ESRD), United States Renal Data System (USRDS).

https://doi.org/10.1016/j.pmedr.2018.03.006
Received 28 June 2017; Received in revised form 9 February 2018; Accepted 9 March 2018
Available online 14 March 2018

Society of Nephrology (ASN) highlighted the importance of this topic as one of the five *Choosing Wisely* recommendations (Williams et al., 2012). In addition to potential patient harms, cancer screening has been shown unproductive for ESRD patients, with only 5 days of net gain in life expectancy (Chertow et al., 1996). Two recent papers (Royce et al., 2014; Tran et al., 2014) have highlighted the high rates of cancer screening in patients with limited life expectancy (Royce et al., 2014) and the risks associated with such screening (Tran et al., 2014). However, little is known about ESRD patients' utilization of preventive services and the appropriateness thereof. It is also not known whether the increased emphasis on preventive services performance measurement over the past decade has impacted screening rates.

Dialysis patients have a high comorbidity and treatment burden. Due to frequent interactions with health care providers, they may be more affected by systems that promote screening and preventive services. Such interventions may be more often implemented by primary care practices than by nephrology (or other specialty) care practices that manage patients with ESRD. The objective of this study was to examine the patterns of routine cancer screening in chronic dialysis patients to assess whether rates of services differ between patients with versus without a primary care visit during the first two years of dialysis.

2. Methods

2.1. Cohort data sources and exposure

The institution reported on in this study includes eight community-based outpatient HD facilities and a Midwestern tertiary care center, covering 8 dialysis units and a population of 395.000 as previously described (Hickson et al., 2015; Schoonover et al., 2013; Thorsteinsdottir et al., 2017). Adult (age > 18 y) patients initiating dialysis within this network between January 1, 2001 and December 31, 2010, as determined by an institutional administrative database, were linked with the United States Renal Data System (USRDS) data to create a local cohort of USRDS patients as previously described (Thorsteinsdottir et al., 2017; Thorsteinsdottir and US Renal Data). Patients were matched using name, social security number, date of birth, and date of death. ESRD patients under age 65 become eligible for Medicare coverage after 3 months of in-center HD. To ensure we had the most complete records possible we excluded patients with < 90 days of follow-up and patients for whom Medicare was not the primary payer. For any ESRD patient covered by a group health insurance plan, Medicare is the secondary payer for up to 33 months of ESRD services. Patients who had less than $675 per month in outpatient dialysis claims were considered to have Medicare as a secondary payer as recommended in the USRDS researcher's guide (United States Renal Data System, 2013b).The cohort was truncated at 2008 to allow for 2 years of follow-up for every patient. The local Institutional Review Board and USRDS approved this study. The group was divided into those that had been seen by primary care clinicians and those who had not. Primary care office visits were defined as any claims in the USRDS database for visits with Family Practice, Internal Medicine, Pediatrics, Geriatrics and Preventive Medicine, and/or visits allocated to the following provider types: General Practice, Family Practice, Internal Medicine, Pediatric Medicine, Geriatric Medicine and Preventive Medicine.

2.2. Hypothesis

Our primary hypothesis was that seeing primary care clinicians, would result in increased use of preventive services.

2.3. Outcomes and follow up

As the primary outcome, rate of screenings for each cancer type was calculated during the first 2 years of dialysis to allow for capture of more services than are recommended on an annual basis. Preventive breast, cervical, colon, and prostate cancer screening services were identified by USRDS claims data using Medicare codes (Table 1). Breast cancer screening was defined by any mammography claims; cervical cancer screening by any pap-smear claims; colon cancer screening was defined by any claims for fecal occult blood, flexible sigmoidoscopy, CT colonography or colonoscopy; and prostate cancer screening by prostate-specific antigen (PSA) testing and digital rectal exam claims. Because colon or cervical cancer screenings are typically repeated > 2 years apart, a separate analysis over the first 5 years of dialysis as opposed to 2 was conducted.

Table 1
Codes used to identify screening tests.
(Thorsteinsdottir and US Renal Data)

Screening	Healthcare Common Procedure Coding System (HCPCS) codes used
Breast	Mammography: G0204, G0206, G0202, 76090, 76091, 76092, 77051, 77052, 77055, 77056, 77057
Cervical	Screening Pap Tests: G0123, G0143, G0144, G0145, G0147, G0148, P3000, Q0060, Q0061, Q0063 Physician Interpretation of Screening Pap Tests: G0124, G0141, P3001 Laboratory Specimen of Screening Pap Tests: Q0091
Colon	Colorectal cancer screening: G0104, G0105, G0106, G0107, G0120, G0121, G0122, G0328, 099PT, 3017F, 82270, 82271, 82272, 82273, 82274
Prostate	Screening PSA test: G0103 Digital Rectal Exam: G0102 S0605 45990

2.4. Covariates

Baseline demographics and cause of ESRD, and comorbidities were collected from the USRDS Standard Analytic Files including Centers for Medicare & Medicaid Services CMS-2728 form (ESRD Medical Evidence Report Medicare Entitlement and/or Patient Registration), and institutional electronic medical records. Comorbid conditions were identified and scored according to the Charlson Comorbidity Index using the first 90 days of claims data, the CMS-2728 form, and supplemented by an automated electronic search strategy to extract Charlson comorbidities from the electronic medical records (Singh et al., 2012). Primary cause of ESRD was divided into diabetic and non-diabetic renal disease, as ESRD patients with diabetes have a poorer survival (2014). Candidates for transplant were determined from the CMS-2728 form and from an institutional transplant database.

Patients qualified for screenings were defined as per U.S. Preventive Services Task Force (USPSTF) as: breast cancer screening for women ages 40–75 years (U.S. Preventive Services Task Force, 2002a; US Preventive Services Task Force, 2009), cervical cancer screening for women age 18–65 years (U.S. Preventive Services Task Force, 2003), PSA screening for men ages 50–75 years (U.S. Preventive Services Task Force, 2002c, 2008b), and colon cancer screening for men and women ages 50–75 years (U.S. Preventive Services Task Force, 2002b, 2008a). We used the 2008–2009 recommendations to inform the upper limit of the recommended screening age of 75 years for breast and colon cancer, as the dialogue about the questionable benefit of cancer screening in the elderly started well before the recommendations formally changed in 2008–2009 (Briss et al., 2004; Walter and Covinsky, 2001). The value of prostate cancer screening in general was questioned in 2002 and 2008, especially in men over age 75 years (U.S. Preventive Services Task Force, 2002c, 2008b). The 2003 recommendation for cervical cancer screening already recommended against screening women over age 65 years (U.S. Preventive Services Task Force, 2003). The reminder systems built into our system's primary care practices from 2003 onwards also used 75 as an upper age limit for screening reminders for breast, colon, and prostate cancer and 65 for cervical cancer.