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Breast Cancer among Women Living in Poverty: Better Care in Canada than in the United States

Kevin M. Gorey, Nancy L. Richter, Isaac N. Luginaah, Caroline Hamm, Eric J. Holowaty, Guangyong Zou, and Madham K. Balagurusamy

This historical study estimated the protective effects of a universally accessible, single-payer health care system versus a multipayer system that leaves many uninsured or underinsured by comparing breast cancer care of women living in high-poverty neighborhoods in Ontario and California between 1996 and 2011. Women in Canada experienced better care, particularly as compared with women who were inadequately insured in the United States. Women in Canada were diagnosed earlier (rate ratio [RR] = 1.12) and enjoyed better access to breast conserving surgery (RR = 1.48), radiation (RR = 1.60), and hormone therapies (RR = 1.78). Women living in high-poverty Canadian neighborhoods even experienced shorter waits for surgery (RR = 0.58) and radiation therapy (RR = 0.44) than did such women in the United States. Consequently, women in Canada were much more likely to survive longer. Regression analyses indicated that health insurance could explain most of the better care and better outcomes in Canada. Over this study's 15-year time frame 31,500 late diagnoses, 94,500 suboptimum treatment plans, and 103,500 early deaths were estimated in high-poverty U.S. neighborhoods due to relatively inadequate health insurance coverage. Implications for social work practice, including advocacy for future reforms of U.S. health care, are discussed.

KEY WORDS: *breast cancer; health care reform; health insurance; Patient Protection and Affordable Care Act; poverty; single-payer system*

The population of people who live in poverty in the United States rose markedly from 37.5 to 46.2 million between 2007 and 2011. During this period, which has come to be known as the Great Recession, the population of people in the United States who were uninsured also increased significantly, to more than 50 million (DeNavas-Walt, Proctor, & Smith, 2012). Including people who were underinsured, those with health insurance but without the financial means of absorbing typically uncovered costs of care, doubled the estimated inadequately insured population to 100 million (Kaiser Family Foundation, 2012; Schapmire, Head, & Faul, 2012). Along with presidential advocacy, this group probably represented a social force that could no longer be ignored and long-awaited reform of U.S. health care, the Patient Protection and Affordable Care Act (ACA) became law in 2010. Commonly called Obamacare, it is bound to make health care accessible for tens of millions more Americans (Congressional Budget Office [CBO], 2012). However, the same report estimated that it could leave as many as 25 million people uninsured or underinsured.

Canada is of particular comparative social policy interest. Its poverty prevalence of approximately 10% did not increase significantly during the Great Recession (Murphy, Zhang, & Dionne, 2012), and its entire population is insured for medically necessary care by a single, public payer. Universal health care is a strong element of Canada's social safety net that, relative to the United States', seems to have provided better protection during a time of economic decline. The National Association of Social Workers (2009) and regional social work associations in coalition with others (for example, Healthcare-Now, 2014) have long advocated for single-payer reform. Although most celebrated the passage of the ACA, their advocacy on behalf of uninsured and underinsured people continues. Advocates, adversaries, scholars, and policymakers wonder the following: How much of an improvement is the ACA likely to make on key health care indicators? And how much more improvement might be realized if single-payer reform were enacted in the United States? Definitive answers will necessitate prospective investigations. In the meantime historical

investigations can advance useful knowledge. This study aims to advance such knowledge by examining evidence on one sentinel indicator among key informative populations during an instructive period: breast cancer care among women who lived in high-poverty U.S. or Canadian neighborhoods during the years immediately prior to ACA's passage.

LITERATURE REVIEW

High-Poverty Neighborhoods in the United States and Canada

Four of every 100 U.S. residents live in high-poverty neighborhoods. These places, where 30% to 40% or more of the people have very low incomes, have been described as places of prevalent demographic vulnerability (Jargowsky, 2005; Wilson, 2012). In addition to people with inadequate incomes, such neighborhoods have high concentrations of people of color, people who are unemployed or who have withdrawn from the labor market, part-time service workers, recipients of social assistance, and people who are homeless. Such places seem particularly distressed for their lack of social and economic capital (Kawachi, 1999). Adequate health insurance, itself a type of social and economic capital, has been observed to be profoundly lacking among people who live in high-poverty U.S. neighborhoods, especially among those who may need it most, such as people with illnesses that require costly care. For example, people with cancer in high-poverty California neighborhoods were recently observed to be nearly two times as likely to be uninsured, up to 12 times as likely to be insured by Medicaid, but only half as likely to have private health insurance as were their counterparts in relatively low-poverty neighborhoods. Of most policy interest was the fact that better treatment access and outcomes observed among residents of more affluent neighborhoods were largely explained by the intermediate effect of their having adequate health insurance, that is, private or Medicare coverage (Gorey et al., 2012, 2013).

There seems to be less descriptive information about high-poverty neighborhoods in Canada. This is perhaps not surprising as such neighborhoods are less prevalent in Canada (Broadway, 1989; W. Chen, Myles, & Picot, 2012). Still, they do exist. In fact, two of every 100 Ontarians live in such high-poverty neighborhoods where 40% or more of the people spend two-thirds or more of their income on life's necessities (Gorey, 1998; Statistics

Canada, 2002). A seemingly small estimate—half that of the United States—it represents a very sizable population of more than half a million Canadians. Though the health risks, including cancer risks that Canadians are exposed to, are quite similar to those that their counterparts in the United States experience (Gorey, Holowaty, Laukkanen, Fehringer, & Richter, 1998; Krieger et al., 2002; Lemstra, Neudorf, & Opondo, 2006; Mustard, Derksen, Berthelot, & Wolfson, 1999), Canadians living in high-poverty neighborhoods seem to have one distinct advantage. They enjoy access to Canada's single-payer health care system. Consequently, such between-country comparisons on cancer care in high-poverty neighborhoods are likely to reveal the relative risks of being uninsured or underinsured in the United States.

Breast Cancer Care in High-Poverty U.S. and Canadian Neighborhoods

Breast cancer care seems a very useful sentinel indicator of health care performance. The most common type of cancer among women in North America, directly affecting one of every eight to nine such women during their lives; its prognosis is typically excellent with early diagnosis and timely access to the best treatments (Coleman et al., 2008). Moreover, for a number of reasons it may be particularly instructive for Canada–U.S. comparisons. First, income has been observed to be strongly associated with breast cancer care and survival in the United States, but not in Canada (Gillan et al., 2012; Gorey, 2009; McKenzie & Jeffreys, 2009). Second, in the United States women with private health insurance or Medicare coverage are more likely to receive better care than are women with arguably less adequate coverage, such as that provided through the Medicaid programs of many states, or none (Coburn et al., 2008; Gorey et al., 2013; Schueler, Chu, & Smith-Bindman, 2008; Subramanian et al., 2011). And third, studies of breast cancer survival in Canada and the United States have consistently observed better survival in Canada among the poor, but no systematic differences within middle or upper socioeconomic strata (Gorey, 2009). In short, breast cancer care seems quite sensitive to the sorts of social and policy forces that probably determine much of the observed income and health insurance inequities in North America.

Because cancer registries in Canada and the United States do not typically include income data,

these studies were all ecological with respect to income. They used census tracts to define low-income neighborhoods that typically only ranged from 10% to 20% poor. So they had limited power to study breast cancer care among the “truly disadvantaged” (Wilson, 2012) people who live in America’s poorest neighborhoods. A preliminary study that described the experiences of such women with breast cancer in Canada and the United States between 1998 and 2006 found that the Canadian women experienced significantly better treatment access and outcomes. They were diagnosed earlier and were more likely to receive breast conserving surgery (BCS) as well as radiation and hormone therapies. Contrary to much political rhetoric, the Canadian women were less likely to experience long waits for surgery or radiation therapy (Gorey, Luginaah, Hamm, Fung, & Holowaty, 2010). More inclusive health insurance coverage in Canada was advanced as the most plausible explanation, but this theory was not directly tested as health insurance variables were not available. Moreover, this study only observed the experiences of 100 women, living in poor, but not extremely poor, neighborhoods. The present study aims to put this health insurance hypothesis to a more recent, focused, and powerful test.

HYPOTHESES

We are unaware of any study that has compared breast cancer care between adequate samples of women living in extremely impoverished neighborhoods in Canada and the United States who were also known to be adequately insured, inadequately insured, or uninsured. This one does so between 1996 and 2011. We hypothesized the following: (a) Overall, Canadian women with breast cancer who live in such high-poverty neighborhoods will experience better cancer care and survival compared with their counterparts in the United States, (b) Canadian breast cancer care and survival will be better when compared with the care received by inadequately insured Americans (uninsured or Medicaid insured), and (c) relative protective effects among the Canadian women will be explained by the intermediate effect of their all having health insurance.

METHOD

Sampling the Historical Cohorts

We chose to study California and Ontario to maximize both internal and external validity. They are the most populous state and province, respectively,

and their comprehensive cancer registries contribute to their respective national cancer surveillance systems with demonstrated validity (Gorey, Luginaah, Holowaty, Fung, & Hamm, 2009; Hall, Schulze, Groome, Mackillop, & Holowaty, 2006; Wright, 1996). This study secondarily analyzed the high-poverty strata of a California–Ontario breast cancer database that originally randomly selected women from high-, middle-, and low-poverty neighborhoods. Women with malignant breast cancer were randomly selected from three geographic strata in Ontario and California between 1996 and 2000: very large metropolitan areas (Toronto versus San Diego, San Francisco, and Los Angeles), smaller metropolitan areas (Windsor versus Salinas, Modesto, Stockton, Bakersfield, and Fresno), and rural places. They have been followed, thus far, until January 1, 2011. We retrospectively collected data on breast cancer stage at diagnosis and treatments from health records across the province of Ontario to augment the Ontario Cancer Registry (OCR). Given the relatively high cost, we were able to sample 300 women from high-poverty neighborhoods in Ontario. We oversampled 1,950 women from high-poverty neighborhoods in California. Oversampling costs were negligible as all of this study’s variables were routinely coded by the California Cancer Registry (CCR). Bolstering statistical power to detect meaningful between-country differences, California participants served as multiple “controls” for the Ontario participant “cases” in a ratio of 6.5 to 1. This study was powered to detect rate differences of 10%, with 80% power at a two-tailed significance level of 5% (Fleiss, Levin, & Paik, 2003; Hennessy, Bilker, Berlin, & Strom, 1999). Subsample analyses that were necessarily less powerful could be deemed exploratory. Any such finding that met the more liberal significance criterion of 10% was reported as approaching significance ($p < .10$).

High-Poverty Cohort Definitions

Conceptually similar definitions of economic deprivation are used by Statistics Canada and the U.S. Census Bureau. Both are based on annual income adjusted for household size, but the Canadian low-income cutoff is approximately 140% of the U.S. poverty threshold (Osberg, 2000). Although not identical, our previous experience suggested that these two measures could be used to construct very similar “high-poverty” cohorts in California and Ontario. After first linking eligible women who

were diagnosed with breast cancer in California to the 2000 census by their residential census tract, we randomly selected our sample from tracts where 30% or more of the households met the federal poverty criterion (range = 30% to 100%, median = 36.8% poor; U.S. Census Bureau, 2002). We then similarly selected from the poorest Ontario tracts (range = 15.0% to 52.8%, median = 22.7% low-income; Statistics Canada, 2002). The resultant median annual household incomes in U.S. dollars (Bank of Canada, 2014) were quite similar in California (\$23,325) and Ontario (\$25,100). We used census tracts to represent extremely poor neighborhoods for this study of cancer care in Canada and the United States for the following reasons. First, validating studies in the United States found such tracts to be more predictive of diverse personal health problems and social ills than either smaller, block group or larger, zip code-based measures (Krieger, Chen, Waterman, Rehkopf, & Subramanian, 2003; Krieger et al., 2002). Second, such tracts typically have approximately 4,000 inhabitants who are similarly poor on both sides of the Canadian–U.S. border (Gorey et al., 2010, 2011). And third, such census tract-based poverty measures have been found to similarly predict the incidence of common types of cancer, including breast cancer, in Canada and the United States (Gorey et al., 1998).

Cancer Registry Variables

Variables coded by the CCR or by our research team to augment the OCR were as follows: stage of disease at diagnosis (node negative [NN], node positive [NP], or distally metastasized); receipt of initial surgery; type of surgery (BCS or mastectomy); receipt of radiation therapy (RT), chemotherapy (CT), or hormone therapy (HT); wait times from diagnosis to treatment; and survival time from diagnosis to death or follow-up at 10 years. NN disease has not yet spread to any regional lymph nodes and is the most treatable type of breast cancer, whereas distally metastasized disease has spread beyond regional lymph nodes to other parts of the body. Surgery is indicated in most instances. BCS or lumpectomy is recommended for most NN breast cancers. Adjuvant treatments like RT, CT, and HT are typically received after surgery to further assist in the elimination or reduction of cancer cells (Brant, Ziegler, & Kairon, 2014; McCready et al., 2005; Morrow et al., 2002). Various long-wait criteria that may be associated with breast cancer

recurrences, metastases, or shorter survival were explored (Bilimoria et al., 2011; Z. Chen, King, Pearcey, Kerba, & Mackillop, 2008).

These variables had less than 3% missing data. Agreements were very high among three health record abstractors who collected augmenting data for the OCR. An interrater reliability assessment of 50 randomly sampled records found that kappa coefficients ranged from 0.88 to 0.96 across study variables. For the California cohort, health insurance status, the primary source of payment to the hospital or primary payer, was determined from health records during the initial course of cancer treatment. It was categorized as follows: uninsured (11.6%), Medicaid (15.0%), Medicare (32.1%), or privately insured (41.3%). Given our oversampling of high-poverty neighborhoods, the relatively low representation of people who were uninsured may seem surprising. Note, though, that most initial breast cancer care took place in hospitals where social workers worked to connect people who were uninsured and poor to additional resources, typically Medicaid.

Statistical Analyses

In comparing survival, early diagnosis, or treatment rates between the two study cohorts, we first directly adjusted them for age and any other significant and substantial covariates using this study's sample as the standard and reported as rates per 100 participants or percentages. Then we used standardized rate ratios (RRs) for between-country comparisons with pooled 95% confidence intervals (CIs) derived from the chi-square test. Logistic regression models tested hypotheses about mediating effects of health insurance on country–breast cancer survival relationships. We estimated odds ratios (ORs) and 95% CIs from logistic regressions and imputed missing data from full models. Binary survival outcomes (survived or not) that were best predicted by significant main effects and interactions were analyzed and reported (Agresti, 2002; Hosmer & Lemeshow, 2000). In each instance, we ran logistic regression models that included four predictors: (1) country alone; (2) country and health insurance; (3) country, health insurance, and stage of disease at diagnosis; and (4) country, health insurance, stage, and treatments. These, respectively, assessed the significance of Canadian protective effects, their mediation or explanation by health insurance, and the main and any additional mediating effects of early diagnosis and

timely surgical and adjuvant treatments. Other methodological details have been reported (Gorey et al., 2010, 2011, 2012, 2013).

RESULTS

Description of Canadian Breast Cancer Care Protections

Survival Rates. Comparisons of survival rates between study cohorts of women in high-poverty neighborhoods of California and Ontario are displayed at the top of Table 1. First, we compared women with NN disease on eight-year survival. Overall, these cohorts of women with the most treatable type of breast cancer did not differ significantly.

However, the survival rate among the women in Ontario (78.5%) seemed somewhat better than that of women who were uninsured or publicly insured in California (70.0%, RR = 1.12). Next, between-country differences were observed to be much greater for NP breast cancer. Overall, five-year survival rates were significantly greater in Ontario (RR = 1.23) and, as hypothesized, this apparent benefit was greater when compared with that for women who were uninsured or Medicaid insured in California (RR = 1.27). The Californian women with NP disease who were uninsured seemed quite disadvantaged, as only about half of them survived for five years (54.7%), whereas three-quarters of the

Table 1: Comparisons of the Residents in California and Ontario's Poorest Neighborhoods on Breast Cancer Care and Survival: Adjusted Rates and Standardized Rate Ratios

Sample Definition Care Characteristic	California		Ontario		Ontario/California	
	Sample <i>n</i>	Rate %	Sample <i>n</i>	Rate %	RR	(95% CI)
Survival						
Node negative (NN) disease						
Eight-year survival ^a	724	76.8	125	78.5	1.02	(0.92, 1.13)
Private	370	83.2			0.94	(0.85, 1.04)
Uninsured or public	354	70.0			1.12*	(0.99, 1.26)
Node positive (NP) disease						
Five-year survival	623	59.9	97	73.7	1.23	(1.05, 1.45)
Private or Medicare	418	62.5			1.18	(1.00, 1.39)
Uninsured or Medicaid	205	58.0			1.27	(1.06, 1.53)
Uninsured	80	54.7			1.35	(1.07, 1.70)
Metastasized disease						
Three-year survival ^b	129	21.8	8	33.4	1.53	(0.39, 6.02)
Private or Medicare	78	29.9			1.12	(0.12, 10.33)
Uninsured or Medicaid	51	13.7			2.44*	(0.84, 7.05)
Early Diagnosis						
Entire sample						
NN disease	1,950	61.5	300	65.0	1.06	(0.96, 1.17)
Private	805	64.5			1.01	(0.90, 1.13)
Uninsured or public	1,145	57.9			1.12	(1.01, 1.24)
Surgical Treatment						
Entire sample						
Had surgery ^c	1,947	94.3	300	96.6	1.02*	(0.99, 1.05)
Private or Medicare	1,429	95.0			1.02	(0.98, 1.06)
Uninsured or Medicaid	518	93.2			1.04	(1.00, 1.08)
NN disease & had surgery						
Had BCS ^d	1,073	49.6	190	73.5	1.48	(1.31, 1.68)
Adjuvant Treatments						
Entire sample						
Received radiation therapy ^c	1,950	39.5	300	58.8	1.49	(1.32, 1.69)
Private	805	42.8			1.37	(1.20, 1.56)
Uninsured or public	1,145	36.6			1.60	(1.40, 1.82)

(continued)

Table 1: Continued

Sample Definition Care Characteristic	California		Ontario		Ontario/California	
	Sample	Rate	Sample	Rate	RR	(95% CI)
Primary insurers	<i>n</i>	%	<i>n</i>	%		
Primary insurers						
NN disease & had BCS						
Received radiation therapy ^d	589	66.4	147	70.6	1.06	(0.98, 1.14)
Private ^e	270	80.8			0.87	(0.77, 0.98)
Uninsured or public	319	60.6			1.17	(1.01, 1.35)
Hormone receptor positive tumor ^f						
Received hormone therapy	993	41.2	216	68.2	1.65	(1.44, 1.89)
Private	408	45.7			1.49	(1.29, 1.73)
Uninsured or public	585	38.3			1.78	(1.53, 2.07)
Wait Times						
Had surgery						
60+ days wait for surgery ^c	1,835	10.4	290	7.2	0.69*	(0.45, 1.06)
Private or Medicare	1,358	9.1			0.79	(0.50, 1.24)
Uninsured or Medicaid	477	12.4			0.58	(0.36, 0.93)
Non-metastasized disease, no chemotherapy						
180+ days wait for RT ^c	367	5.7	96	6.2	1.09	(0.46, 2.58)
Private or Medicare	289	2.9			2.14	(0.80, 5.75)
Uninsured or Medicaid	78	14.2			0.44*	(0.18, 1.10)
Optimum Care: BCS < Two Months Postdiagnosis and RT < Four Months Postsurgery						
NN & low or intermediate grade						
Optimum care ^d	624	44.5	85	64.0	1.44	(1.16, 1.79)
Private	244	47.4			1.35*	(0.98, 1.86)
Uninsured or public	345	43.1			1.48	(1.13, 1.94)
Uninsured	56	33.8			1.89	(1.31, 2.72)

Notes: RR = standardized rate ratio, CI = confidence interval, BCS = breast conserving surgery, RT = radiation therapy. Bolded rate ratios were statistically significant at $p < .05$. Unless noted otherwise, all rates were age-adjusted across these categories: 25 to 44, 45 to 54, 55 to 64, 65 to 74, and 75 or older.

^aSamples were restricted to those less than 70 years of age.

^bRates were age-adjusted across these categories: 25 to 64 and 65 or older.

^cRates were age- and stage-adjusted across these categories: 25 to 64 and 65 or older, and NN and NP breast cancer.

^dRates were age and tumor size-adjusted across these categories: 25 to 64 and 65 or older, and less than 20 mm and 20 or more mm.

^eOnly between-country comparisons indicative of an American advantage.

^fEstrogen or progesterone receptor positive.

* $p < .10$.

women with similarly advanced disease in Ontario survived (73.7%, RR = 1.35). We then explored three-year survival of women whose disease had metastasized, a trend indicative of better survival in Ontario was observed (RR = 1.53), and the survival rate in Ontario (33.4%) was much greater than that of women who were uninsured or Medicaid insured in California (13.7%, RR = 2.44).

Diagnosis and Treatments. Under the subheading of early diagnosis in Table 1 it can be seen that overall the two cohorts did not differ significantly on early diagnosis rates. Moreover, women who were privately insured in California (64.5%) had an early diagnosis rate essentially identical to that of all Ontarian women (65.0%, RR = 1.01). However, the Ontario rate was significantly better than that of the aggregate rate among women who were uninsured and Medicaid or Medicare insured in California

(57.9%, RR = 1.12). The Ontarian women were 12% more likely to be diagnosed early than were the uninsured or publicly insured women in California.

The analyses also strongly suggested that Ontarian women with breast cancer living in extreme poverty have better access to more effective treatments, whether directed toward cure or palliation, especially as compared with their inadequately insured Californian counterparts. Overall between-country differences were minuscule on the receipt of surgery, which was received in nearly all instances. However, about 4% fewer of the uninsured or Medicaid insured received surgical treatment of their breast cancers (RR = 1.04). Of course there are legitimate reasons for refusing surgery. It should be noted that surgery refusal rates were nearly identical among the women in California (10.7%) and Ontario (10.0%) who did not have surgery. The between-country

divide was much greater when a specific surgery was considered. Only half of the Californian cohort received BCS (49.6%) compared with three-quarters of the Ontarian cohort (73.5%, RR = 1.48), a very large, hypothetically consistent Canadian benefit.

Adjuvant treatments are displayed next in Table 1. Overall, RT was received by many more in Ontario than in California (58.8% versus 39.5%, RR = 1.49), and the access gap was even greater among the uninsured or publicly insured (36.6%, RR = 1.60). When RT was most indicated, that is, for women with NN disease who received BCS, there was no overall difference between the cohorts on RT receipt. But the Ontario RT rate (70.6%) was significantly better than the aggregate rate among those who were uninsured or Medicaid or Medicare insured in California (60.6%, RR = 1.17). Alternatively, the Ontario RT rate was significantly worse than the rate among those who were privately insured in California (80.8%, RR = 0.87). The pattern of HT findings was similar to that of RT. HT was received by many more in Ontario than in California (68.2% versus 41.2%, RR = 1.65), and the gap was even greater among the uninsured or publicly insured (38.3%, RR = 1.78). No significant between-country differences were observed on CT.

Wait Times. Two exemplary wait criteria are displayed in Table 1. Overall, the women in Ontario seemed less likely to have waited for two months or more between their diagnosis and surgery (7.2% versus 10.4%, RR = 0.69). As hypothesized, women with adequate insurance in California did not differ significantly from women in Ontario on such long waits for surgery, but those with inadequate insurance in California were substantially more likely to experience long waits (12.4%, RR = 0.58). Ontarian women with non-metastasized disease not treated with CT were also much less likely to have experienced long waits of six months or more for RT than were women with inadequate insurance in California (6.2% versus 14.2%, RR = 0.44).

Optimum Care. We developed a nominal measure of optimum treatment of one of the most common and treatable types of breast cancer—NN and low to intermediate grade (localized and “well-differentiated” tumors that tend to grow and spread slowly)—from four study variables: received BCS within two months of diagnosis and received adjuvant RT within four months of surgery. Admittedly, it is probably only one of a number of “optimum” care criterions with some measure of clinical valid-

ity. About two-thirds of the Ontario cohort received such optimum care (64.0%), but less than half of the California cohort did (44.5%, RR = 1.44). Hypothetically consistent, the between-country optimum care differential was significantly less when Ontarian women were compared with women with private insurance in California (47.4%, RR = 1.35). The differential was much larger when considering the uninsured in California (33.8%). The women in Ontario were nearly twice as likely to receive optimum care (RR = 1.89).

Canadian Advantages Explained by Health Insurance

Three survival analyses are displayed in Table 2: (1) long-term, eight-year survival among women less than 70 years of age at diagnosis, the majority of whom would be expected to survive throughout follow-up given life expectancies in the United States and Canada, (2) five-year survival among all participants, and (3) short-term, three-year survival among women with metastasized disease, the majority of whom were probably not treated with the intention to cure, but to palliate. In each instance, model 1 demonstrated practically significant Canadian survival advantages (respective odds ratios [ORs] of 1.56, 1.50, and 2.10) that, as hypothesized, were substantially to completely mediated by the large and positive effects of having adequate health insurance in model 2. Significant main and interacting effects of early diagnosis (model 3) and treatment access (model 4) were entered into regression models in temporal order. Early diagnosis and receipt of RT and HT strongly predicted eight-year survival, whereas the odds of survival diminished substantially for those who waited two months or more for surgery. These diagnostic and treatment effects seemed to be the same in both countries, as there was no stage or treatment by country interactions. A very similar pattern was observed for the prediction of five-year survival by early diagnostic, RT, and surgical wait effects, but in this instance there was also one significant interaction effect: early diagnosis by country. The advantaging effect of being diagnosed with NN disease was significantly larger for the U.S. cohort (OR = 4.06, 95% CI 3.26, 5.06) than for the Canadian cohort (OR = 1.91, 95% CI 1.07, 3.42). We explored possible reasons for this and found that when diagnosed later the Canadian women (30.7%) were three times as likely as women in the United States (9.7%) to be treated very thoroughly with CT,

Table 2: Associations of Country, Health Insurance, Diagnostic, and Treatment Characteristics with Breast Cancer Survival: Logistic Regression Models

Characteristic	Model 1		Model 2		Model 3		Model 4	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Eight-Year Survival among 1,500 Women < 70 Years of Age at Diagnosis^a								
Country (Canadian advantage)	1.56	(1.12, 2.17)	1.29	(0.91, 1.82)	1.27	(0.89, 1.82)	1.09	(0.75, 1.57)
Medicare or private insurance			1.70	(1.34, 2.15)	1.56	(1.21, 2.00)	1.48	(1.15, 1.91)
NN disease at diagnosis					3.89	(3.09, 4.89)	3.98	(3.15, 5.01)
Waited > 60 days for surgery							0.55	(0.38, 0.78)
Received radiation therapy							1.34	(1.06, 1.70)
Received hormone therapy							1.35	(1.04, 1.75)
Five-Year Survival among all 2,250 Women in the Sample^b								
Country (Canadian advantage)	1.50	(1.12, 1.99)	1.31*	(0.98, 1.77)	1.33*	(0.98, 1.81)	1.10	(0.81, 1.50)
Medicare or private insurance			1.66	(1.31, 2.10)	1.55	(1.21, 1.97)	1.37	(1.07, 1.76)
NN disease at diagnosis					3.65	(2.98, 4.48)	2.90	(2.32, 3.62)
Waited > 60 days for surgery							0.47	(0.35, 0.65)
Received radiation therapy							1.44	(1.17, 1.78)
NN disease at diagnosis by country							0.49	(0.27, 0.90)
Three-Year Survival among 137 Women with Metastasized Disease at Diagnosis^c								
Country (Canadian advantage)	2.10	(0.47, 9.41)	1.32	(0.27, 6.38)		Not applicable	1.00	(0.09, 11.39)
Medicare or private insurance			3.13	(1.11, 8.78)			1.68	(0.41, 6.92)
Received chemotherapy							5.08	(1.00, 26.67)
Received hormone therapy							5.84	(1.54, 22.14)

Notes: OR = odds ratio, CI = confidence interval, NN = node negative. Bolded ORs were statistically significant at $p < .05$.

^aAll effects were age-adjusted across these categories: 25 to 44, 45 to 54, 55 or older.

^bAll effects were age-adjusted across these categories: 25 to 44, 45 to 54, 55 to 64, 65 to 74, 75 or older.

^cAll effects were age- and grade-adjusted across these categories: 25 to 64, 65 or older, and low to intermediate or high grade.

* $p < .10$.

RT, and HT (RR = 3.16, 95% CI 2.19, 4.57). For the three-year model, survival odds were five- to sixfold greater among women with metastasized disease who had received CT or HT in either country. No significant effects of country remained after health insurance, disease stage, and treatments were accounted for (respective ORs of 1.09, 1.10, and 1.00, all nonsignificant).

DISCUSSION

This study compared breast cancer care in high-poverty neighborhoods in Canada and the United States. Using breast cancer as a health care policy sentinel we found consistent support for the hypothesis that Canadian women experienced better care and outcomes in the years prior to passage of the ACA. Such Canadian women were more likely than their counterparts in the United States to receive BCS, RT, and HT, and those with NP or metastasized disease survived longer. Contrary to prevalent rhetoric, Canadian women were less likely to experience long waits for care. We also found consistent support for the hypothesis that Canadian protections were even greater when compared with those of U.S. women who were uninsured or Medicaid insured.

Such women in the United States were at greater risk of receiving substandard care. They were diagnosed later; waited longer for treatment; had much less access to BCS, RT, and HT; and were less likely to survive. We also observed suggestive Medicare inadequacies. Most telling, women in the United States who were uninsured or publicly insured by Medicaid or Medicare were much less likely than Canadian women to receive optimum, evidence-based care. Finally, three mathematical models cross-validated the hypothesis that health insurance mediated between-country differences. Better three-, five-, and eight-year outcomes among Canadian women were primarily explainable by the fact of their more adequate health insurance.

Compared with Canadian women, uninsured women in the United States received the most consistently substandard care. Risks of care inadequacies were also observed among those who were Medicaid insured, and notable detriments were even observed among women in the United States whose care was primarily covered by Medicare or by a private insurer. These findings seem consistent with well-known inequities in U.S. health care. Such admitted inequities have even come to be reflected in

the language of U.S. health insurance. For example, it may go without saying that those covered by Medicare need to purchase additional Medigap coverage. Private insurance plans are called “bronze, silver, gold, or platinum,” implying that certain people have better coverage than others. The probability of its providing health insurance to tens of millions more Americans notwithstanding (CBO, 2012), the ACA may not be able to rectify such structural inequities. In fact, it has been estimated that the vast majority of private plans purchased through the ACA’s health insurance exchanges will be bronze or silver plans with very high deductibles (Wharam, Ross-Degnan, & Rosenthal, 2013). Similar structural inequities, including compromised coverage with greater out-of-pocket expenses, have been predicted for Medicaid’s expansion across 50 states (Magge, Cabral, Kazis, & Sommers, 2013). It seems possible that many previously uninsured people may become underinsured under the ACA, and it is people who live in poverty who will be least able to absorb the additional, often great, out-of-pocket costs of cancer care, for example (Gorey et al., 2012, 2013, 2014). This study suggests that a single-payer system of universal health care coverage with global budgets and without competition to cover the most desirable people for the most profit (or least public spending) could avoid such inequities.

Country-level Effect: Universal Access versus Inadequate Insurance-based Access Gaps

This study’s key country effects, estimated with standardized RRs or adjusted ORs, ranged from 1.12 for early diagnosis to 1.50 for the receipt of optimum care and survival. Their direction indicated consistent Canadian protective effects, but one might wonder about their practical significance in population health or policy terms. The attribution of risk or protection at the population level is a function of three factors of which the effect size (RR or OR) is only one. It is also important to consider the size of the population at risk and the prevalence of exposure to the risk factors being studied. In this instance, the central exposure or risk factor to be mediated is a social one, poverty. The other social exposure of interest is the risk of being inadequately insured. Nearly a quarter of a million women in the United States are diagnosed with breast cancer each year, one of every five of whom lives in poverty (American Cancer Society, 2012;

Iceland, 2013). This study estimated that six of every 10 such women are inadequately insured. That represents an annual population of 30,000 women in the United States at risk of receiving less effective care than similarly impoverished, but single-payer covered, women in Canada.

Extrapolating these statistics and parameters, we estimated that 2,100 women living in poverty with breast cancer are diagnosed later, 6,300 treated less optimally, and 6,900 die earlier each year in the United States than would have, had they all enjoyed access to a single-payer health care system. That is an estimated 31,500 late diagnoses, 94,500 suboptimum treatments, and 103,500 premature deaths in the United States during this study’s 15-year time span. These striking inequities are probably only the tip of the population health detriment iceberg, as breast cancer accounts for less than 2% of the burden of disease in the United States (Michaud et al., 2006). We deem such large population risks attributable to inadequate health insurance as evidence not only of extraordinary social inequities, but also of profound social injustices. The ACA will most assuredly begin to close such between-country gaps. However, given that substantial populations will probably remain uninsured or underinsured in the United States (CBO, 2012), substantial care and survival gaps are also very likely to remain. This study strongly suggests that single-payer reform of health care in the United States would close such gaps even further.

Limitations and Implications

Our analyses demonstrated that poverty and health insurance matter, but what of ethnicity? Although this study was not able to directly account for this factor because the OCR does not code ethnicity, we were able to conservatively compare the subsample of non-Hispanic white women in California with the entire ethnically diverse sample in Ontario. For example, we secondarily analyzed the optimum care of women with imminently treatable breast cancer, excluding all members of any ethnic minority group in California. Evidence of significantly better access in Canada remained. Furthermore, the substantial rate of suboptimum care among women of color who were inadequately insured in California did not differ significantly from that of their non-Hispanic white counterparts. In short, the disadvantageous effects of being uninsured or underinsured seem quite similar for all women living in poverty in the United States, whether majority white

or minority women of color. However, we think that ethnic background or racialized group membership still very much matters. Women of color comprised more than half of this study's Californian sample. And compared with non-Hispanic white women, such women of color were 40% more likely to be uninsured or Medicaid insured and 20% less likely to have private health insurance. So approximately six of every 10 of the late diagnoses, suboptimum treatments, and premature deaths in high-poverty California neighborhoods were experienced by women of color (Galea, Tracy, Hoggatt, DiMaggio, & Karpati, 2011; Steenland & Armstrong, 2006). Even though the risks associated with being inadequately insured are similar for all women living in poverty in the United States, because women of color are more likely to live in poverty and to be inadequately insured, they are more likely than non-Hispanic white women to experience the injustices of contemporary U.S. health care. Race still matters (West, 1993). Other potential limitations have been discussed in previous articles (Gorey et al., 2010, 2011, 2012, 2013).

Social Work Implications

The risk of living in poverty remains much greater among racially or ethnically diverse people in the United States. Moreover, this study affirmed again that such people experience much greater risks of having serious and costly illnesses, of being inadequately insured, and so of receiving inadequate health care and of dying prematurely. Effective Medicaid expansion through the ACA would go a long way toward eliminating such oppressive, structural inequalities in U.S. health care. The uptake of ACA changes are likely to be very challenging, especially for those who live in poverty or near the poverty line, and for racial, ethnic, or cultural minority people of color (Gorin, Gehlert, & Washington, 2010; Kimbrough-Melton, 2013; Sommers et al., 2012). Recent national and statewide surveys consistently found prevalent lack of knowledge about ACA changes, especially among those who might benefit the most from them (Barcellos et al., 2014; Blewett, Lukanen, Call, & Dahlen, 2013; Sinaiko, Ross-Degnan, Soumerai, Lieu, & Galbraith, 2013). In aggregate it seems that the majority of those living in poverty are presently unprepared to effectively navigate the post-Obamacare health care system. Implications for social work practice are clear. Culturally sensitive social workers, performing a continuum of roles, will be needed to ensure that

people who are presently uninsured gain the best possible health insurance, and when needed, enjoy the highest-quality health care: outreach, teaching, referral, care advocacy, coordination, and follow-up. Finally, at the time of this writing, only 28 states and the District of Columbia had "opted" to expand Medicaid. Surely such an absurd structural inequality that would disenfranchise millions of Americans cannot stand. Social workers in coalition with allied professionals and diverse communities ought to advocate for the full enactment of recent health care reforms across all 50 states as we continue to advocate for future, single-payer reform of U.S. health care.

CONCLUSION

Women living in poverty with breast cancer receive better care and are more likely to survive in Canada than in the United States. Prevalent health insurance inadequacies in the United States versus universal, single-payer coverage in Canada largely explain this between-country divide. The ACA will substantially reduce such inequities, but additional reforms, including the introduction of a single-payer system, would further reduce if not completely eliminate them. Social justice and policy implications are clear. Even as elements of the ACA continue to unfold, social workers and allied advocates ought to continually strive to ensure that all Americans have access to the highest-quality health care. **SWR**

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