Differences in Perceived Waiting Time by Health Insurance Type in the Inpatient Sector: An Analysis of Patients With Breast Cancer in Germany

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Abstract

Although the relationship between health insurance and waiting time has been established in the ambulatory sector in Germany, research in the inpatient sector is limited. This study aims to contribute to previous work through analyzing differences in perceived waiting time by health insurance type during the inpatient stays of patients with breast cancer in Germany. This study utilizes cross-sectional data from 2017 of patients with breast cancer (N = 4626) who underwent primary breast cancer surgery in a certified breast care center in Germany. Results from multilevel logistic regression models indicate a significant effect of health insurance status on perceived waiting time, net of other relevant factors (patient's sociodemographic background, Union for International Cancer Control stage, grading, self-reported and classified health, type of surgery, and chemotherapy). Patients with statutory insurance were significantly more likely than privately insured patients to report long waiting times for examinations/procedures, discharge, and to speak with the physician. There were no significant differences in waiting time for nursing staff between private and statutory insurance holders. Results align with previous findings in the ambulatory sector and suggest a private health insurance advantage, with private patients receiving priority to some health care services. Disparities in health care accessibility and quality need to continue to be addressed and discussed, as well as the impact of health insurance type on other indicators of health.

What do we already know about this topic?
Previous work has found that patients with private health insurance (PHI) in the ambulatory sector in Germany have significantly lower waiting times for consultations or appointments than patients with statutory health insurance (SHI).
How does your research contribute to the field?
This study examines whether PHI is also associated with lower perceived waiting times during inpatient hospital stays in Germany, finding that PHI is one of the most significant predictors for differences in perceived waiting times, even after extensively controlling for patients' clinical data, type of treatment, and sociodemographic background.
What are your research's implications toward theory, practice, or policy?
The consequences of disparities in health care accessibility need to continue to be addressed in both the ambulatory and inpatient sectors, particularly when differential financial incentives may influence patient waiting lists.

Background

Health insurance coverage and type have been linked with differences in health outcomes,[1] patient experiences,[2] and health care accessibility and utilization.[3] Although one aim of universal health coverage in Germany is to provide equal access to health care and reduce health disparities, differences in health care access have been observed based on the type of health insurance patients have.[4-7] Health insurance in Germany can be categorized into 2 main schemes—statutory

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health insurance (SHI) and private health insurance (PHI)—and thus presents a unique case in examining differences in patient outcomes by insurance type. In Germany, better coverage and higher profitability associated with PHI may pose a financial incentive for physicians to give preferential treatment to privately insured patients.[6] PHI patients in the ambulatory sector in Germany, for example, can potentially bring in a 20% to 35% higher revenue than SHI patients.[6] Because PHI patients may have access to more innovative treatments, prioritizing them through earlier appointments and consultations may be financially advantageous for health care providers and possibly lead to relatively longer waiting times for SHI patients. While several studies have established a difference in waiting times between PHI and SHI patients in the ambulatory sector in Germany, little is known about the waiting time experiences during inpatient stays. Moreover, few studies on waiting time in Germany have taken into account patients' clinical data, type of treatment, and other factors that might also potentially be correlated with long waiting times. The aim of this study is to examine whether there is a significant difference in PHI and SHI patients' waiting time experiences during their hospital stays, even after extensively controlling for their condition, type of treatment, and sociodemographic background.

Waiting time for surgery or treatment can be considered as one measure for access to care,[8] and although long waiting times for patients can sometimes be attributed to unavoidable factors, such as high patient volume and lack of personnel, long waiting times could potentially pose negative consequences for both patients and staff. Long patient waits have been associated with patient satisfaction in a variety of settings, such as in primary care and in outpatient departments,[9,10] military clinics[11] and emergency departments,[12] and in some cases, waiting time to speak with a clinician was found to be the most significant predictor of patient satisfaction.[13] Waiting time was also associated with patient' perceptions of other aspects of care, such as kindness or compassion of the staff,[14] doctor's capability, patients' confidence in health services,[15] or patients' perception of the caregivers' ability to perform health services "reliably and accurately."[16] Moreover, patient dissatisfaction with waiting time was found to be correlated with dissatisfaction with overall care services among emergency department patients.[17] Long waiting times could thus potentially pose difficulties for health care providers in patient interactions due to high dissatisfaction, eroded trust, or lack of compliance.

While waiting time is often viewed as an unavoidable aspect of the patient experience, longer waits could also pose ramifications for health outcomes if patients are less likely to consult with medical staff due to longer waits, which could potentially lead to later diagnoses and delays in treatment.[18] In more serious cases, where treatment is time-dependent and patients need immediate care, waiting lists determined partially by health insurance status rather than solely by urgency of condition pose more serious health consequences for patients. Longer wait times have been associated with poorer health outcomes among vulnerable populations, such as among elderly veterans in the United States.[19] Since more vulnerable patients are more likely to be SHI holders in Germany, differences by health insurance status could exacerbate already existing social and health disparities.

The relationship between health insurance status and waiting time has been explored through experimental studies (calling practices or hospitals for appointments), or through secondary data that retrospectively ask patients how long they waited for an appointment. Several experimental studies have found significant differences based on health insurance, with PHI holders having on average shorter waiting times for an appointment than SHI holders.[6,7,20] The advantage of experimental studies is that the time to appointment can be recorded with more accuracy than data which ask patients to remember and write down how long they waited, which could leave more room for error. However, most of the experimental studies on health insurance and waiting time focus primarily on getting an outpatient appointment or in specialized care,[4,18,21,22] and the literature is scant on the relationship between health insurance status and waiting time in the inpatient sector. One experimental study in Germany examined differences between PHI and SHI patients in acute care hospitals, finding that PHI patients had significantly shorter waiting times; however, the study also only analyzed waiting time for an appointment.[7] Since waiting time studies in Germany have mainly focused on outpatient settings and thus focused on 1 or 2 aspects of waiting time, such as getting an appointment or speaking with the general practitioner, there has not yet been a study that examines aspects of waiting time in the inpatient experience, such as waiting time for consultation with hospital staff or discharge. Moreover, few studies have extensively controlled for both patient's clinical information (specific details of patient's condition and treatment) and sociodemographic background in the analyses, presumably due to the experimental nature of the studies (phone calls for appointments), or due to lack of data.

Against this background, it is timely to examine the relationship between health insurance and waiting time in the inpatient sector in Germany, net of other potentially relevant factors, such as patient health, type of treatment, sociodemographic background, and hospital-level characteristics. Are there significant differences in perceived waiting times during the inpatient stay between PHI patients and SHI patients? Moreover, while the relationship between health insurance and waiting time has been observed in previous work in Germany, it is not known how this relationship might vary across hospitals, depending on the share of privately insured patients. Given the limited nature of resources and time, is the effect of insurance status on waiting time influenced by the share of privately insured patients in the hospital?

In order to examine the research questions, this study focuses on a large sample of patients with breast cancer in Germany and examines their perceived waiting time for various aspects of their inpatient hospital stay, namely waiting time for appointments, speaking with a physician or nursing staff, discharge, and satisfaction with appointment for surgery. Because all the patients in the sample are patients with breast cancer receiving treatment in an accredited breast center in Germany, patients should receive a standardized treatment that follows the catalog of requirements outlined by their respective Medical Association, which certifies the breast centers yearly. However, there are several reasons to expect that SHI patients experience longer waiting times than PHI patients during their inpatient stays, as outlined by Kuchinke et al.[7] PHI patients tend to be wealthier and healthier than their SHI counterparts, due to income thresholds for PHI accessibility as well as costs associated with morbidity and age.[23] Consequently, PHI patients as a group carry lower risk of additional costs for the hospital.[7,23] Granting PHI patients lower waiting times and priority over other patients is one way to increase their satisfaction with the hospital and in the long term, ensure a higher share of PHI patients and thus greater profitability.

Because of limited research on waiting time in the inpatient sector, this paper aims to contribute to previous work through exploring determinants of several measures of waiting time in order to make a more differentiated analysis of the inpatient experience. Moreover, the analyses include a rich set of controls that have previously not been available in other studies, such as patient's health, UICC (Union for International Cancer Control) stage, grading, and type of treatment received, as well as information at the hospital-level, i.e. the share of privately insured patients in the hospital, in order to examine the net effect of health insurance type on waiting time.

Methods

Study Design and Sample

Data were collected through a mail survey of patients with breast cancer who underwent primary breast surgery in 1 of 88 certified hospitals in the German federal state North Rhine-Westphalia, as part of a yearly patient survey used to certify breast cancer centers. Patients were surveyed if they met the following 3 conditions: (1) received a first diagnosis of breast cancer with at least 1 malignancy, (2) received inpatient surgery at one of the breast cancer centers during the 6-month period of data collection, and (3) received at least 1 postoperative histological evaluation. Patients received a written informed consent form before discharge. The survey questionnaire was distributed between a 6-month period in 2017 to the patients who agreed to participate in the study and is combined with patients' clinical information (ie, tumor size, grading, type of treatment, American Society of

Anesthesiologists [ASA] physical status classification), which is filled out by the hospital personnel. The survey is designed based on the Dillmann Total Design Method with 3 postal contact attempts made, which yielded an 88.94% response rate and a total of 4626 patients included in the analysis. The survey and data collection process received approval from the Ethics Committee of the Medical Faculty of the University of Cologne.

Instrument and Measures

Items were drawn from the Cologne Patient Questionnaire—Breast Cancer (KPF-BK 3.0), which surveys patients' perception of their inpatient experience. In order to measure different aspects of patients' waiting time during their hospital stay, items were drawn from the survey that asked patients whether they had to wait long in specific situations or whether they were satisfied with the waiting time for their surgery appointment.

Four separate items on self-reported long waiting time were used as outcome variables based on the following questions: "There were often long waiting times for examinations and procedures," "I had to wait a long time to be discharged," "When I rang for the nurse in my room, I had to wait a long time before any nursing staff arrived," "When I asked to speak with the physician outside of the rounds, I had to wait for a long time." Answer choices for the first 4 questions were originally on a 4-point scale (1) "do not agree at all, to (4) "agree completely." The response categories were then recoded into a binary variable (0) disagree and (1) agree. "I cannot assess" was treated as a missing variable.

A fifth outcome measure was drawn from a question on patients' satisfaction with their waiting time for surgery: "I was satisfied with the wait for my surgery appointment." The 4-point answer choices were reverse recoded so that higher values indicate dissatisfaction with waiting time, ranging from (0) "totally satisfied" to (3) "totally dissatisfied." Each measure was then created into a binary variable by combining the 2 higher answer choices (2 and 3 = long perceived waiting time) and the 2 lower answer choices (0 and 1 = not long perceived waiting time). These variables were collapsed into dichotomous variables due to the fact that the variables are not interval variables. However, the variables were also analyzed as quasi-continuous variables in hierarchical linear models and produced similar results.

The outcome variables for waiting time are thus based on patients' self-reports of long waiting time and patient satisfaction with the waiting time for surgery. While they are not absolute numerical measures of waiting time, patient's perception of waiting time has been found to be a more significant predictor of overall patient satisfaction while absolute waiting time was not.[12] Moreover, one study that compared actual waiting times and perceived waiting times found no significant differences (10).

A dichotomous variable was created for health insurance status (private or statutory) using the question, "What kind of

health insurance do you have?" Answer choices were, "I am insured in a statutory health insurance," "I have additional private insurance coverage," and "I have private health insurance (with or without state aid)." Since insurance companies offer additional private insurance coverage for an extra fee in order to allow statutory insured patients to have private patient benefits during hospital stays, patients with additional private coverage were also considered as privately insured patients in the analyses. (Analyses were also conducted differentiating patients with PHI, SHI, and SHI patients with additional private coverage, which yielded similar results. Because additional private insurance coverage allows SHI patients to have access to many PHI benefits, such as consultation with and treatment from the chief attending and entitlement to a private room, these patients were grouped with PHI patients in the final analyses.)

The following sociodemographic and clinical information were used as control variables: age, highest level of education, native language, UICC stage, grading, whether the patient underwent neoadjuvant chemotherapy, and type of surgery (mastectomy with or without reconstruction, breast-conserving surgery). Measures of patient health were also included with the variables ASA classification (I-IV) and self-reported health (1 = "poor" to 7 = "excellent"). Table 1 shows the distribution of the patient characteristics.

The share of private patients in the hospital was measured calculating the proportion of privately insured patients in the sample, which was then centered around the mean. (We created the variable of share of private patients as a proxy measure using data from our own sample, as there was no standardized data available at the time of this study on the overall share of private patients per hospital in Germany.) The variance inflation factor (VIF) was calculated for the variables in order to test for multicollinearity, with a VIF score of around 2. Listwise deletion of cases was used for missing values, resulting in a sample of 4329 patients nested in 86 hospitals.

In order to test the influence of health insurance status on waiting time, perceived waiting time was predicted with a 2-level multilevel logistic regression model of patients nested within hospitals using STATA 14.2. Multilevel modeling is an appropriate method for this analysis, as it accounts for heterogeneity across hospitals. A comparison of a 2-level fixed intercept model and a 2-level random intercept model show that inclusion of random intercepts provides a significantly better fit in analyzing waiting time. The intraclass correlation coefficients of the null models ranged from 6% (variance in happiness with waiting time for surgery) to 15% (variance in long waiting times to speak with the physician) which could be attributed to factors at the hospital level.

Results

According to the summary statistics of the sample, 28.02% (N = 1284) of the sample are privately insured or have additional private coverage, while 71.98% (N = 3299) have

statutory insurance. The majority of patients in the sample were diagnosed with either Stage I (N = 1554) or Stage II (N = 1193) cancer and underwent breast-conserving surgery (N = 3323). The age of the sample ranged from 24 to 97 years, with an average age of about 61 years (SD = 12.40). Of the measures of waiting time, the largest shares of patients reported long waiting times for examinations and procedures (15.15%) and speaking with a physician outside of rounds (12.59%). A full list of the patient information are displayed in Table 1. Figure 1 displays the distribution of the share of private patients in the hospitals.

Table 2 shows a comparison between groups across the variables of interest. At first glance, significant differences in perceived waiting time are observed between PHI and SHI patients across all outcome measures except for ringing for nursing staff. There are also differences observed between PHI and SHI patients in self-reported health, age, highest education, and native language, with PHI patients significantly higher in self-reported health, slightly older, more educated, and more likely to speak German as their native language than SHI patients (Table 2). No significant differences in clinical information (tumor stage, grading, neoadjuvant chemotherapy, type of surgery, and ASA classification) were observed by health insurance type (results not shown, available upon request).

In light of these descriptive findings, the influence of health insurance type and perceived waiting time for exams and procedures, discharge, arrival of the nursing staff after ringing, speaking with the physician outside of rounds, and patient satisfaction with waiting time for surgery were analyzed after controlling for patients' sociodemographic and clinical information. In the second model of each outcome, the share of privately insured patients was included as a hospital-level indicator and interacted with health insurance status in order to examine whether the effect of health insurance type increases when the share of private patients is greater. The results of the final models of the multilevel estimates are displayed in Table 3. (For the sake of brevity, Table 3 shows the models adjusted for sociodemographic background but only displays the coefficients of waiting time and clinical information. Full models with all coefficients are displayed in the appendix.)

Aligning with expectations, patients with SHI were significantly more likely to perceive long waiting times for all outcome measures compared with privately insured patients, with the exception of waiting time for the nursing staff (Table 3, Models 3a and 3b). This effect persisted across all specifications, with SHI holders significantly more likely than PHI holders to report long waiting times for exams and procedures, discharge, and speaking with the physician outside of rounds, and SHI holders were significantly less likely than PHI holders to be satisfied for the waiting time for their surgery appointment. Other predictors of perceptions of waiting time include self-reported health, which was negatively associated with long waiting time for all measures, and

Table 1. Distribution of Patient-Level Variables (N = 4626).

Variable	Response trait	N (%)
UICC stage	Stage 0	260 (5.62)
	Stage I	1554 (33.59)
	Stage II	1193 (25.79)
	Stage III	296 (6.40)
	Stage IV	107 (2.31)
Grading	G1	677 (14.64)
	G2	2500 (54.05)
	G3	1130 (24.43)
Neoadjuvant chemotherapy	No	3457 (74.73)
	Yes	944 (20.41)
	No answer	225 (4.86)
Type of surgery	Mastectomy without direct reconstruction	851 (18.40)
	Mastectomy with direct reconstruction	334 (7.22)
	Breast-conserving surgery	3323 (71.83)
	Other	14 (0.30)
ASA classification	ASA I	1763 (38.11)
	ASA II	2134 (46.13)
	ASA III	563 (12.17)
	ASA IV	16 (0.35)
Self-reported health	No response	150 (3.24)
	1 "poor"	49 (1.06)
	2	142 (3.07)
	3	535 (11.57)
	4	1205 (26.05)
	5	1436 (31.04)
	6	906 (19.58)
	7 "excellent"	279 (6.03)
Age	No response	74 (1.60)
	18-29 y	21 (0.45)
	30-39 y	144 (3.11)
	40-49 y	609 (13.16)
	50-59 y	1332 (28.79)
	60-69 y	1295 (27.99)
	70-79 y	873 (18.87)
	80 y and older	346 (7.48)
Highest education received	No answer	6 (0.13)
	No school certificate	91 (1.97)
	Lower secondary school	1042 (22.52)
	Intermediate secondary school	736 (15.91)
	Junior high school	1271 (27.48)
	Upper secondary school	541 (11.69)
	Abitur	848 (18.33)
Native language	No answer	97 (2.10)
	Language other than German	354 (7.65)
	German	4209 (90.99)
Type of health insurance	Missing	63 (1.36)
	Statutory	3299 (71.98)
	Private or with additional private coverage	1284 (28.02)
Long waiting time for		
Examinations and procedures	Disagree	3786 (84.85)
	Agree	676 (15.15)
Discharge	Disagree	3990 (89.36)
	Agree	475 (10.64)
Nurse	Disagree	3291 (95.06)
	Agree	171 (4.94)
Speak with a physician	Disagree	1958 (87.41)
	Agree	282 (12.59)
Happy with length of time for an operation	Disagree	4336 (94.24)
	Agree	265 (5.76)

Note. UICC = Union for International Cancer Control; ASA = American Society of Anesthesiologists.
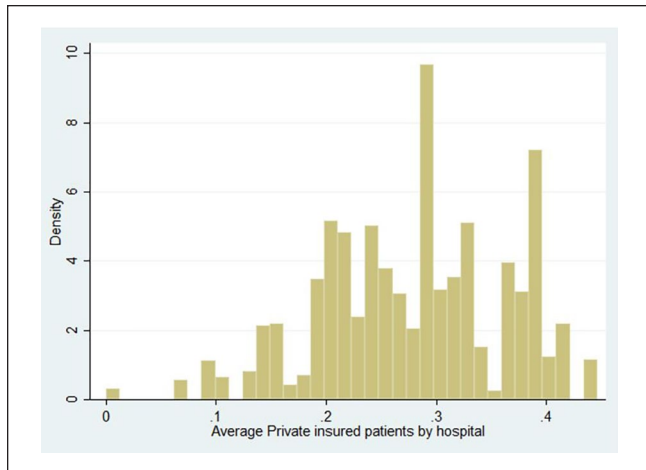
Figure 1. Share of privately insured patients by hospital.

Table 2. Descriptive Statistics by Health Insurance Type.

Variable	Private insurance	Statutory insurance
Long perceived waiting time		
Examinations and procedures	0.135	0.159*
Discharge	0.080	0.117***
Nursing staff	0.042	0.052
Speaking with physician	0.100	0.136*
Length of time to wait for surgery	0.037	0.065***
Self-reported health	3.800	3.641***
Age	61.976	61.001*
Highest education achieved	4.467	3.551***
Native language German	0.102	0.016***

*p<0.05, **p<0.01, ***p<0.001, *t*-test difference between patients with statutory health insurance and private health insurance.

education, with patients with lower education more likely to perceive long waiting time with speaking to the nursing staff than patients with a university-track high school degree (*Abitur*). Some differences were also observed across clinical conditions. Patients classified as ASA II were less likely to perceive long waiting time in speaking with the physician outside of rounds compared with ASA I patients. Patients who underwent neoadjuvant chemotherapy were more likely to be satisfied with their waiting time for surgery than patients who did not receive chemotherapy (Model 5). Compared with patients who received mastectomy without reconstruction, patients with breast-conserving surgery were less likely to perceive long waiting time to speak with physician but more likely to be dissatisfied with the waiting time for surgery (Models 4 and 5).

The share of privately insured patients with breast cancer in the hospital, however, did not influence overall waiting time or the individual effect of health insurance on waiting

time, as observed in the interaction terms. The only exception is in the case of ringing for nursing staff; a positive association is observed in the interaction term ($b = 5.12$, $P < .05$), indicating that SHI holders are significantly more likely to report waiting long for the nursing staff when the share of private patients in the hospital is above average (Model 3b). At the same time, the share of private patients becomes negative when introducing the interaction term in Model 3b ($b = 4.88*$, $P < .05$), suggesting that PHI holders are significantly less likely than SHI holders to perceive long waiting times when the share of private patients is above average, thereby demonstrating how these relationships may differ across hospitals.

Discussion

Due to the generally better coverage and profitability associated with PHI in Germany, we examined whether there are significant differences in perceived waiting time in the inpatient experiences of patients with breast cancer. We find that health insurance type is a significant predictor of perceived waiting time, above and beyond patients' condition and type of treatment they received. Results suggest a PHI advantage, with private patients being less likely to report long waits for physician consultations, examinations, and discharge during their inpatient stays and more likely to be satisfied with their surgery appointment. The only notable exception is waiting time for nursing staff, with no significant difference observed, unless the share of private patients in the hospital was above average. One possible explanation for this finding is that nursing staff may in general be less likely to prioritize patients based on health insurance type than other hospital personnel, who might feel more direct pressure or incentive to ensure higher profitability for the hospital through PHI. Another possibility is that patients are more likely to have more frequent and thus more personal contact with nursing staff in comparison with other hospital staff, which may make it less likely for them to perceive waiting time as long. However, the fact that SHI patients perceive longer waiting times depending on the share of private patients at the hospital suggests that differences in the experiences of PHI and SHI holders may widen when the share of PHI holders is higher.

Future research could examine the treatment of PHI and SHI holders from the hospital perspective to see whether certain organizational features make preferential treatment more likely, such as whether certain departments or staff in hospitals benefit more directly from higher shares of private patients and are thus more incentivized to give priority to PHI patients, or whether certain consumer-centric models of health care or hospital benchmarks lead to more pressure on staff to privilege PHI patients.

The strengths of this study include a large sample and comprehensive data set, which includes very specific information on patients' health (UICC stage, grading),

Table 3. Multilevel Logistic Regressions Predicting Perceived Waiting Time and Patient Satisfaction With Waiting Time for Surgery.

	Model 1a: Exams and procedures	Model 1b: Exams and procedures	Model 2a: Discharge	Model 2b: Discharge	Model 3a: Nurse	Model 3b: Nurse	Model 4a: Speak with physician	Model 4b: Speak with physician	Model 5a: Satisfaction with wait for surgery	Model 5b: Satisfaction with wait for surgery
Statutory health insurance (ref. private)	0.24* (0.11)	0.21† (0.11)	0.38** (0.13)	0.36** (0.13)	−0.03 (0.20)	−0.03 (0.20)	0.45* (0.18)	0.48* (0.19)	0.54** (0.18)	0.54** (0.19)
Staging (ref. Stage II)										
Stage 0	−0.15 (0.22)	−0.15 (0.22)	−0.17 (0.26)	−0.17 (0.26)	−0.08 (0.40)	−0.09 (0.40)	−0.13 (0.35)	−0.13 (0.35)	0.32 (0.30)	0.32 (0.30)
Stage I	−0.06 (0.12)	−0.07 (0.12)	0.11 (0.14)	0.11 (0.14)	−0.09 (0.23)	−0.10 (0.23)	0.19 (0.19)	0.19 (0.19)	−0.13 (0.19)	−0.13 (0.19)
Stage III	0.12 (0.20)	0.13 (0.20)	0.36† (0.22)	0.37† (0.22)	0.15 (0.32)	0.18 (0.32)	0.21 (0.27)	0.21 (0.27)	0.52† (0.28)	0.52† (0.28)
Stage IV	−0.27 (0.33)	−0.26 (0.33)	0.11 (0.35)	0.11 (0.35)	0.12 (0.48)	0.16 (0.48)	0.91** (0.35)	0.89* (0.35)	−0.24 (0.54)	−0.24 (0.55)
Grading (ref. G2)										
G1	0.11 (0.13)	0.11 (0.13)	−0.19 (0.16)	−0.19 (0.16)	0.22 (0.25)	0.21 (0.25)	0.06 (0.22)	0.07 (0.22)	−0.18 (0.21)	−0.18 (0.21)
G3	0.22† (0.11)	0.22† (0.11)	−0.01 (0.13)	−0.01 (0.13)	0.42* (0.20)	0.42* (0.20)	0.08 (0.18)	0.08 (0.18)	0.45** (0.16)	0.45** (0.16)
Neoadjuvant chemotherapy (ref. none)	−0.10 (0.13)	−0.10 (0.13)	−0.24 (0.15)	−0.24 (0.15)	−0.09 (0.23)	−0.09 (0.23)	0.32† (0.19)	0.32† (0.19)	−0.67** (0.21)	−0.67** (0.21)
Type of surgery (ref. mastectomy without reconstruction)										
Mastectomy with direct reconstruction	−0.33 (0.22)	−0.33 (0.22)	0.34 (0.24)	0.34 (0.24)	0.49 (0.31)	0.50 (0.32)	−0.37 (0.30)	−0.37 (0.30)	0.13 (0.34)	0.13 (0.34)
Breast-conserving surgery	0.14 (0.13)	0.14 (0.13)	0.19 (0.15)	0.19 (0.15)	−0.15 (0.22)	−0.15 (0.22)	−0.48** (0.18)	−0.48** (0.18)	0.48* (0.21)	0.48* (0.21)
ASA classification (ref. ASA I)										
ASA II	0.02 (0.11)	0.02 (0.11)	0.06 (0.12)	0.06 (0.12)	−0.13 (0.20)	−0.13 (0.20)	−0.58** (0.17)	−0.58** (0.17)	−0.03 (0.16)	−0.03 (0.16)
ASA III	0.30† (0.16)	0.30† (0.16)	−0.06 (0.20)	−0.06 (0.20)	−0.12 (0.28)	−0.14 (0.28)	−0.26 (0.24)	−0.26 (0.24)	−0.27 (0.25)	−0.27 (0.25)
ASA IV	1.48* (0.66)	1.51* (0.66)	0.68 (0.81)	0.70 (0.81)	0.28 (1.09)	0.40 (1.09)	−0.21 (0.86)	−0.23 (0.86)	0.00 (1.02)	0.00 (.)
Self-reported health	−0.12** (0.04)	−0.12** (0.04)	−0.07† (0.04)	−0.07† (0.04)	−0.15* (0.06)	−0.15* (0.06)	−0.21** (0.05)	−0.21** (0.05)	−0.26** (0.05)	−0.26** (0.05)
Share of PHI patients in hospital	−0.46 (0.94)	−1.52 (1.37)	−0.91 (0.94)	−1.99 (1.55)	−0.83 (1.22)	−4.88* (2.19)	0.58 (1.18)	1.39 (2.09)	0.06 (1.02)	−0.00 (2.07)
SHI × share of PHI patients in hospital		1.32 (1.25)		1.32 (1.52)		5.12* (2.32)		−0.98 (2.08)		0.08 (2.13)
Constant	−0.96* (0.39)	−0.93* (0.40)	−2.29** (0.47)	−2.27** (0.47)	−3.22** (0.75)	−3.22** (0.75)	−1.37* (0.58)	−1.39* (0.59)	−2.01** (0.59)	−2.01** (0.60)
N (patients)	4329.00	4329.00	4329.00	4329.00	3278.00	3278.00	2154.00	2154.00	4422.00	4422.00
N (hospitals)	86	86	86	86	86	86	85	85	86	86
AIC	3597.89	3598.78	2908.00	2909.25	1333.59	1330.76	1590.96	1592.73	1873.13	1875.13

Note. Adjusted for age, highest school education, and native language. Complete tables available in appendix. t statistics in parentheses. ASA = American Society of Anesthesiologists; PHI = private health insurance; SHI = statutory health insurance; AIC = Akaike information criterion.

†$P < .10$. *$P < .05$. **$P < .01$.

treatment (type of surgery and chemotherapy), and background (education and language) and thereby enables a more fine-grained analysis of predictors of waiting time. Moreover, this study is one of the few to examine waiting time in various aspects of the inpatient sector in Germany (beyond waiting time for appointment), and all patients in the sample are patients with breast cancer surveyed on the quality of care they received in accredited breast care centers. We are thus able to control for their clinical and sociodemographic profiles and find that health insurance status significantly explains differences in the waiting time experiences of patients.

However, we want to draw attention to several limitations of this study that warrant a cautious interpretation of the results. One limitation is that the outcome measures are based on patient's perception of waiting time rather than on objective measures, such as waiting time in minutes in waiting rooms. However, since no significant differences between absolute and subjective waiting times were observed in one study (10), the importance of patient perceptions in determining the patient experience should not be overlooked. It would be worthwhile in future work to examine the validity of patient perceptions through estimating correlations between actual and perceived waiting times in hospitals and analyzing both measures as predictors of patient-reported outcomes. We also acknowledge the recall bias that often occurs in waiting time studies using secondary data, which

ask patients to record long waiting times retrospectively. Another limitation of this study is the possibility that SHI holders might simply be more likely to perceive longer waiting times because of the well-known assumption in Germany that PHI holders receive priority in care. However, PHI holders have been observed to be more sensitive to waiting time than SHI holders, which is explained by higher perceived opportunity costs of foregone income and leisure from the perspective of patients who pay for PHI.[24] This finding suggests that under the same circumstances, it is more likely that PHI holders would perceive long waiting time than SHI holders, which is not observed in the analyses.

Conclusion

This study establishes a significant difference between PHI and SHI holders in regard to perceived waiting time in various aspects of the inpatient experience. While research on health insurance type and waiting time in the inpatient sector has been scarce in Germany, the results of this study align with findings of ambulatory studies and suggest a general advantage associated with PHI for quality of care in the hospital setting. Disparities in health care accessibility need to continue to be addressed and discussed, as well as the impact of health insurance type on other indicators of health care. Future research can also analyze the influence of long waiting time on other patient-reported outcomes.

Appendix

Table A1. Full Models Predicting Perceived Waiting Time and Satisfaction With Waiting Time for Surgery.

	Model 1a: Exams and procedures	Model 1b: Exams and procedures	Model 2a: Discharge	Model 2b: Discharge	Model 3a: Nurse	Model 3b: Nurse	Model 4a: Speak with physician	Model 4b: Speak with physician	Model 5a: Satisfaction with wait for surgery	Model 5b: Satisfaction with wait for surgery
Statutory health insurance (ref. private)	0.24*	0.21†	0.38**	0.36**	−0.03	−0.03	0.45*	0.48*	0.54**	0.54**
	(0.11)	(0.11)	(0.13)	(0.13)	(0.20)	(0.20)	(0.18)	(0.19)	(0.18)	(0.19)
Staging (ref. stage II)										
Stage 0	−0.15	−0.15	−0.17	−0.17	−0.08	−0.09	−0.13	−0.13	0.32	0.32
	(0.22)	(0.22)	(0.26)	(0.26)	(0.40)	(0.40)	(0.35)	(0.35)	(0.30)	(0.30)
Stage I	−0.06	−0.07	0.11	0.11	−0.09	−0.10	0.19	0.19	−0.13	−0.13
	(0.12)	(0.12)	(0.14)	(0.14)	(0.23)	(0.23)	(0.19)	(0.19)	(0.19)	(0.19)
Stage III	0.12	0.13	0.36†	0.37†	0.15	0.18	0.21	0.21	0.52†	0.52†
	(0.20)	(0.20)	(0.22)	(0.22)	(0.32)	(0.32)	(0.27)	(0.27)	(0.28)	(0.28)
Stage IV	−0.27	−0.26	0.11	0.11	0.12	0.16	0.91**	0.89*	−0.24	−0.24
	(0.33)	(0.33)	(0.35)	(0.35)	(0.48)	(0.48)	(0.35)	(0.35)	(0.54)	(0.55)
Grading (ref. G2)										
G1	0.11	0.11	−0.19	−0.19	0.22	0.21	0.06	0.07	−0.18	−0.18
	(0.13)	(0.13)	(0.16)	(0.16)	(0.25)	(0.25)	(0.22)	(0.22)	(0.21)	(0.21)
G3	0.22†	0.22†	−0.01	−0.01	0.42*	0.42*	0.08	0.08	0.45**	0.45**
	(0.11)	(0.11)	(0.13)	(0.13)	(0.20)	(0.20)	(0.18)	(0.18)	(0.16)	(0.16)
Neoadjuvant chemotherapy (ref. none)	−0.10	−0.10	−0.24	−0.24	−0.09	−0.09	0.32†	0.32†	−0.67**	−0.67**
	(0.13)	(0.13)	(0.15)	(0.15)	(0.23)	(0.23)	(0.19)	(0.19)	(0.21)	(0.21)
Type of surgery (ref. mastectomy without reconstruction)										
Mastectomy with direct reconstruction	−0.33	−0.33	0.34	0.34	0.49	0.50	−0.37	−0.37	0.13	0.13
	(0.22)	(0.22)	(0.24)	(0.24)	(0.31)	(0.32)	(0.30)	(0.30)	(0.34)	(0.34)
Breast-conserving surgery	0.14	0.14	0.19	0.19	−0.15	−0.15	−0.48**	−0.48**	0.48*	0.48*
	(0.13)	(0.13)	(0.15)	(0.15)	(0.22)	(0.22)	(0.18)	(0.18)	(0.21)	(0.21)
ASA classification (ref. ASA I)										
ASA II	0.02	0.02	0.06	0.06	−0.13	−0.13	−0.58**	−0.58**	−0.03	−0.03
	(0.11)	(0.11)	(0.12)	(0.12)	(0.20)	(0.20)	(0.17)	(0.17)	(0.16)	(0.16)
ASA III	0.30†	0.30†	−0.06	−0.06	−0.12	−0.14	−0.26	−0.26	−0.27	−0.27
	(0.16)	(0.16)	(0.20)	(0.20)	(0.28)	(0.28)	(0.24)	(0.24)	(0.25)	(0.25)
ASA IV†	1.48*	1.51*	0.68	0.70	0.28	0.40	−0.21	−0.23	0.00	0.00
	(0.66)	(0.66)	(0.81)	(0.81)	(1.09)	(1.09)	(0.86)	(0.86)	(.)	(.)
Self-reported health	−0.12**	−0.12**	−0.07†	−0.07†	−0.15*	−0.15*	−0.21**	−0.21**	−0.26**	−0.26**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)

(continued)

Table A1. (continued)

	Model 1a: Exams and procedures	Model 1b: Exams and procedures	Model 2a: Discharge	Model 2b: Discharge	Model 3a: Nurse	Model 3b: Nurse	Model 4a: Speak with physician	Model 4b: Speak with physician	Model 5a: Satisfaction with wait for surgery	Model 5b: Satisfaction with wait for surgery
Age	−0.01† (0.00)	−0.01† (0.00)	−0.00 (0.01)	−0.00 (0.01)	−0.00 (0.01)	−0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	−0.01 (0.01)	−0.01 (0.01)
Highest education (ref. abitur)										
No school certificate	0.02 (0.31)	0.03 (0.31)	0.25 (0.35)	0.25 (0.35)	1.52** (0.48)	1.53** (0.48)	0.02 (0.41)	0.01 (0.41)	0.15 (0.43)	0.15 (0.43)
Elementary school	−0.07 (0.16)	−0.07 (0.16)	0.24 (0.19)	0.24 (0.19)	1.10** (0.34)	1.09** (0.34)	−0.26 (0.26)	−0.27 (0.26)	0.02 (0.25)	0.02 (0.25)
Lower secondary school	−0.50** (0.16)	−0.50** (0.16)	−0.15 (0.19)	−0.15 (0.19)	0.81* (0.33)	0.79* (0.33)	−0.37 (0.25)	−0.37 (0.25)	−0.40 (0.26)	−0.40 (0.26)
Intermediate secondary school	−0.25† (0.13)	−0.25† (0.13)	0.05 (0.16)	0.05 (0.16)	0.35 (0.32)	0.33 (0.32)	−0.35 (0.23)	−0.35 (0.23)	−0.12 (0.21)	−0.12 (0.21)
Technical college	0.06 (0.15)	0.06 (0.15)	0.17 (0.19)	0.16 (0.19)	0.58† (0.35)	0.56 (0.35)	0.10 (0.26)	0.10 (0.26)	0.15 (0.24)	0.15 (0.24)
Native language German (ref. other language)	−0.08 (0.16)	−0.08 (0.16)	0.12 (0.20)	0.12 (0.20)	0.35 (0.33)	0.36 (0.33)	0.17 (0.23)	0.17 (0.23)	−0.33 (0.22)	−0.33 (0.22)
Share of private insured patients in hospital	−0.46 (0.94)	−1.52 (1.37)	−0.91 (0.94)	−1.99 (1.55)	−0.83 (1.22)	−4.88* (2.19)	0.58 (1.18)	1.39 (2.09)	0.06 (1.02)	−0.00 (2.07)
Private shared patients × share of privately insured patients in hospital		1.32 (1.25)		1.32 (1.52)		5.12* (2.32)		−0.98 (2.08)		0.08 (2.13)
Constant	−0.96* (0.39)	−0.93* (0.40)	−2.29** (0.47)	−2.27** (0.47)	−3.22** (0.75)	−3.22** (0.75)	−1.37* (0.58)	−1.39* (0.59)	−2.01** (0.59)	−2.01** (0.60)
N (patients)	4329.00	4329.00	4329.00	4329.00	3278.00	3278.00	2154.00	2154.00	4422.00	4422.00
N (hospitals)	86	86	86	86	86	86	85	85	86	86
AIC	3597.89	3598.78	2908.00	2909.25	1333.59	1330.76	1590.96	1592.73	1873.13	1875.13

Note. t statistics in parentheses. ASA = American Society of Anesthesiologists; AIC = Akaike information criterion.
†$P < .10.$ *$P < .05.$ **$p < .01.$

Declaration of Conflicting Interests

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