







Lost time: COVID-19 indemnity claim reporting and results in the Wisconsin workers' compensation system from March 12 to December 31, 2020

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Abstract

Background: The COVID-19 pandemic introduced a new compensable infectious disease to workplaces.

Methods: This was a descriptive analysis of Wisconsin COVID workers' compensation (WC) claims between March 12 and December 31, 2020. The impact of the presumption law (March 12 to June 10, 2020) was also evaluated.

Results: Less than 1% of working-age residents with COVID-19 filed a claim. COVID-19 WC claim rates (per 100,000 FTE) were notably low for frontline industry sectors such as Retail Trade ($n = 115$), Manufacturing ($n = 88$), and Wholesale Trade ($n = 31$). Healthcare workers (764 claims per 100,000 FTE) comprised 73.2% of COVID-19 claims. Most claims (52.8%) were denied and the proportion of denied claims increased significantly after the presumption period for both first responders and other occupations.

Conclusion: The presumption law made benefits accessible primarily to first responders. Further changes to WC systems are needed to offset the individual and collective costs of infectious diseases.

KEYWORDS

COVID-19, industry, occupation, presumption law, workers' compensation

1 | INTRODUCTION

Throughout the COVID-19 pandemic, infectious disease risk in the workplace has been a significant concern for workers, employers, and policymakers. Multiple studies have shown that SARS-CoV-2 can be transmitted rapidly in the work environment, and occupational outbreaks have been documented in a wide variety of work

settings.¹⁻³ In addition to the health impacts borne by workers, COVID-19 can place substantial economic burdens on employees in the form of medical expenses, wage loss, and lost work time. While 75% of private sector workers had access to paid sick leave as of March 2020,⁴ millions of workers remained without sick leave or with leave that was inadequate to cover lost time.⁵ In Wisconsin alone, the estimated wage loss for employees due to COVID-19 exceeded \$1.1

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billion as of March 2022, and each infected worker experienced an average lost work time of more than 1.5 weeks.^{6,7}

The workers' compensation (WC) system is the primary mechanism whereby workers who become sick or injured because of their job duties can receive compensation for lost wages or medical expenses. In general, WC systems are state-regulated, and the coverage provided by these systems is a combination of private, state-based, and self-insurance. In WI, there is no state carrier and WC coverage is provided through mostly private carriers and some self-insured employers. The WC system typically covers specific, recognized occupational risks that are inherent to the work itself, such as industrial accidents or acute toxic exposures. By contrast, common infectious diseases such as influenza are generally considered "ordinary disease[s] of life" as they are not specific to most work tasks or settings.⁸ Such "ordinary disease[s]" are defined in direct contrast to the recognized occupational diseases which are covered by WC.⁸

COVID-19 required many WC systems to contend with the impact of an infectious disease pandemic on the workforce. To address the burden of COVID-19 on occupations presumed to be at highest risk, several states passed rebuttable presumption laws.⁹ Such laws presume that covered workers acquire COVID-19 in the workplace and are therefore entitled to WC benefits without the need to prove work-relatedness. In Wisconsin, the rebuttable presumption law was in effect from March 12 to June 10, 2020 and covered only first responders.¹⁰ This law defined a first responder as "[...] an employee of or volunteer for an employer that provides firefighting, law enforcement, or medical treatment of COVID-19 [...]."¹⁰ Excluded were many workers classified as frontline, critical, or essential in state emergency orders and federal guidance.^{11,12} These workers were eligible to file COVID-19 compensation claims, but were required to present evidence to establish that their case of COVID-19 was work-related.¹³ This presented significant challenges as it required not only establishing a linkage with workplace transmission, but also the absence of disease exposures outside of work.¹⁴

Given the occupational risks of COVID-19 and the difficulty for most workers in establishing COVID-19 compensability, we sought to determine the extent to which infected workers availed themselves of the WC system for wage replacement. We reviewed Wisconsin's COVID-19 WC claims from March 12 to December 31, 2020, to assess how many workers filed claims, characterized claims across industries and occupations, and determined how many claims were denied. We also assessed the impact of Wisconsin's rebuttable presumption on first responders and examined whether the law was correlated with differences in claim denials over time.

2 | METHODS

2.1 | Study design and population

We assessed Wisconsin COVID-19 WC claim counts, claim rates, claimant characteristics (e.g., demographics and occupation), and claim outcomes. All claims filed from March 12 to

December 31, 2020, were included in the analysis. March 12 was selected because it was the date when Wisconsin's Governor first declared a public health emergency and, as such, it marked the beginning of Wisconsin's presumption law. To assess COVID-19 WC claimants relative to COVID-19 among the working age population, a reference group of noninstitutionalized persons aged 16–64 years was extracted from the Wisconsin Electronic Disease Surveillance System (WEDSS), the primary reporting database used by the Wisconsin Division of Public Health for electronic disease surveillance.

2.2 | COVID-19 and non-COVID-19 WC claims

Claim data were obtained from the Wisconsin Department of Workforce Development (DWD). As Wisconsin does not have state-funded WC coverage, all claims were from private insurance carriers (86%) or self-insured employers (14%).¹⁵ All WC first reports of injury reported to DWD, regardless of claim status, were included. The analysis was limited to claims that included a lost work time component only. In Wisconsin, medical claims are not reported to the WC Division and were not included in this analysis. The date of injury was used to determine the timing of the claim. Claims were stratified into a primary data set of COVID-19 WC claims and a comparison data set of non-COVID-19 claims. We identified COVID-19 WC claims by searching for the detailed claim information (DCI) nature of injury code 83 (COVID-19) or cause of injury code 83 (pandemic). To identify additional COVID-19 claims, we searched free text within the injury description field for the terms "corona," "covid," "ncov," and "sars-cov-2." Claims identified using the text search were manually checked for accuracy and included as COVID-19 claims if the description was consistent with a COVID-related absence or the injury description was consistent with exposure and infection with COVID-19.

2.3 | WC claimant data linkage to disease surveillance system

As the WC data did not have demographic and medical outcome variables, COVID-19 claimants were first matched with WEDSS to obtain demographic data, including race and ethnicity, episode date (i.e., symptom onset date or positive test date), hospitalization status, vital status, and comorbidities. Records were matched on full name (i.e., last name, first name, middle name, or middle initial) by using the Jaro–Winkler method¹⁶ and exact match on date of birth. This specific matching method was used to compensate for misspellings, nicknames, and typographical errors. Claimants were compared to the reference group of cases to assess WC utilization and to determine whether claimants differed from the reference group in terms of demographics or medical outcomes.

2.4 | Industry and occupation

Wisconsin's WC data did not contain standardized industry and occupation codes. Industry codes were derived by matching employers in the WC data to their respective North American Industry Classification System (NAICS) code,¹⁷ as recorded in Wisconsin's Unemployment Insurance (UI) data. Employers in the WC and UI data were matched on their federal employer identification number (FEIN).

NAICS industry codes and free-text occupation descriptions in the WC data were used to derive 2010 Standardized Occupation Codes (SOC)¹⁸ using the National Institute for Occupational Safety and Health (NIOSH) Industry and Occupation Computerized Coding System (NIOCCS) autocoder.¹⁹ NIOCCS produces both a standardized occupation code and a score reflecting the system's confidence in the match. All resulting matches were considered. Manual checks and cleaning were performed on industries and occupations that were missing NAICS and SOC codes as well as those with a matching probability of $\leq 50\%$. A total of 91.5% (18,841 of 20,311) of claims (99.5% of COVID-19 claims and 89.5% of non-COVID-19 claims) were assigned NAICS codes. Similarly, 89.6% (18,198 of 20,311) of claims (88.2% of COVID-19 claims and 89.9% of non-COVID-19 claims) were assigned a SOC.

Full-time equivalents (FTEs) for hours worked by industry and occupation were derived from the American Community Survey (ACS) 2020 data and used as denominators for claim rate calculations.²⁰ Federal workers and unemployed persons were excluded from the ACS 2020 data before FTE calculation to match the WC data structure. ACS FTE estimates were not available for seven industry subsectors and were excluded from the analysis (see Table 3 footnote).

We calculated claim rates as the proportion of claims to FTEs, expressed as claims per 100,000 FTE. COVID-19 and non-COVID-19 claim rates were calculated by industry (sectors and subsectors) and occupation (major and minor occupation groups) that had at least 20 claims and for which ACS denominators were available. The Management of Companies and Enterprises industry sector (NAICS code 55) was excluded due to the instability of the ACS estimates for this sector. Counts and rates are presented at the two-digit level for NAICS and SOC and the three-digit level for industry subsectors and minor occupation groups. All industries and occupations with fewer than 20 claims were suppressed in our rate calculations.

2.5 | Claim outcomes

In the Wisconsin WC data, only the first submission status field (WKC 13) is required. As such, we determined claim outcomes based on the combination of the submission status and payment information. Claims were considered denied if claim status was listed as "denied" at first WC submission status (WKC 13) and no payment was associated with the claim. Such state-reported denied claims included claims that were not initially and quickly denied by insurers, claims that went through arbitration, or initial denials that the insurer chose to report to the state voluntarily. Non-denied claims were either accepted or assigned to an

"other status" category which included "no lost time" (i.e., less than 3-day waiting period), "not compensable" (i.e., out-of-jurisdiction), and "missing status." Denial proportions were calculated based on the number of denied claims out of total claims. Results by industry and occupation are provided in terms of the proportion of denied claims for COVID-19 versus non-COVID-19 claims.

Payment data were limited to lost work time payments. In Wisconsin, lost work time payments can be awarded for temporary partial disability, temporary total disability, salary, and state hazardous pay. Wisconsin's temporary total disability pays two thirds of employee wages, with no specified maximum for COVID-19.¹³ Permanent total and partial disability payments depend on the past and future loss of income, but in practice such claims were rare in the COVID-19 data, likely due to the current lack of consensus around what constitutes permanent disability from COVID-19.²¹ Lost work time payments were calculated by industry sector (two-digit NAICS) only.

2.6 | Presumption period and presumption occupations

The presumption period was March 12 to June 10, 2020, and the post-presumption period was defined as June 11 to December 31, 2020. Under the presumption law, first responders included three major occupation groups (two-digit SOC): Healthcare Practitioners and Technical Occupations (29), Healthcare Support Occupations (31), and Protective Service Occupations (33). Minor and detailed occupation groups within those categories were excluded if their role did not fit within the first responder definition in Wisconsin's presumption law (i.e., if these groups were not defined as "first responders" under the law or were not "directly providing patient care"). A list of the excluded detailed occupation groups is provided as a footnote to Figure 2.

2.7 | Statistical analysis

To visualize the overall trend of COVID-19 cases, WC claims, first responders' claims, and non-first responders' claims, we plotted the monthly count on a logarithmic (base 10) scale. Categorical demographic variables are presented as counts and percentages. Summary statistics for lost work time payments included median payment, payment range, and total payment by industry sector. We computed the proportions of denied claims relative to the total claims submitted by industry sectors along with their 95% confidence intervals. Claim rate point estimates and their 95% confidence intervals are provided to allow for comparisons within and across industries and occupations. We examined the impact of the presumption law on claimants' outcomes by comparing the proportions of claims denied during and after the presumption period for first responders and other occupations. Continuous variables (age and lost work time payment) were summarized as to their median and range. A Wilcoxon rank sum test with continuity correction was conducted for comparison of categorical

variables. To assess the strength of association, we used a Pearson's Chi-square (χ^2) test of independence with a significance threshold (p -value) less than 0.05. As a post hoc secondary analysis, a two-sided Fisher's exact test was used as appropriate for comparisons. For all the tests performed, the significance threshold (p -value) of less than 0.05 was considered statistically significant. Data were cleaned, processed, and analyzed with SAS V9.4 (SAS) and R V4.0.5 (R Foundation for Statistical Computing).

2.8 | Ethical considerations

The University of Wisconsin Institutional Review Board (UW-IRB) provided written approval for the Wisconsin Fundamental-Plus Occupational Health Surveillance Program (Submission ID number: 2013-0331-CR010) under which this study was performed. The UW-IRB determined that this study met the requirements of public health surveillance as defined in the U.S. Department of Health and Human Services regulations for the protection of human subjects (45 CFR 46.102(l)(2)). Additionally, this activity was reviewed by the Centers for Disease Control and Prevention (CDC) and was conducted consistent with applicable federal law and CDC policy. This analysis did not require the informed consent of cases as these were administrative data reported to statewide public health surveillance databases.

3 | RESULTS

3.1 | COVID-19 and non-COVID-19 WC claims

During the study period, a total of 20,311 WC claims were filed by workers, of which 3,937 (19.4%) were identified as COVID-19 related. These COVID-19 claims were filed by 3,880 unique claimants, of whom 27 (0.7%) submitted multiple COVID-19 claims (Figure 1).

3.2 | COVID-19 cases and WC claims

There was a proportionate relationship between the trajectory of COVID-19 case incidence and COVID-19 WC claims, including an increase in WC claims filed in Fall 2020, coinciding with a statewide case surge (Figure 2). During the presumption period, the number of WC claims among first responders exceeded the number of WC claims filed by non-first responders (380 vs. 227, respectively; χ^2 , $p < 0.001$). After the presumption period (March 12 to June 10, 2020), the trajectory of WC claims for both occupation types was similar and aligned with the overall WC claims and COVID-19 case trajectory (Figure 2). Further analysis of the claim denials during and after the presumption period is provided in Section 3.6.

3.3 | COVID-19 claimant demographics and medical outcomes

During the study period, there were 392,219 working-age, non-institutionalized Wisconsin persons with confirmed or probable COVID-19 test results. We were able to match 3,637 out of our 3,880 COVID-19 WC claimants (93.7%) to COVID-19 positive cases in WEDSS to obtain claimant demographics and medical outcomes (i.e., hospitalization and death due to COVID-19).

We found significant associations between the worker type (claimant, reference population) and several key demographics including: age (χ^2 , $p < 0.001$), sex (χ^2 , $p < 0.001$), race (χ^2 , $p < 0.001$), ethnicity (χ^2 , $p < 0.001$), and hospitalization status (χ^2 , $p < 0.001$; Table 1).

COVID-19 claimants differed demographically from the reference population of all non-institutionalized working-age persons with COVID-19 (Table 1). Claimants appeared to be older than the reference population with the median age of 40.3 years and 38.7 years, respectively (Wilcoxon rank sum test, $p < 0.001$). Claimants were more likely to be in the 25–34 age category (Fisher's exact test,

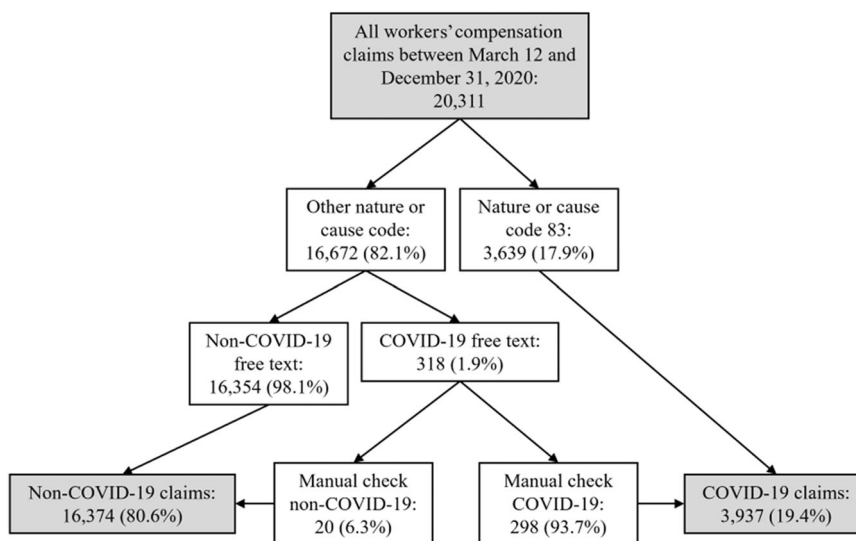


FIGURE 1 COVID-19 claim identification flow chart, Wisconsin, March–December 2020

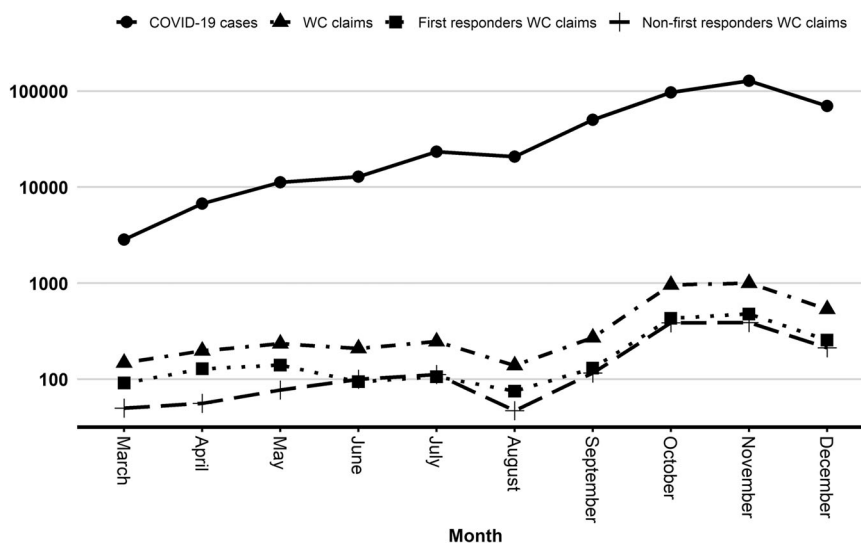


FIGURE 2 Trajectory of monthly COVID-19 cases, WC claims, first responders WC claims and non-first responders WC claims, Wisconsin, March–December 2020. WC, workers' compensation. Notes: Number of COVID-19 cases and WC claims graphed on logarithmic (base 10) scale. The data used to graph this figure are provided in the Supporting Information Table (Appendix A). First responders under the Wisconsin presumption law (*Wisconsin Statutes and Annotations 102.03(6)*)¹⁰ included Healthcare Practitioners and Technical Occupations (SOC 29), Healthcare Support Occupations (SOC 31), and Protective Service Occupations (SOC 33). Detailed occupational groups not directly involved in patient care were excluded, including: Other Healthcare Practitioners and Technical Occupations, Medical Equipment Preparers, Medical Transcriptionists, Veterinary Assistants and Laboratory Animal Caretakers, Forest Fire Inspectors and Prevention Specialists, Fish and Game Wardens, Animal Control Workers, and Private Detectives and Investigators.

25.9%), while the reference population had a higher percentage in the 15–24 age category (21.7%) (Fisher's exact test, $p < 0.001$; Table 1). Females made up a larger proportion of claimants than the reference population (61.1% vs. 52.8%, respectively; Fisher's exact test, $p < 0.001$; Table 1).

Although COVID-19 claimants and working age COVID-19-infected persons were mostly White, the proportion of Black or African Americans was significantly greater among claimants compared to the reference population (10.7% vs. 6.2%, respectively; Fisher's exact test, $p < 0.001$). Conversely, there were fewer Hispanic or Latino workers among claimants than the reference population (6.2% vs. 12.1%, respectively; Fisher's exact test, $p < 0.001$).

Regarding health risk factors and outcomes, claimants were significantly more likely to be hospitalized than the reference population (4.1% vs. 3.4%, respectively; Fisher's exact test, $p = 0.002$). However, a large proportion of hospitalization data were missing for both groups. Comorbidities and deaths did not significantly differ between WC claimants and the reference population (χ^2 , $p < 0.18$ and $p = 0.18$, respectively).

3.4 | Claim rates by industry and occupation

By industry, almost three-quarters of COVID-19 claims (73.2%) were in the Health Care and Social Assistance sector ($n = 2,881$; Table 2). The next two largest groups combined constituted less than 15% of COVID-19 claims: Transportation and Warehousing ($n = 406$, 10.3%) and Public Administration ($n = 155$, 3.9%). The other eight industry

sectors combined comprised 12.7% of COVID-19 claims. In contrast, non-COVID-19 claims were more evenly distributed across sectors. Manufacturing had the highest number of non-COVID-19 claims (20.5%; $n = 3,361$), while Health Care and Social Assistance made up 11% of non-COVID-19 claims ($n = 1,831$). COVID-19 claim rates (per 100,000 FTE) were highest in the Health Care and Social Assistance (764), Transportation and Warehousing (396), and Public Administration (167) sectors (Table 2).

Table 3 details COVID-19 claim counts and rates (per 100,000 FTE) by industry subsector. Couriers and Messengers, a subsector of Transportation and Warehousing, comprised 10% of claim counts and had the highest claim rate ($n = 3,230$). Within the Health Care and Social Assistance industry sector, the highest COVID-19 claim counts occurred in the subsectors of Hospitals ($n = 1,781$), Nursing and Residential Care Facilities ($n = 580$), and Ambulatory Health Care Services ($n = 479$). The highest number of non-COVID-19 claims were in Administrative and Support Services ($n = 1,059$), Executive, Legislative, and Other General Government Support ($n = 984$), and Food Manufacturing ($n = 765$; Table 3).

The highest COVID-19 claim rate (per 100,000 FTE) occurred in the Couriers and Messengers industry subsector, with a rate of 3,230 (95% CI: 2,673–3,787). Subsectors within the Healthcare and Social Services industry had the next highest COVID-19 claim rates: Hospitals (1,371; 95% CI: 1,004–1,737), Nursing and Residential Care Facilities (1,040; 95% CI: 720–1,359), and Ambulatory Health Care Services (346; 95% CI: 161–531). In contrast, the highest non-COVID-19 claim rates were observed in the subsectors of Executive, Legislative, and Other General Government Support (4,464; 95% CI:

TABLE 1 Workers' compensation COVID-19 claimant demographics and medical outcomes, Wisconsin, March–December 2020

	Claimant (N = 3,637)	Reference ^a (N = 392,219)	Pearson χ^2 p-value	Fisher's exact test p-value
Age				
15–24	521 (14.3%)	85,159 (21.7%)	<0.001	<0.001
25–34	943 (25.9%)	84,564 (21.6%)		<0.001
35–44	764 (21.0%)	75,091 (19.1%)		<0.001
45–54	700 (19.2%)	75,453 (19.2%)		0.3
55–64	586 (16.1%)	71,952 (18.3%)		0.03
Missing	123 (3.4%)	0 (0%)		
Sex				
Female	2,223 (61.1%)	207,115 (52.8%)	<0.001	<0.001
Male	836 (23.0%)	184,473 (47.0%)		<0.001
Missing	570 (15.7%)	31 (0.0%)		<0.001
Unknown	8 (0.2%)	600 (0.2%)		0.28
Race				
White	2,351 (64.6%)	311,127 (79.3%)	<0.001	<0.001
Black or African American	388 (10.7%)	24,283 (6.2%)		<0.001
Asian	67 (1.8%)	9,309 (2.4%)		0.14
American Indian or Alaska Native	28 (0.8%)	4,871 (1.2%)		0.001
Multiple Races	17 (0.5%)	1,683 (0.4%)		1
Native Hawaiian or Other Pacific Islander	9 (0.2%)	812 (0.2%)		1
Unknown	777 (21.4%)	40,134 (10.2%)		<0.001
Ethnicity				
Not Hispanic or Latino	2,676 (73.6%)	305,997 (78.0%)	<0.001	<0.001
Hispanic or Latino	225 (6.2%)	47,331 (12.1%)		<0.001
Unknown	736 (20.2%)	38,891 (9.9%)		<0.001
Morbidities				
No comorbidities	3,266 (89.8%)	355,457 (90.6%)	<0.18	0.06
One or more comorbidities	371 (10.2%)	36,715 (9.4%)		0.18
Unknown	0 (0%)	47 (0.0%)		1
Hospitalization due to COVID-19				
No hospitalization	1,947 (53.5%)	226,511 (57.8%)	0.002	0.002
Hospitalization	148 (4.1%)	133,223 (3.4%)		0.002
Missing	1,542 (42.4%)	152,485 (38.9%)		
Vital status				
Alive	3,626 (99.7%)	391,470 (99.8%)	0.18	0.244
Deceased to COVID-19	11 (0.3%)	749 (0.2%)		0.244

^aAll noninstitutionalized working age persons (16–64 years) with COVID-19 were extracted from the Wisconsin Electronic Disease Surveillance System (WEDSS), excluding claimants.

TABLE 2 COVID-19 and non-COVID-19 counts and claim rates by industry sector, Wisconsin, March–December 2020

NAICS ^a	Title	COVID-19 claims		Non-COVID-19 claims	
		Count (%) N = 3,937	Rate (95% CI) Rate per 100,000 FTE	Count (%) N = 16,374	Rate (95% CI) Rate per 100,000 FTE
62	Health Care and Social Assistance	2,881 (73.2%)	764 (489–1,038)	1,831 (11.2%)	485 (387–584)
48–49	Transportation and Warehousing	406 (10.3%)	396 (198–593)	1,296 (7.9%)	1,262 (1,104–1,421)
92	Public Administration	155 (3.9%)	167 (38–296)	1,171 (7.2%)	1,264 (1,105–1,422)
56	Administrative and Support and Waste Management and Remediation Services	58 (1.5%)	65 (0–145)	1,012 (6.2%)	1,135 (985–1,285)
44–45	Retail Trade	115 (2.9%)	47 (0–114)	1,762 (10.8%)	712 (593–832)
42	Wholesale Trade	31 (0.8%)	40 (0–104)	945 (5.8%)	1,234 (1,077–1,390)
54	Professional, Scientific, and Technical Services	36 (0.9%)	24 (0–72)	208 (1.3%)	137 (85–189)
72	Accommodation and Food Services	25 (0.6%)	23 (0–71)	499 (3.0%)	456 (361–552)
31–33	Manufacturing	88 (2.2%)	17 (0–58)	3,361 (20.5%)	645 (531–758)
61	Educational Services	28 (0.7%)	13 (0–49)	401 (2.4%)	185 (124–246)

Abbreviations: CI, confidence interval; NAICS, North American Industry Classification System.

^aIndustry sectors with fewer than 20 claims were suppressed. Percentages reflect the proportion of all COVID-19 (N = 3,397) or non-COVID-19 (N = 16,374) claims represented by each industry sector. Percentages do not add to 100% due to exclusion of some industry sectors.

4,171–4,756), Couriers and Messengers (2,353; 95% CI: 2,138–2,568), and Administrative and Support Services (1,345; 95% CI: 1,182–1,509; Table 3).

Claim counts and rates by major occupation (SOC) groups are shown in Table 4. Occupations that fell under Wisconsin's presumption law were among those with the highest rates of COVID-19-related claims (SOC 29, 31, and 33). The major occupation groups with the highest claim rates (per 100,000 FTE) were Healthcare Support (894; 95% CI: 761–1,028), Healthcare Practitioners and Technical (669; 95% CI: 554–785), and Personal Care and Service (408; 95% CI: 318–499). In contrast, the highest non-COVID-19 claim rates were observed in the major occupation groups of Transportation and Material Moving (1,603; 95% CI: 1,425–1,781), Building and Grounds Cleaning and Maintenance (1,059; 95% CI: 914–1,205), Production (999; 95% CI: 858–1,140; Table 4).

Table 5 shows differences in claim counts and rates by minor occupation (SOC) groups. The Health Diagnosing and Treating Practitioners' occupations made up 21% of COVID-19 claims. Three of the top five minor occupation groups with the highest COVID-19 claim rates (per 100,000 FTE) were healthcare related: Nursing, Psychiatric, and Home Health Aides (1,256; 95% CI: 1,098–1,414), Occupational Therapy and Physical Therapist Assistants and Aides (744; 95% CI: 622–866), and Health Diagnosing and Treating Practitioners (744; 95% CI: 622–866). Among non-COVID-19 claims, the highest claim rates were observed among non-healthcare-related occupations. Healthcare occupations collectively made up 55.6% of all COVID-19 claims (Table 5). The healthcare occupations include Health Diagnosing and Treating Practitioners, Health Technologists and Technicians, Other Healthcare Practitioners and Technical

Occupations, Nursing, Psychiatric, and Home Health Aides, Occupational Therapy and Physical Therapist Assistants, and Other Healthcare Support Occupations.

Another notable occupational group was Other Personal Care and Service Workers, a group that includes childcare workers and fitness instructors. The COVID-19 claim rate in this group was 865 (95% CI: 734–997), the second highest among all minor occupational groups, but their COVID-19 claim rate was not significantly different from the non-COVID claim rate. All other minor occupational groups for which a comparison was possible had significantly lower rates of COVID-19 claims compared with non-COVID-19 claims (Table 5).

3.5 | Claim outcomes

A review of all COVID-19 claims reported during the study period showed that there was a significant association between the claim status and the claim type ($p < 0.001$). Furthermore, the proportion of denied claims was higher for COVID-19 claims (52.8%) compared to non-COVID-19 claims (14.3%; $p < 0.001$; Table 6).

Figure 3 shows the proportion of denied claims by the industry sector for both COVID-19 and non-COVID-19 claims. The highest proportion of denied COVID-19 claims was in the industry sectors of Transportation and Warehousing (99.0%) and Professional, Scientific, and Technical Services (94.4%). Healthcare and Social Assistance was one of the industry sectors with the lowest proportion of denied claims (45.8%). In contrast, denials were relatively low for non-COVID-19 claims and ranged from 6.5% in Public Administration to 21.1% in Retail Trade.

TABLE 3 COVID-19 and non-COVID-19 counts and claim rates by industry subsector, Wisconsin, March–December 2020

NAICS ^a	Title ^b	COVID-19 claims		Non-COVID-19 claims	
		Count (%) N = 3,937	Rate (95% CI) Rate per 100,000 FTE	Count (%) N = 16,374	Rate (95% CI) Rate per 100,000 FTE
492	Couriers and Messengers	394 (10.0%)	3,230 (2,673–3,787)	287 (1.8%)	2,353 (2,138–2,568)
622	Hospitals	1,781 (45.2%)	1,371 (1,004–1,737)	578 (3.5%)	445 (350–539)
623	Nursing and Residential Care Facilities	580 (14.7%)	1,040 (720–1,359)	429 (2.6%)	769 (645–893)
921	Executive, Legislative, and Other General Government Support	146 (3.7%)	662 (407–918)	984 (6.0%)	4,464 (4,171–4,756)
621	Ambulatory Health Care Services	479 (12.2%)	346 (161–531)	236 (1.4%)	170 (112–229)
453	Miscellaneous Store Retailers	42 (1.1%)	234 (82–386)	64 (0.4%)	357 (272–441)
444	Building Material and Garden Equipment and Supplies Dealers	31 (0.8%)	96 (0–194)	316 (1.9%)	982 (842–1,121)
624	Social Assistance	41 (1.0%)	77 (0–165)	175 (1.1%)	330 (249–412)
561	Administrative and Support Services	57 (1.4%)	72 (0–157)	1,059 (6.5%)	1,345 (1,182–1,509)
311	Food Manufacturing	45 (1.1%)	56 (0–130)	765 (4.7%)	946 (809–1,083)
423	Merchant Wholesalers, Durable Goods	22 (0.6%)	51 (0–123)	387 (2.4%)	905 (771–1,039)
722	Food Services and Drinking Places	25 (0.6%)	27 (0–78)	367 (2.2%)	393 (304–482)
541	Professional, Scientific, and Technical Services	36 (0.9%)	24 (0–72)	214 (1.3%)	141 (88–194)
611	Educational Services	28 (0.7%)	13 (0–49)	375 (2.3%)	173 (114–232)

Abbreviations: CI, confidence interval; NAICS, North American Industry Classification System.

^aIndustry subsectors with fewer than 20 claims were suppressed. Percentages reflect the proportion of all COVID-19 (N = 3937) or non-COVID-19 (N = 16,374) claims represented by each industry subsector. Percentages do not add to 100% due to exclusion of some industry subsectors. Due to the quality of the NAICS codes, 193 claims from the Manufacturing sector could not be coded down to three digits to determine the subsectors.

^bThe following industry subsectors were excluded due to the lack of ACS rate denominators: Construction of Buildings (236), Heavy and Civil Engineering Construction (237), Specialty Trade Contractors (238), Monetary Authorities—Central Bank (521), Securities, Commodity Contracts, and Other Financial Investments and Related Activities (523), Lessors of Nonfinancial Intangible Assets (Except Copyrighted Works) (533), and Management of Companies and Enterprises (551).

The total lost work time payment for COVID-19 paid claims across all industries was \$2,287,282.70, of which Health Care and Social Assistance claimants received \$1,941,172.60 (85% of the total). The median lost work time payment across all industry sectors was \$1,099.00 and ranged from \$577.70 to \$5,970.90 (Table 7).

3.6 | Claim denials during and after the rebuttable presumption period

The proportion of denied COVID-19 claims among first responders increased from 18.4% (n = 70) during the presumption period (March 12 to June 10, 2020) to 43.8% (n = 677) after the presumption period (p = 0.001). The proportion of denied COVID-19 claims among other occupations also increased significantly, from 47.1% (n = 107) during the presumption period to 70.3% (n = 926) after the presumption

period (p = 0.033). For first responders, the proportion of denied non-COVID-19 claims was 12.5% (n = 41) during the presumption period and 13.6% (n = 122) after the presumption period (p = 0.838). For other occupations, the proportion of denied non-COVID-19 claims was 12.9% (n = 460) during the presumption period and 14.7% (n = 1,463) after the presumption period (p = 0.737; Table 8).

4 | DISCUSSION

4.1 | COVID-19 claim reporting

In Fall 2020, toward the end of our study period, Wisconsin had the nation's third highest rate of health-related work absences.²² Many of those absences were likely due to COVID-19.²³ Yet, as our analysis showed, Wisconsin workers reported comparatively few

TABLE 4 COVID-19 and non-COVID-19 counts and claim rates by major occupation groups, Wisconsin, March–December 2020

SOC ^a	Title	COVID-19 claims		Non-COVID-19 claims	
		Count (%) N = 3,937	Rate (95% CI) Rate per 100,000 FTE	Count (%) N = 16,374	Rate (95% CI) Rate per 100,000 FTE
31	Healthcare Support	770 (19.6%)	894 (761–1,028)	450 (2.7%)	523 (420–625)
29	Healthcare Practitioners and Technical	1,161 (29.5%)	669 (554–785)	633 (3.9%)	365 (279–450)
39	Personal Care and Service	182 (4.6%)	408 (318–499)	239 (1.5%)	536 (432–639)
43	Office and Administrative Support	460 (11.7%)	179 (119–239)	1,153 (7.0%)	448 (354–543)
33	Protective Service	65 (1.7%)	154 (98–210)	273 (1.7%)	647 (533–760)
21	Community and Social Service	54 (1.4%)	131 (80–182)	145 (0.9%)	351 (267–435)
37	Building and Grounds Cleaning and Maintenance	71 (1.8%)	110 (63–157)	684 (4.2%)	1,059 (914–1,205)
11	Management	256 (6.5%)	71 (33–109)	729 (4.5%)	202 (138–266)
35	Food Preparation and Serving Related	58 (1.5%)	70 (33–108)	496 (3.0%)	599 (489–708)
53	Transportation and Material Moving	104 (2.6%)	51 (19–83)	3,259 (19.9%)	1,603 (1,425–1,781)
49	Installation, Maintenance, and Repair	41 (1.0%)	39 (11–67)	946 (5.8%)	904 (770–1,038)
41	Sales and Related	79 (2.0%)	36 (9–63)	863 (5.3%)	393 (304–481)
51	Production	73 (1.9%)	26 (3–49)	2,807 (17.1%)	999 (858–1,140)
13	Business and Financial Operations	27 (0.7%)	17 (0–35)	272 (1.7%)	171 (113–230)
25	Education, Training, and Library	20 (0.5%)	13 (0–29)	137 (0.8%)	90 (47–132)

Abbreviations: CI, confidence interval; SOC, Standard Occupational Code.

^aMajor occupation groups with less than 20 claims were suppressed. Percentages reflect the proportion of all COVID-19 (N = 3,937) or non-COVID-19 (N = 16,374) claims represented by each major occupation group. Percentages do not add to 100% due to exclusion of some occupation groups.

COVID-19 claims for lost work time, comprising just 19% of indemnity claims filed during the study period. Wisconsin's COVID-19 claimants represented less than 1% ($n = 3,637$) of the 392,219 documented COVID-19 cases among Wisconsin's non-institutionalized working-age persons.

While differences in methodology and time frame make direct comparisons difficult, our results are consistent with the emerging picture of low COVID-19 claim reporting in the United States generally and in Wisconsin in particular.²⁴ Wisconsin's claim reporting is considerably lower than Italy's 5.2% of working-age COVID-positive residents filing claims (155,684 claims for more than 3 million cases) from March 2020 to February 2021.²⁵ Domestically, Wisconsin's figures are slightly lower than Washington state, where the presumption law was similarly restricted to first responders and healthcare workers.⁹ There, the proportion of workers who filed a claim relative to statewide working-age positive cases in 2020 was 3.2% (6,248 claims for 193,623 cases).²⁶ Wisconsin's lower figures (<1%) may have been related to the fact that Wisconsin's presumption law was in effect for only 3 months.¹³ Wisconsin's lower claim reporting may also have been compounded by the fact that the state

offers some of the lowest indemnity payments nationwide.²⁷ Nationally, in 2020, there were over 20 million COVID-19 cases among all age groups.²⁸ In a report of claims submitted by private insurance carriers across 38 states in 2020, 45,000 COVID-19-related claims were reported, although this total does not include some larger states,²⁹ indicating that the vast majority of COVID-19 cases among workers did not have associated claims. The national COVID-19 claim rate of 8 claims per 10,000 workers was considerably lower than the historical non-COVID-19 claim rate of 250 claims per 10,000 workers.²⁴ This paucity of COVID-19 claims relative to other claims is also reflected in our results.

Healthcare workers filed the vast majority (73.2%) of claims in Wisconsin. This finding parallels figures from several other studies.^{25,30,31} The largest numbers of healthcare claims were from Health Diagnosing and Treating Practitioners and Nursing, Psychiatric, and Home Health Aide Workers (Table 5). By contrast, other essential, critical, or frontline industry sectors such as Retail Trade, Wholesale Trade, Accommodation and Food Services, and Manufacturing had very low claim counts and claim rates (Table 2), despite the fact that several outbreak analyses^{32–36} have shown that these are

TABLE 5 COVID-19 and non-COVID-19 counts and claim rates by minor occupation groups, Wisconsin, March–December 2020

SOC	Title ^a	COVID-19 claims		Non-COVID-19 claims	
		Count (%) N = 3,937	Rate (95% CI) per 100,000 FTE	Count (%) N = 16,374	Rate (95% CI) per 100,000 FTE
311	Nursing, Psychiatric, and Home Health Aides	648 (16.5%)	1,256 (1,098–1,414)	356 (2.2%)	690 (573–808)
399	Other Personal Care and Service Workers	177 (4.5%)	865 (734–997)	197 (1.2%)	963 (825–1,102)
435	Material Recording, Scheduling, Dispatching, and Distributing Workers	300 (7.6%)	863 (732–994)	661 (4.0%)	1,901 (1,707–2,094)
312	Occupational Therapy and Physical Therapist Assistants and Aides	22 (0.6%)	744 (622–866)	NA	NA
291	Health Diagnosing and Treating Practitioners	852 (21.6%)	697 (579–815)	336 (2.1%)	275 (201–349)
292	Health Technologists and Technicians	302 (7.7%)	633 (520–745)	292 (1.8%)	612 (501–723)
319	Other Healthcare Support Occupations	100 (2.5%)	317 (237–397)	88 (0.5%)	279 (204–354)
372	Building Cleaning and Pest Control Workers	67 (1.7%)	168 (110–226)	535 (3.3%)	1,340 (1,177–1,503)
211	Counselors, Social Workers, and Other Community and Social Service Specialists	50 (1.3%)	155 (99–211)	129 (0.8%)	400 (311–490)
431	Supervisors of Office and Administrative Support Workers	23 (0.6%)	132 (81–184)	NA	NA
333	Law Enforcement Workers	29 (0.7%)	127 (77–178)	111 (0.7%)	487 (389–586)
439	Other Office and Administrative Support Workers	48 (1.2%)	108 (61–154)	146 (0.9%)	328 (247–409)
119	Other Management Occupations	236 (6.0%)	108 (61–154)	557 (3.4%)	254 (182–325)
352	Cooks and Food Preparation Workers	33 (0.8%)	103 (57–148)	173 (1.1%)	538 (435–642)
412	Retail Sales Workers	57 (1.4%)	94 (51–138)	448 (2.7%)	740 (619–862)
434	Information and Record Clerks	60 (1.5%)	76 (37–115)	201 (1.2%)	255 (183–326)
537	Material Moving Workers	72 (1.8%)	72 (34–110)	1,742 (10.6%)	1,745 (1,559–1,931)
499	Other Installation, Maintenance, and Repair Occupations	20 (0.5%)	39 (11–67)	648 (4.0%)	1,264 (1,106–1,423)
533	Motor Vehicle Operators	25 (0.6%)	28 (4–52)	1,457 (8.9%)	1,632 (1,452–1,811)
131	Business Operations Specialists	26 (0.7%)	27 (4–51)	240 (1.5%)	252 (181–323)
519	Other Production Occupations	22 (0.6%)	21 (1–42)	998 (6.1%)	962 (823–1,100)

Abbreviations: CI, confidence interval; SOC, Standard Occupational Code.

^aMinor occupation groups with less than 20 claims were suppressed. Percentages reflect the proportion of all COVID-19 (N = 3937) or non-COVID-19 (N = 16,374) claims represented by each minor occupation group. Percentages do not add to 100% due to exclusion of some minor occupation groups.

Claim status	COVID-19 claims N (%)	Non-COVID-19 claims N (%)	Pearson χ^2 p-value	Fisher's exact test p-value
Accepted	1,462 (37.1)	12,218 (74.6)	<0.001	<0.001
Denied	2,078 (52.8)	2,333 (14.3)		<0.001
Other status	397 (10.1)	1,823 (11.1)		0.59
Total	3,937 (100)	16,374 (100)		

TABLE 6 COVID-19 claims by first submission status, Wisconsin, March–December 2020

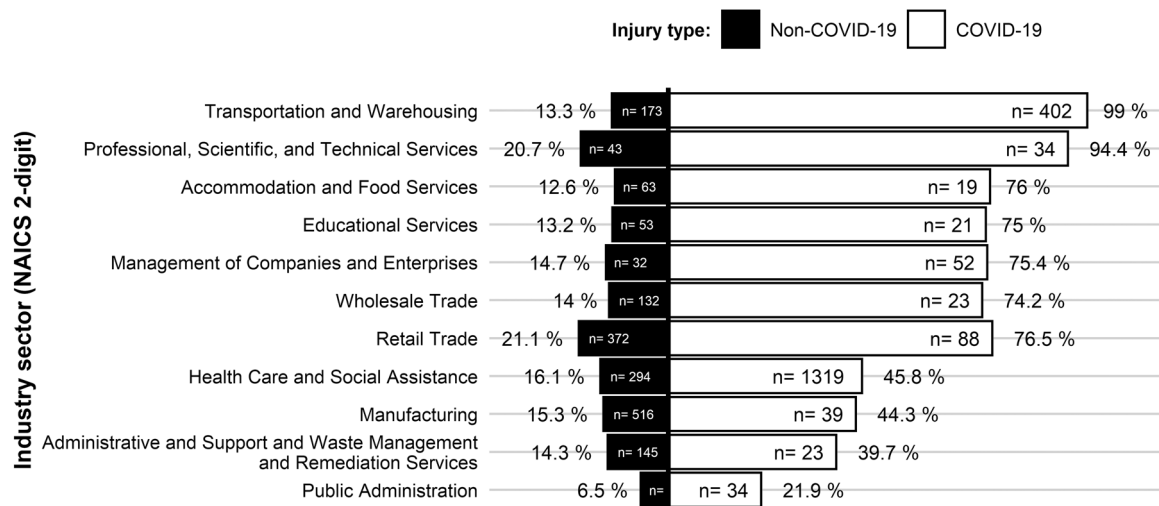


FIGURE 3 Percentage and number of non-COVID-19 and COVID-19 claims denied by industry sector, Wisconsin, March–December 2020. Notes: *n* denotes the number of COVID-19 and non-COVID-19 claims denied by the industry sector; bars represent the percentage of claims denied by the industry sector. Among industry sectors with fewer than 20 claims, there were 14 denied claims which accounted for 48% of the total claims in these sectors.

among the major industry sectors affected by COVID-19. These four industries combined represented 6.6% of COVID-19 claims ($n = 259$; Table 2). While COVID-19 likely drove workplace absences for such workers during the study period, the overwhelming majority of their lost work time claims ($n = 6,567$) were still for traditional, non-COVID-19 injuries or illnesses.

The exception in our data was Transportation and Warehousing, which had the third highest COVID-19 claim rate (396 per 100,000 FTE; $n = 406$ claims; Table 2). These claims were highly concentrated within delivery services, which are classified as Couriers and Messengers (Table 3). Nearly all of these were attributable to a single employer. This may speak to both infection risk³⁷ and the organizational context of that particular group of workers (e.g., workers' information or beliefs about COVID-19 claims, management practices, unionization status, WC insurance carrier, etc.).

Low claim reporting, including by workers in high-incidence industries, raises questions about the adequacy of supplemental payment options for exposed or ill workers. A certain portion of workers with mild or moderate illness across industries and occupations were likely able to use pre-existing or federally mandated paid sick leave during this time to cover their absences. Indeed, use of state and federally mandated sick leave in lieu of WC

was a key finding of a California study,³⁸ but the fact that California offered expansive state-mandated COVID-19 sick leave while Wisconsin offered none, raises questions about how much this effect pertained to Wisconsin workers.³⁹ For those whose lost work time exceeded paid leave, other factors, such as lack of information about how to claim or fear of repercussions, have been noted as a reason for non-claiming even among presumptive workers.³⁸ Such factors risk compound disparities and compromise public health. For those who need more leave time than available, the lack of COVID-19 WC protections for most Wisconsin workers encourages presenteeism^{27,40} with the potential to raise risks to individual workers as well as sustain COVID-19 outbreaks in both occupational and community settings.^{41,42} The lack of compensation can also undermine public health efforts by discouraging workers from testing, quarantining, or disclosing contact status to avoid absences. The dual economic (wage loss) and health (illness) effects of such policies for many low-wage workers can precipitate a further erosion of the social determinants of health by incurring greater medical costs, jeopardizing food security and housing stability and, for those who experience severe illness or develop long COVID without adequate leave time or medical care, curtailing lifetime earnings potential. Paradoxically, presenteeism also incurs substantial costs to employers.^{40,43}

TABLE 7 COVID-19 lost work time claim payment by industry sector, Wisconsin, March–December 2020

Title	Number of paid claims	Median	Minimum	Maximum	Total
Health Care and Social Assistance	1,193	\$1,173.3	\$0	\$33,628.2	\$1,941,172.6
Public Administration	59	\$1,676.8	\$459.2	\$6,452.4	\$118,852.5
Manufacturing	42	\$1,209.6	\$325.6	\$36,333.8	\$108,692.6
Administrative and Support and Waste Management and Remediation Services	32	\$1,256.5	\$266.7	\$5,971.7	\$45,206.8
Management of Companies and Enterprises	15	\$1,138	\$592.6	\$6,278.3	\$29,612.6
Retail Trade	12	\$709.2	\$517.8	\$1,328.3	\$9,254.9
Educational Services	6	\$1,060	\$533.3	\$2,277.2	\$6,951.1
Arts, Entertainment, and Recreation	4	\$606.4	\$160	\$826.2	\$2,199.1
Wholesale Trade	4	\$642.2	\$370.9	\$2,452.3	\$4,107.6
Finance and Insurance	3	\$986.7	\$906.7	\$3,153	\$5,046.4
Transportation and Warehousing	3	\$1,027.8	\$537.4	\$1,926.8	\$3,491.9
Accommodation and Food Services	2	\$589.4	\$572.1	\$606.7	\$1,178.8
Other Services (except Public Administration)	2	\$577.7	\$355.5	\$800	\$1,155.5
Mining, Quarrying, and Oil and Gas Extraction	1	\$3,153	\$3,153	\$3,153	\$3,153
Professional, Scientific, and Technical Services	1	\$1,236.4	\$1,236.4	\$1,236.4	\$1,236.4
Utilities	1	\$5,970.9	\$5,970.9	\$5,970.9	\$5,970.9

TABLE 8 Workers' compensation claim denial proportions among first responders and other occupations during and after the presumption period, Wisconsin, March 12 to December 31, 2020

Claim type	Occupation type	Period	Denial proportion	Pearson <i>p</i> -value
COVID-19	First responders ^a	Presumption (3/12–/10)	70 (18.4%)	0.001
		After presumption (6/11–12/31)	677 (43.8%)	
	Other occupations	Presumption (3/12–6/10)	107 (47.1%)	
		After presumption (6/11–12/31)	926 (70.3%)	
Non-COVID-19 ^b	First responders	Presumption (3/12–6/10)	41 (12.5%)	0.838
		After presumption (6/11–12/31)	122 (13.6%)	
	Other occupations	Presumption (3/12–6/10)	460 (12.9%)	
		After presumption (6/11–12/31)	1,463 (14.7%)	

^aFirst responders under the Wisconsin presumption law (*Wisconsin Statutes and Annotations* 102.03(6))¹⁰ included Healthcare Practitioners and Technical Occupations (SOC 29), Healthcare Support Occupations (SOC 31), and Protective Service Occupations (SOC 33). Detailed occupational groups not directly involved in patient care were excluded, including: Other Healthcare Practitioners and Technical Occupations, Medical Equipment Preparers, Medical Transcriptionists, Veterinary Assistants and Laboratory Animal Caretakers, Forest Fire Inspectors and Prevention Specialists, Fish and Game Wardens, Animal Control Workers, and Private Detectives and Investigators.

^bNon-COVID-19 claims are divided into presumption and non-presumption groups for descriptive comparison only, as the presumption would not have applied to non-COVID-19 claims.

Our analysis also may have implications for the interpretation of WC data more broadly. While our observed distribution of COVID-19 claims between workers in healthcare and other sectors is similar to that of other authors,³⁰ our analysis of claim reporting does not support the assertion that claims serve as a proxy for occupational

COVID-19 risk. Our comparison of medical factors for COVID-19 claimants versus a reference group of working-age cases, shows higher rates of hospitalizations in the claimant group. However, our data also showed that some groups with high COVID-19 exposure nationally, such as Hispanic or Latino workers,¹⁸ are

underrepresented in COVID-19 claims, even relative to their COVID-19 case levels. McInerney has noted under-reporting by Hispanics generally and attributes it to a combination of information barriers on WC and substantiated fears over higher risk of job loss after filing for WC.⁴⁴ Additionally, industries with high incidence rates, such as Accommodation and Food Services, Manufacturing, and Educational Services,³⁷ are only sparsely represented among COVID-19 claims in our analysis (see Table 2). This aligns with the patterns other researchers have generally noted of claiming being a function of factors beyond work-related illness or injury.¹⁸

4.2 | COVID-19 claim outcomes

Despite COVID-19 being a compensable injury for some Wisconsin workers, our findings showed most COVID-19 claims (52.7%) were denied by first submission status, and COVID-19 claims were nearly four times more likely to be denied than claims made for other types of illness or injury (14.3%; see Table 6). The proportion of denied claims in our data set is likely to be an underestimate because the state's reporting requirements do not mandate reporting of all denied claims (e.g., those deemed not compensable by insurers before the initial state reporting deadline).

Claim outcomes varied widely by industry, from 46% denied in healthcare to 99% in Transportation and Warehousing. Wisconsin's high denial rates for industries such as Manufacturing and Transportation and Warehousing, mirror findings from Washington State.²⁶ These results indicate the reticence of insurers to classify COVID-19 claims—especially outside of the healthcare sector—as work-related.⁴⁵

While presumption was in effect, less than one fifth of claims for covered healthcare workers and first responders were denied. This was only slightly above denial proportions for other, non-COVID-19 claims during the study period (see Table 8), but still much less favorable than in Washington State, where only 4% of COVID-19 claims for healthcare and social assistance workers were denied during the same time frame.²⁶ Once Wisconsin's 3-month presumption period expired, denials of these workers' claims more than doubled, from 18.4% to 43.8%. At the same time, other, non-presumptive workers also experienced fewer COVID-19 claim denials during the rebuttable presumption period (47.1% during vs. 70.3% after presumption). These findings are suggestive of rebuttable presumption having the desired effect of providing more coverage for first responders in Wisconsin,¹³ yet also suggest the influence of other factors which affected the outcomes of both presumptive and non-presumptive workers, including a possible spillover effect of the presumption law onto non-presumptive workers.

Both the high overall denial of COVID-19 claims and the relative success of healthcare sector workers were reflected in payment data. Healthcare sector workers comprised 70% of the claims and 80% of total payments. Median payments across industries were less than \$1,500 (\$1,438.37), for a total of \$2,287,282.70 in lost work time

payments for all COVID-19 claims during the study period. This puts Wisconsin at about half of the median, nationwide indemnity-only COVID-19 payment⁴⁵ but aligns with the National Council of State Legislatures' assessment that "90% of COVID-19 claims nationally have been small-dollar claims with negligible impact on the overall workers' compensation system."^{45,46} Even after accounting for sick leave and disability insurance, indemnity payments may have had a similarly negligible impact on net worker wage loss, estimated at over \$1,140,000,000 in Wisconsin and \$54,282,000,000 nationally as of April 2022.⁴⁶ With sparse indemnity payments to workers and private and public insurers bearing the costs of COVID-19 hospitalizations,⁴⁷ COVID-19 appears to be a clear example of Leigh and Marcin's finding that the costs for denied claims are "shifted to workers and their families, non-workers' compensation insurance carriers, and governments."⁴⁸

4.3 | Study strengths and limitations

This descriptive analysis of Wisconsin's 2020 COVID-19 WC claims is one of the first studies to review COVID-19 WC utilization and outcomes by industry and occupation and has the advantage of including the time period of rebuttable presumption in the analyses. Wisconsin's relatively short period of presumption law allows for an early examination of covered workers' outcomes during and after such protections. This analysis was focused on the pre-vaccine period, thus any differential rates of vaccination between industries would not have had any impact on the rates of infection and WC claim rates during the study period.

Our analysis improves on previous studies by implementing many of the best practices, such as using a statewide database rather than a single insurer and utilizing industry and occupation-specific rates to better allow for cross-group comparisons.⁴⁹ The study also offers methodological advances by matching WC data to public health case data, thereby allowing for additional information on most COVID-19 claimants and a more direct approximation of the percent of relevant cases that resulted in claims.

Such practices were made possible through multiple levels of rigorous data cleaning and linkage. For instance, our use of text mining and manual claims review allowed us to identify COVID-19 claims that would not otherwise have been identified. Our high match rate for assigning industry and occupation codes to claims (99.6% of COVID-19 claims and 89.5% of non-COVID-19 claims) allowed us to present a robust picture of claims in relation to work.

Our findings are subject to at least five limitations. First, Wisconsin's WC system excludes federal workers, some farm employees, and some businesses in Tribal territories. Second, the benefits paid (see Table 7) are limited to lost work time payments. Data on medical costs were not available, and it is possible that different patterns would emerge for medical claims than for lost work time claims. There is reason to believe that medical payments for COVID-19 claims are substantial. According to Wisconsin Compensation Rating Bureau, Wisconsin had one of the highest medical

payments per claim in the nation²⁷ and approximately 60%–70% of Wisconsin's total WC claim costs were for medical expenses.^{27,45} Unfortunately, those expenses cannot be accounted for in our analysis of lost work time payments.

Third, indemnity payments may underestimate overall payments to workers due to COVID-19. We cannot account for “good faith” payments made directly by employers to employees outside of the WC system.⁵⁰ Such informal practices may have been more common during the early pandemic when many industries voluntarily increased sick leave and there was uncertainty over the impact of the pandemic on WC insurance premium costs.⁵⁰

Fourth, there is the possibility of misclassification of some claims by injury type, industry, or occupation. We followed established practices where available⁵¹ and included manual reviews of results to minimize misclassification as a source of error. However, the relative newness of COVID-19 and the NIOCCS auto-coding system leaves open the possibility that some claims may have been misclassified either by insurers or through our analysis.

Lastly, our data cannot address the question of why workers—especially those outside of the healthcare sector—had low COVID-19 claim rates. Wisconsin's limited rebuttable presumption protections appear to have shaped the claiming environment. But the extent to which workers' reticence to claim compensation for COVID-19 was driven by any number of documented factors (e.g. low expectations of success; lack of information about COVID-19 compensability; workplace claiming culture; or even a reduced need for WC due to state, federal, and employer-provided alternatives), is beyond the scope of this study.³⁸

5 | CONCLUSION

In response to the COVID-19 pandemic, WC systems had to adapt to a novel infectious disease, even though most infectious diseases have generally not been recognized as compensable. Our study shows that the majority of reported claims and indemnity payments involved workers in the healthcare sector. Claim denials were significantly lower for first responders, including many healthcare workers, during the three months when such workers were covered by a rebuttable presumption law, although the presumption period also corresponded with lower denials for non-presumption occupations. Additional studies are needed to understand the reasons why non-healthcare workers were frequently unable to substantiate COVID-19 claims as work-related.

Our results demonstrated that only a fraction of COVID-infected workers received workers' compensation for lost time. While presumption laws and the recognition of COVID-19 as a compensable illness made benefits accessible to some workers, further changes to WC and other social insurance systems are likely needed to offset the individual and collective costs of infectious diseases in the workplace.

AUTHOR CONTRIBUTIONS

All authors contributed to the conceptualization, design of the work, writing, editing, and preparation of the manuscript for publication. Tracy Aiello contributed to data acquisition and contextualization of

the work. Komi K. S. Modji, Collin R. Morris, and Barbara Grajewski were primarily responsible for data acquisition, data curation, and data analysis. Authors Komi K. S. Modji, Collin R. Morris, Katherine McCoy, and Paul D. Creswell contributed to the interpretation of findings, drafted the manuscript, and revised it critically for important intellectual content. Authors Carrie D. Tomasallo, Ian Pray, and Jonathan G. Meiman provided critical reviews and feedback on the manuscript. All authors approved the final version and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Author Jonathan G. Meiman is the Principal Investigator of the Wisconsin Fundamental-Plus Occupational Health Surveillance Program.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author.

ETHICS APPROVAL AND INFORMED CONSENT

The University of Wisconsin Institutional Review Board (UW-IRB) provided written approval for the Wisconsin Fundamental-Plus Occupational Health Surveillance Program (Submission ID number: 2013-0331-CR010) under which this study was performed. The UW-IRB determined that this study met the requirements of public health surveillance as defined in the U.S. Department of Health & Human Services regulations for the protection of human subjects (45 CFR 46.102(l)(2)). Additionally, this activity was reviewed by the Centers for Disease Control and Prevention (CDC) and was conducted consistent with applicable federal law and CDC policy. This analysis did not require the informed consent of cases as these were administrative data reported to statewide public health surveillance databases.

DISCLOSURE BY AJIM EDITOR OF RECORD

John Meyer declares that he has no conflict of interest in the review and publication decision regarding this article.

DISCLAIMER

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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