



The impact of the COVID-19 pandemic on alcohol-related emergency department visits in the Netherlands: The ALCOVID study

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Abstract

Introduction. The ongoing COVID-19 pandemic has a profound impact on society and healthcare utilisation. Some studies found that alcohol consumption increased. While declines in non-COVID emergency department (ED) visits have been observed worldwide, little is known about the impact of the COVID-19 pandemic on the number of alcohol-related ED visits. We aimed to examine the changes in alcohol-related ED utilisation during the first year of the pandemic in the Netherlands. We assessed whether lockdowns, closure of the catering industry and alcohol bans were associated with changes in ED utilisation for alcohol-related emergencies. **Methods.** We performed a retrospective analysis of alcohol-related ED visits in a Dutch trauma level 2 centre, comparing the pandemic year 2020 and using the year 2019 as a reference. Alcohol-related ED visits were categorised as alcohol intoxication, alcohol-related trauma or a combination of both. **Results.** There was an absolute decline of 23.3% in alcohol-related ED visits during 2020 compared to 2019. The decline was most distinct during the second lockdown period (−60%, $P \leq 0.001$), which included an alcohol ban. No significant differences were found in the type of alcohol-related ED visits. The proportion of alcohol-related ED visits remained similar (2.2% vs. 2%). **Discussion and Conclusions.** Despite reports of higher alcohol consumption, we observed a reduction of alcohol-related ED visits during the COVID-19 pandemic. The decline was most distinct during the second lockdown period, which included an alcohol ban. Further prospective studies are warranted to examine this possible association. [Knapen FMFM, Laumer SJM, Van Osch FHM, Barten DG. The impact of the COVID-19 pandemic on alcohol-related emergency department visits in the Netherlands: The ALCOVID study. *Drug Alcohol Rev* 2022;41:476–483]

Key words: COVID-19, emergency service hospital, alcohol prohibition, pandemic.

Introduction

Alcohol-related attendances are a major driver of emergency department (ED) utilisation all around the world. This mainly concerns acute alcohol intoxications and alcohol-related injuries [1]. Previous studies showed a wide variation in the number of alcohol-related ED visits. This varied from 9% in rural Australia [2] and 12–15% in a large inner-city ED in the UK [3] to an average of 32.5% in US trauma centres [4]. In another study from South Africa, between 35.8% and 78.9% of trauma unit patients had consumed alcohol [5]. Furthermore, it has been shown that the consumption of alcohol increases the risk of more serious injury [6]. In addition to the impact on emergency care, alcohol consumption is responsible

for 1.3–3.3% of health costs globally and for 5.9% of all causes of annual deaths [7,8].

Compared to other countries, the alcohol consumption level in the Netherlands is considered to be moderate. On average, Dutch citizens consume 8.7 L of pure alcohol per year [9]. Approximately 55.6% of the population drink more than one unit of alcohol per day and 6.9% drink excessively [10]. Over the past 10 years, ED utilisation for alcohol-related problems in the Netherlands has steadily increased. Between 2008 and 2017, the number of alcohol intoxications treated in the ED increased by 39% [11].

The ongoing COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has an unprecedented impact on all health-care disciplines, including emergency care.

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Multiple studies have shown that the pandemic was associated with decreased ED utilisation, with reductions ranging from 16% to 50% [12–14].

This decline in ED utilisation may have protected EDs from overcrowding, despite their maintenance of full non-COVID ED care [15]. The causes for decreased ED utilisation in times of the pandemic are not entirely clear. Anxiety may have played a role, but improved hygiene and indirect lockdown effects are other possible explanations [12]. One of these indirect lockdown effects may be caused by the closure of bars, clubs and restaurants, which have been imposed in many countries. As a result of catering industry bans, there was a lower risk of nightlife-related injuries, and it may also have lowered alcohol consumption rates. On the other hand, there has been an increase in domestic violence during the pandemic, which was often associated with alcohol intake [16]. Substance abuse, such as excessive alcohol intake, may have increased due to boredom and/or the large psychosocial impact of the pandemic [17]. The government measures may have led to an increase in anxiety with alcohol being a dysfunctional strategy for some people to deal with these emotions [18]. Two studies found that 10.7–35.5% of the population had increased alcohol consumption compared to the start of the lockdown period [18,19].

The aim of this study was to estimate the impact of the COVID-19 pandemic on alcohol-related ED visits in the Netherlands and to assess whether lockdown measures were associated with alcohol-related ED utilisation patterns.

Methods

Study design and setting

We retrospectively investigated the number of alcohol-related ED visits in a level 2 trauma centre located in a combined urban and rural region in the southeast of the Netherlands. The ED has an annual ED census of 25 000 patients and the adherence area comprises 280 000 individuals. By 31 December 2020, there have been 796.981 confirmed infections (of which 20 077 were hospitalised) and 11 432 confirmed COVID-19 deaths in the Netherlands since the first Dutch COVID-19 case on 27 February 2020. The infection rate corresponds to 4623 cases per 100 000 inhabitants [19,20]. Alcohol-related ED utilisation was assessed for the pandemic year 2020, and the year 2019 was used as a reference. The year 2020 comprises the first COVID-19 wave (27 February–30 June) and the first part of the second COVID-19 wave (1 September–ongoing).

Impact of COVID-19 and government measures during the first and second lockdown period

The first lockdown period (described as ‘intelligent lockdown’ by the Dutch government) was imposed during the first COVID-19 wave (27 February–30 June). It included a stay-at-home order and a general advice to avoid social contacts. Furthermore, schools and public places – such as sports clubs, bars, restaurants and nightclubs – were closed. However, several essential shop categories remained open and it was allowed to visit parks, nature reserves and beaches. There was no alcohol ban.

The second lockdown was imposed during the second COVID-19 wave (1 September–ongoing). It was divided into two stages: a partial (14 October–15 December) and a total lockdown (15–31 December). Measures during the second lockdown were similar to those during the first lockdown period. However, non-essential stores were opened during the partial lockdown as opposed to the total lockdown period. At the time of the second lockdown, an alcohol ban was imposed. Both sales and consumption of alcoholic beverages were prohibited between 8 pm and 7 am [21].

During the first and second COVID-19 wave, the stringency index, a composite measure based on nine response indicators, including school closures, workplace closures and travel bans, was similar [22]. More detailed information on the first and second COVID-19 wave and the various stages of the two lockdown periods is included in the Appendix.

Data collection and outcome measures

Cases were identified through a search engine in the hospital’s electronic health record (EHR) (Chipsoft HiX, Chipsoft, Amsterdam, Netherlands). The files were extracted from the system if the medical record contained the words ‘alcohol’, ‘C2H5OH’ and ‘intoxication’. Each case was manually checked by the first author (FMFMK), screening both the medical and nursing file. Data were anonymously coded and stored in an online database (Castor Electronic Data Capture, Ciwit BV, Amsterdam, Netherlands).

Alcohol-related attendances were included if they concerned an alcohol intoxication, alcohol-related injury or a combination of both. Patients presenting with alcohol withdrawal syndromes and other disorders associated with alcohol consumption, such as alcoholic pancreatitis, Wernicke encephalopathy and decompensated liver cirrhosis, were not included in this study.

Alcohol intoxication was defined as an intercurrent clinically harmful condition caused by recent excessive alcohol intake that is characterised by disturbances in

consciousness, cognition, perception, affect behaviour or coordination [8,23,24,25]. Whether there was an alcohol intoxication or not was based on clinical appearance as described in the medical file, and not on blood alcohol concentration.

Alcohol-related injury was defined as any type of trauma which was associated with alcohol consumption. If an ED visit concerned both an alcohol intoxication as well as an alcohol-related injury, and it was not clear what was the main reason for the ED visit, it was labelled as 'combined reason'. In case of doubt about the categorisation, two other authors (SJL and DGB) were consulted and a decision was made upon agreement. Collected data included: age, gender, date and time of presentation.

Statistical analysis

Baseline characteristics were presented as means with SD or percentages. The number and type of alcohol-related visits were tested using logistic regression generating an odds ratio with 95% confidence interval or by means of a χ^2 -test. Pre-/post-odds were calculated for the different COVID-19 waves and lockdown periods by making a comparison with the corresponding period in the reference year 2019. The specific periods are described under the heading 'study design and setting', as well as in Table 1. The study protocol describing the design and statistical plan for the study was approved by the institutional review board of VieCuri Medical Centre, Venlo, Netherlands. Due to the retrospective and observational approach of the study, a waiver of informed consent was provided.

Results

The search yielded 8355 unique ED episodes over a 2-year period. Subsequent manual checks of these episodes resulted in 887 ED visits that could be labelled as alcohol-related (Figure 1).

From 1 January to 31 December 2019, 23 176 patients visited the ED. In 2020, this number decreased to 19 237 patients (−17%). There were 502 alcohol-related visits in 2019, and 385 in 2020 (−23.3%, $P = 0.238$). These correspond to 2.2% and 2% of all ED visits, respectively. Types of alcohol-related visits as well as age and gender distribution were similar between 2019 and 2020 (Table 2; Figure 2). For the entire study period, there were significant gender differences with regards to the type of alcohol-related visit ($P = <0.001$). While women more often presented with an alcohol intoxication (44% vs. 25.5%), men were more likely to present with an alcohol-related trauma (69.3% vs. 52.5%) (Table 3).

Alcohol-related ED utilisation was compared for different phases of the pandemic (Table 1). In absolute terms, there has been a decrease in the number of alcohol-related ED visits during all different phases of the COVID-19 pandemic compared to the reference year. No statistically significant difference in alcohol-related ED visits was found for the first COVID-19 wave (−34.7%, $P = 0.225$). The closure of the catering industry during the first lockdown period was also not associated with significant changes in ED utilisation (−41.8%, $P = 0.304$). In contrast, a significant difference was found with regards to the second COVID-19 wave (−49.5%, $P = <0.001$).

A similar trend was observed with lockdown periods. During the first lockdown period, alcohol-related ED

Table 1. Number of alcohol-related visits during COVID-19 waves and lockdown periods in 2020

	2019	2020	OR	95% CI	Sig. (P)	Pre-/post-ratio
Total	502	385	0.92	0.81, 1.05	0.238	0.77
First COVID-19 wave	170	111	0.86	0.68, 1.10	0.225	0.65
Date: 27 February–30 June						
First lockdown period (intelligent lockdown)	58	31	0.80	0.52, 1.24	0.322	0.53
Date: 23 March–11 May						
Closure of catering period 1	98	57	0.84	0.61, 1.17	0.304	0.58
Date: 15 March–1 June						
Second COVID-19 wave	186	94	0.61	0.48, 0.79	<0.001	0.51
Date: 1 September–31 December						
Second lockdown (partial and total lockdown)	109	44	0.52	0.37, 0.74	<0.001	0.40
Date: 14 October–31 December						
Second phase of second lockdown (total lockdown)	20	9	0.63	0.28, 1.39	0.250	0.45
Date: 15–31 December						

Odds ratios (OR) are calculated on the total number of emergency department visits in the corresponding time periods in the reference year 2019. CI, confidence interval.

utilisation was not significantly different to the reference period (-46.5%, $P = 0.322$). Conversely, when compared to the reference period, alcohol-related ED utilisation was significantly lower during the second lockdown (-59.6%, $P = <0.001$).

Discussion

Several studies have shown that alcohol consumption has increased during the COVID-19 pandemic [18,19,26,27], raising concerns over possible increases of alcohol-related emergencies. However, these concerns are not supported by the findings in our cohort. Instead, we

observed an absolute decline of 23.3% in alcohol-related ED visits during the pandemic year 2020 compared to the reference year 2019. The decline was most distinct during the second lockdown period, which included an alcohol ban.

A Dutch study investigating the number of acute alcohol intoxications among <18 year olds observed a 70% decrease of ED visits during the first lockdown period compared to the pre-lockdown period [28]. A study from the USA on the impact of the COVID-19 pandemic on suicidal ideations and alcohol presentations in EDs revealed a 14.6% decline during a one-month period in early 2020 [29]. Similarly, another US study on the impact of COVID-19 on ED utilisation for substance use disorders in the early pandemic period (13 March–31 July 2020) reported a 16% decline for alcohol use disorders [30]. These declines slightly differed from the 23.3% reduction in our study. This difference may be explained by a more specific study period used in these studies, that is, the first COVID-19 wave as opposed to our study where of the entire year 2020 was studied. Furthermore, inclusion and exclusion criteria may be different. Moreover, ED case mix and utilisation patterns are known to be dissimilar between countries [31]. The average alcohol intake in the USA and the Netherlands is considered similar [9]. However, there may be significant differences between regions.

The reduction of alcohol-related ED visits during the COVID-19 pandemic is probably multifactorial. First, the drop in alcohol-related ED visits may reflect a combination of social isolation policies and a general reluctance to seek care for fear of contracting a COVID-19 infection in the hospital [12,32]. However, one should expect that the impact of fear would have been lower during the second wave than during the first wave, when COVID-19 was a novel, relatively unknown disease. Second, the closure of restaurants and bars seems

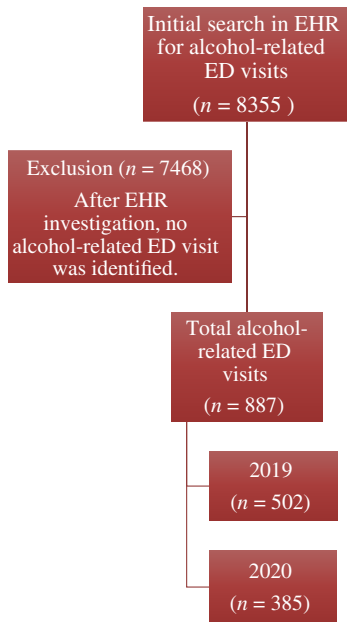


Figure 1. Total identified alcohol-related emergency department (ED) visits. EHR, electronic health record.

Table 2. Patient characteristics and number and type of alcohol-related visits

	2019	2020	Sig. (P)
Total ED visits	23 176	19 237	
Total alcohol-related visits	502 (2.2%)	385 (2%)	0.238 ^a
Type of visit			
Alcohol intoxication	153 (30.5%)	126 (32.7%)	0.475 ^b
Alcohol-related injury	323 (64.3%)	244 (63.4%)	0.766 ^b
Both	26 (5.2%)	15 (3.9%)	0.369 ^b
Patient characteristics			
Gender			0.916 ^a
Male	342 (68%)	261 (68%)	
Female	160 (32%)	124 (32%)	
Age, years	41 ± 18	43 ± 18 (n = 384)	0.083 ^c

Data are numbers (%). ^a χ^2 -test. ^bOdds-ratio. ^cMann-Whitney test. ED, emergency department.

Alcohol-related ED visitis

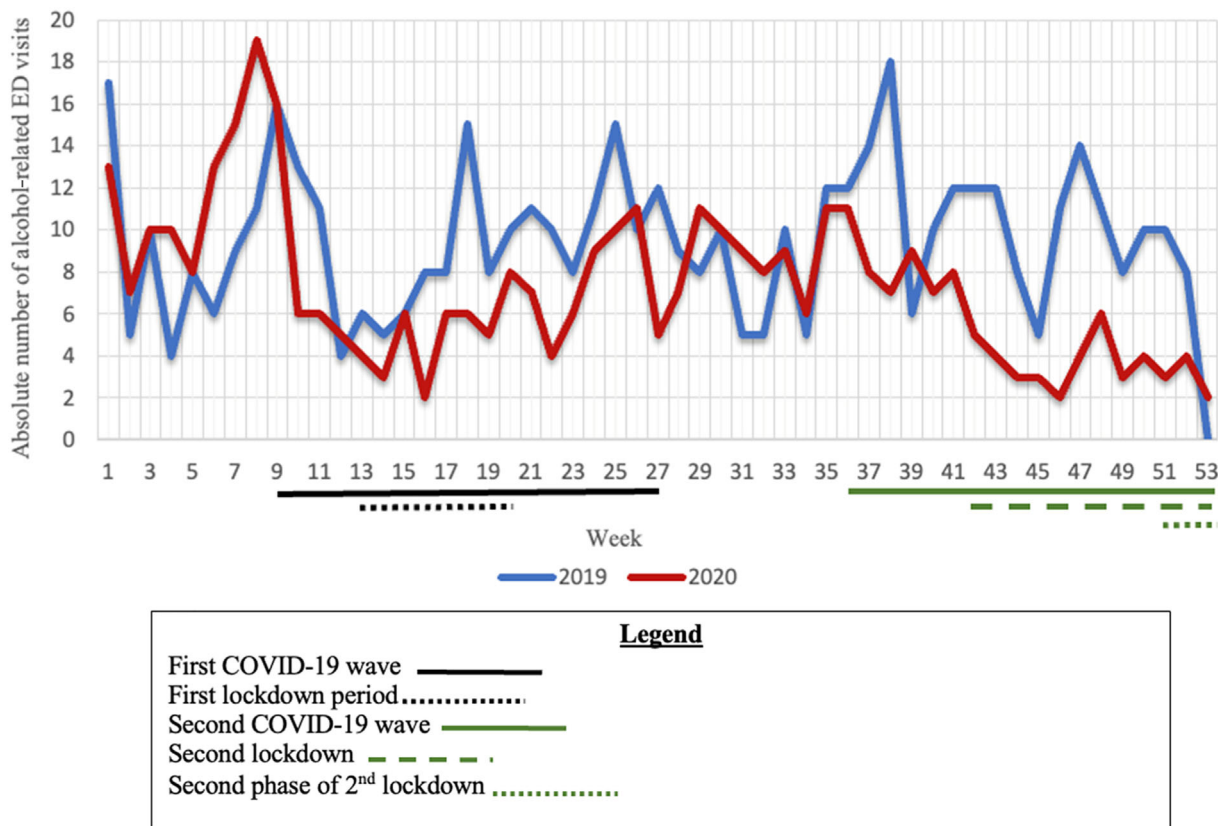


Figure 2. Overview of alcohol-related emergency department visits in 2019 and 2020. Results are presented as the absolute number of alcohol-related emergency room visits per week. The peak around week 7 can be explained by a Dutch tradition/festivity called carnival, the peak around week 18 could be explained by the May holiday. ED, emergency department.

Table 3. Gender difference within type of visit

	Male	Female	Sig. (P)
Total	603	284	
Type of visit		125 (44%)	<0.001 ^a
Alcohol intoxication	154 (25.5%)		
Alcohol-related injury	418 (69.3%)	149 (52.5%)	
Both	31 (5.1%)	10 (3.5%)	

Data are numbers (%). ^a χ^2 -test.

to have played a role in the reduction of ED visits as some studies report shifts away from the harmful drinking that typically arises in social settings outside the home [27]. Changing mobility trends may have influenced the number of alcohol-related ED visits throughout the COVID-19 pandemic. Google Mobility Trends showed that ‘retail and recreation’ mobility dropped to -49% during the first COVID-19 wave compared to the pre-pandemic period. During the

second COVID-19 wave, this decline reached -58% [22]. It is unknown whether to what extent these mobility trends correlate with ED utilisation patterns.

During the first COVID-19 wave and lockdown period, numbers of alcohol-related ED visits declined to the same extent as overall ED visits. Conversely, during the second COVID-19 wave and lockdown period, alcohol-related ED visits dropped to a greater extent than overall ED visits. An alcohol ban was only imposed

during the second lockdown, which may possibly explain this difference. However, further prospective studies are warranted to examine this possible association. Contrary to the above, de Cauwer *et al.* describes that after the first lockdown with clearly less admissions and referrals by general practitioners, the summer of 2020 and the second lockdown period resulted in more urgent admissions and the relapse of alcoholism in those who recently stopped drinking before the lockdown [33].

The association of an alcohol ban with reduced alcohol-related ED visits has been observed in some other studies too. After the COVID-19 alcohol ban was imposed in South Africa, a 53–59% drop in the number of trauma admissions was noted between the no-ban and complete alcohol ban period [34,35]. Another South African study showed equivalent results, estimating that EDs received 5000 fewer visits on a weekly basis, with more lives saved from alcohol-related causes than lives lost to COVID-19 [36]. Finally, a study by Moultrie *et al.* showed a significant decrease in the number of unnatural South African deaths during times of alcohol sales restrictions. [37]. These results may not be representative for the rest of the world. The estimated alcohol consumption level per capita in South Africa in 2016 is 9.3 L per year; substantially less than many other countries. However, the amount consumed per drinker is close to 29.9 L per adult, which is among the highest in the world [9].

A strength of the study is the long study period. Furthermore, this is one of the few studies that examined the influence of lockdown periods, the closure of the catering industry and alcohol bans on alcohol-related ED utilisation. Study limitations include its single centre design, which limits generalisation to other communities. Second, the retrospective nature of the study may have resulted in an underestimation of the presence of alcohol-related trauma, as this information sometimes is absent in the medical file. Nonetheless, this would apply to both the reference and the pandemic year. Finally, there may be unknown confounders that could have attributed to the differences between the first and second COVID-19 wave which were not taken into account in this retrospective study.

Conclusion

Despite reports of higher alcohol consumption, we observed a reduction of alcohol-related ED visits during the COVID-19 pandemic. The decline was most distinct during the second lockdown period, which included an alcohol ban. Further prospective studies are warranted to examine this possible association.

Acknowledgement

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Conflict of Interest

The authors have no conflicts of interest.

Data Availability Statement

The ALCOVID protocol and anonymous dataset is available from the corresponding author on reasonable request.

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Appendix

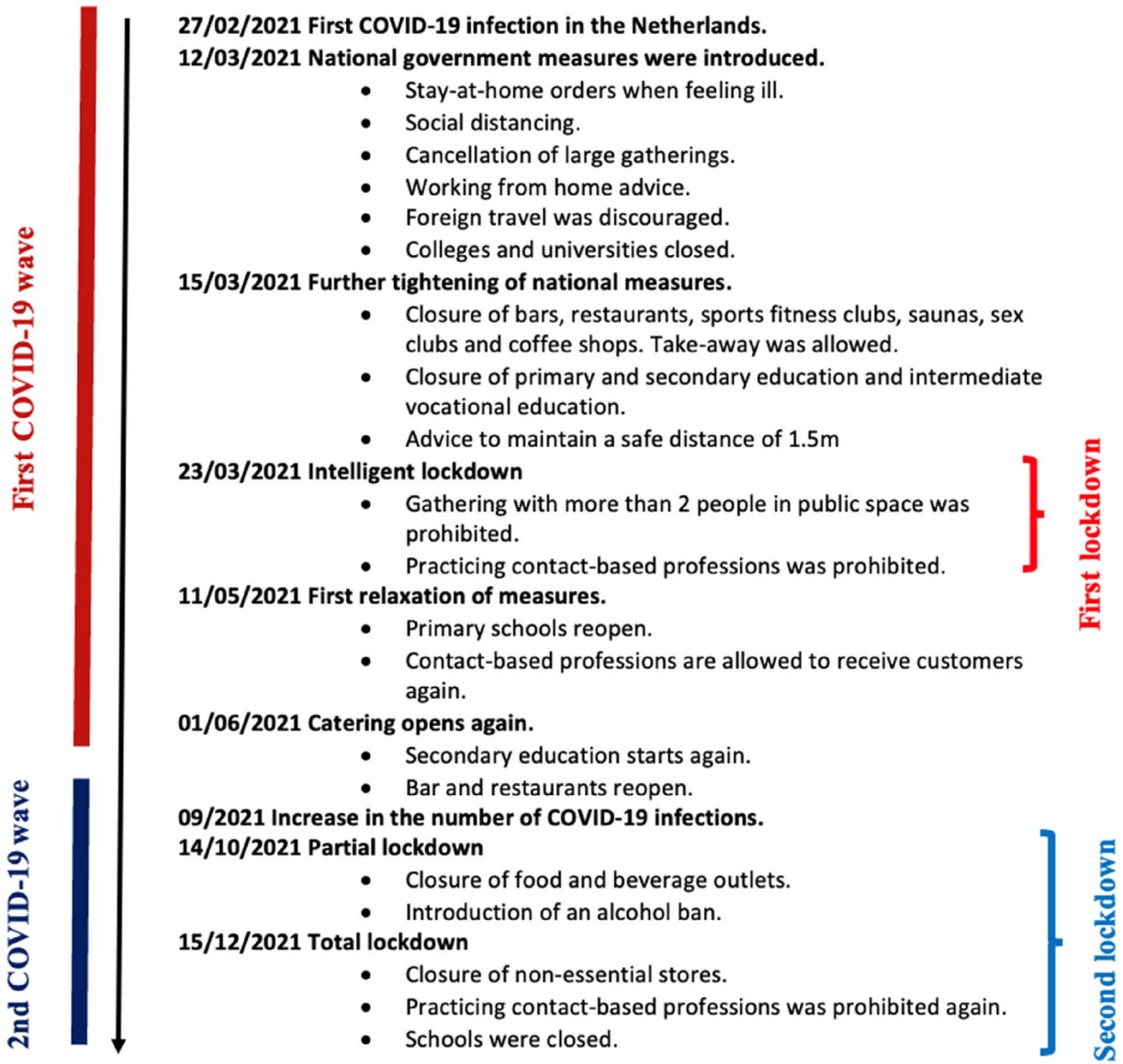


Figure A1. Overview of lockdown dates and restrictions during the COVID-19 pandemic in the Netherlands [21,25].