A Probabilistic Domain-knowledge Framework for Nosocomial Infection Risk Estimation of Communicable Viral Diseases in Healthcare Personnel: A Case Study for COVID-19

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SUBMISSION DATE / POSTED DATE

06-11-2021 / 11-11-2021

CITATION

Huynh, Phat (2021): A Probabilistic Domain-knowledge Framework for Nosocomial Infection Risk Estimation of Communicable Viral Diseases in Healthcare Personnel: A Case Study for COVID-19. TechRxiv. Preprint. <https://doi.org/10.36227/techrxiv.16943434.v1>

DOI

[10.36227/techrxiv.16943434.v1](https://doi.org/10.36227/techrxiv.16943434.v1)

TABLE 1S

CHARACTERISTICS OF THE SELECTED FEATURES AND THEIR ASSOCIATED DATABASES

Features		Values/Units	Notation	Characteristics	Data sources
Time from symptom onset to hospitalization		Days	SOH_{time}	Secondary clinical attack rate is significantly high within the first 5 days from symptom onset	COVID-19 transmission dynamics data in Taiwan
Clinical severity of patients		Discrete	CS	Be classified into: Asymptomatic, Mild illness, Mild pneumonia, Severe pneumonia, and ARDS/sepsis	
PPE sufficiency level		%	PPE_{SL}	To assess the sufficiency level, we used the answer of nurses and physicians to the question: “Does your hospital have adequate PPE for clinicians to treat the patients you have right now?”. In addition, Texas Health Center COVID-19 Survey Summary Report provided the Health Centers with an adequate supply of (PPE) for the next week.	1. California COVID-19 Health Surveys: Data and Charts 2. Texas Health Center COVID-19 Survey Summary Report
Contact with others		Score from 0 to 1	CO	The four physical job attributes help to determine the occupational-specific risk score: <ul style="list-style-type: none">• Contact with others: How much does this job require the worker to be in contact with others to perform it?• Physical proximity: To what extent does this job require the worker to perform tasks in close physical proximity to others?• Exposure to disease/infection: How often does this job require exposure to disease or infection?• Working hours per week	U.S. Department of Labor O*Net database
Physical proximity			PP		
Exposure to disease/infection			EI		
Working hours per week			N_{hours}		
Patient characteristics	Age	Continuous	Age	Age of HCP	Cross-sectional observational study of UK-based healthcare workers
	Having Cancer	Binary	$Cancer$	HCP’s comorbidities include cancer	
	Having respiratory disease	Binary	$Resp$	HCP’s comorbidities include respiratory disease	
	Having obesity	Binary	$Obes$	HCP’s comorbidities include obesity	
	Current or Ex-smoker within 1 year	Binary	$Smoker$	HCP is a current smoker or ex-smoker within one year	
Work details	Allied health professionals	Binary	$Allied_prof$	HCP is a current smoker or ex-smoker within one year	
	Dentists and dental staffs	Binary	$Dental_staff$	HCP is a dentist or a dental staff	
	Doctors	Binary	$Doctor$	HCP is a doctor	
	Use public transport	Binary	Pub_trans	HCP uses public transport to travel to work	
Workplace exposure	Regular clinical contact	Discrete	$C_contact$	Having Regular clinical contact with suspected or confirmed COVID-19 patients	
	Regular exposure to AGPs	Discrete	AGP	Having Regular exposure to aerosol generating procedures (AGPs) performed in suspected or confirmed COVID-19 patients	
PPE usage	Sufficient training in PPE use	Binary	PPE_train	Having Sufficient training in PPE use before handling patients	
	Lacked access to PPE	Binary	$Lacked_PPE$	Lacked access to PPE items for clinical contact with suspected or confirmed COVID-19 patients	
	Clinical contact without adequate PPE	Discrete	$Cont_wo_PPE$	Be classified into never, rarely, sometimes, often, always	
	Used improvised PPE	Binary	Imp_PPE	HCP has used improvised (customized) PPE	