



## **D4.6 ASSESSING STRATEGIES FOR IMPROVING HOSPITAL CAPACITY FOR HANDLING PATIENTS DURING A PANDEMIC**

**Project acronym:** BuildERS

**Project title:** Building European Communities' Resilience and Social Capital

**Call:** H2020-SU-SEC-2018-2019-2020/H2020-SU-SEC-2018



This project has received funding from the European Union's Horizon2020 research and innovation programme under grant agreement No. 833496

## Disclaimer

The content of the publication herein is the sole responsibility of the publishers and it does not necessarily represent the views expressed by the European Commission or its services.

While the information contained in the documents is believed to be accurate, the authors(s) or any other participant in the BuildERS consortium make no warranty of any kind with regard to this material including, but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Neither the BuildERS Consortium nor any of its members, their officers, employees or agents shall be responsible or liable in negligence or otherwise howsoever in respect of any inaccuracy or omission herein.

Without derogating from the generality of the foregoing neither the BuildERS Consortium nor any of its members, their officers, employees or agents shall be liable for any direct or indirect or consequential loss or damage caused by or arising from any information advice or inaccuracy or omission herein.



<b>Project no.</b>	833496
<b>Project acronym:</b>	BuildERS
<b>Project title:</b>	Building European Communities' Resilience and Social Capital
<b>Call:</b>	H2020-SU-SEC-2018-2019-2020/H2020-SU-SEC-2018
<b>Start date of project:</b>	01.05.2019
<b>Duration:</b>	36 months
<b>Deliverable title:</b>	D4.6 Assessing Strategies for Improving Hospital Capacity for Handling Patients during a Pandemic
<b>Due date of deliverable:</b>	30.09.2021
<b>Actual date of submission:</b>	31.12.2021
<b>Deliverable Lead Partner :</b>	George Mason University
<b>Work Package:</b>	WP4
<b>No of Pages:</b>	7
<b>Keywords:</b>	COVID-19; SARS-CoV-2; Hospital capacity management; Intensive care; Infectious patient care

<b>Name</b>	<b>Organization</b>
Bahar Shahverdi (BS)	George Mason University, Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering, Fairfax, VA, USA
Elise Miller-Hooks (EMH)	George Mason University, Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering, Fairfax, VA, USA
Mersedeh Tariverdi (MT)	The World Bank, Washington, D.C., USA
Hadi Ghayoomi (HG)	George Mason University, MS, Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering, Fairfax, VA, USA
David Prentiss (DP)	George Mason University, MS, Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering, Fairfax, VA, USA
Thomas D. Kirsch (TDK)	National Center for Disaster Medicine and Public Health, Uniformed Services University, Bethesda, MD, US



## Dissemination level

<b>PU</b>	Public
-----------	--------

## History

Version	Date	Reason	Revised by
01	17.05.2021	Submitted for possible publication in Disaster Medicine and Public Health Preparedness	BS, EMH, MT, HG, DP, TDK
02	01.09.2021	Revised	BS, EMH, MT, HG, DP, TDK
03	23.12.2021	Under review in Disaster Medicine and Public Health Preparedness	
04	23.12.2021	D4.6 final version	TON/TOI
<b>Final</b>	31.12.2021	Submission to the EC	AMH/VTT



## Executive Summary

D4.6 consist of a scientific publication based on the work done in T4.6 in USA by George Mason University. The scientific article has been submitted to the Disaster Medicine and Public Health Preparedness.

The content of the paper has been included in D4.8, which sums up all the main results from the case studies in BuildERS WP4.

On the next pages, the abstract of the article can be found.

The work was funded by National Science Foundation grant 2027624 and the World Bank Group.



## **Models for Assessing Strategies for Improving Hospital Capacity for Handling Patients during a Pandemic**

Shahverdi, B., E. Miller-Hooks, M. Tariverdi, H. Ghayoomi, D. Prentiss, T. D. Kirsch

Journal: Disaster Medicine and Public Health Preparedness

*Reference: Shahverdi, B., E. Miller-Hooks, M. Tariverdi, H. Ghayoomi, D. Prentiss, T. D. Kirsch, (under review) Models for Assessing Strategies for Improving Hospital Capacity for Handling Patients during a Pandemic, Under review in Disaster Medicine and Public Health Preparedness*

### **Abstract**

#### **Objective**

The aim of this study was to investigate the performance of key hospital units associated with emergency care of both routine emergency and pandemic (COVID-19) patients under capacity enhancing strategies.

#### **Methods**

This investigation was conducted using whole-hospital, resource-constrained, patient-based, stochastic, discrete-event simulation models of a generic 200-bed urban U.S. tertiary hospital serving routine emergency and COVID-19 patients. Systematically designed numerical experiments were conducted to provide generalizable insights into how hospital functionality may be affected by the care of COVID-19 pandemic patients along specially designated care paths under changing pandemic situations from getting ready to turning all of its resources to pandemic care.

#### **Results**

Several insights are presented. For example, each day of reduction in average ICU length of stay increases intensive care unit patient throughput by up to 24% for high COVID-19 daily patient arrival levels. The potential of five specific interventions and two critical shifts in care strategies to significantly increase hospital capacity is described.

#### **Conclusions**

These estimates enable hospitals to repurpose space, modify operations, implement crisis standards of care, prepare to collaborate with other health care facilities, or request external support, increasing the likelihood that arriving patients will find an open staffed bed when one is needed.

*This work was funded by National Science Foundation grant 2027624 and the World Bank Group.*



## CONTACT US



[www.buildersproject.eu](http://www.buildersproject.eu)



[@BuildERS\\_EU](https://twitter.com/BuildERS_EU)



<https://www.facebook.com/Builders-2762442730463980/>



<https://www.linkedin.com/company/builders-h2020>

