A framework to evaluate the impact of infectious disease outbreak response measures on delivery of routine health services

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Grantor:

Special National University Health Systems
COVID-19 Seed Grant Call
Background

- 23 Jan 2020: First confirmed case of COVID-19 in Singapore
- Clinical services were being curtailed in preparation for escalation to DORSCON Orange
- 07 Feb 2020: DORSCON Orange (15 days after first confirmed case)
No framework to study the impact of a pandemic on non-communicable diseases
Methods

Rapid Literature Review → Stakeholders Interview

Adaptation of the Donabedian Outcomes Model
Methods – Rapid Literature Review

• Goal: To examine indirect effects of past disease outbreaks to extract common themes

• The review was limited to studies that assessed or described the effects of epidemics, pandemics, or disease outbreaks on other health services, and not the direct impact of the infectious disease itself

• Studies that evaluated the impact on patient outcomes (e.g. clinical presentation of cancer patients with COVID-19), mental health, medical education and training, and health care workers’ welfare were excluded
Methods – Rapid Literature Review

• Early studies on the COVID-19 pandemic published before May 2020 were included (1 January 2000 - 7 May 2020)

• The search was done on one database (PubMed) and title and abstract reviews were done by a single researcher (DB)

• Recurring themes from the studies and evaluation parameters that were most commonly used were extracted
Methods – Stakeholders Interviews

• What aspect of your work has changed as a result of COVID-19?
• What is the intermediate impact on health services and patients?
• What is the likely longer-term impact on patient outcomes?
• Collated responses were used to identify the indicators for each of the three components of structure, process and outcomes.
Methods – Adapting the Donabedian’s Outcome Model

Results – Rapid Literature Review

Figure 1. PRISMA flow diagram of the rapid review
Results – Rapid Literature Review

Table. Most common themes and parameters in studies evaluating indirect effects of disease outbreaks

1. Decreased utilization of healthcare services
2. Delay in pre-hospital care due to infection control measures
3. Decrease in delivery of non-urgent care
4. Delay or postponement of elective procedures
5. Organizational changes (e.g. shift to telemedicine, shift to primary care instead of hospital, triaging and separating of suspect cases, use of personal protective equipment, redeployment, and implementation of split team arrangements)
6. Emergence of new clinical guidelines (e.g. medical specialty or facility specific)
7. Disruption to research and education activities (e.g. medical specialty or facility specific)
Results

• Clinicians from five major medical and surgical disciplines (cardiology, nephrology, oncology, neurology and other infectious disease), as well as primary care, participated in Zoom interviews

• List of discipline-specific indicators were captured

• Clinicians suggested to think of the impact of the pandemic in different phases/waves
<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Description</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction &amp; heart failure management</td>
<td>Door-to-balloon time for acute myocardial infarction patients</td>
<td>Time from the patient's arrival at the recipient hospital to the time of deployment of first device, defined as balloon inflation, manual thrombectomy or direct stenting, during PCI in patients with ST elevation</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Process</td>
<td>Mean length of stay</td>
<td>Number of inpatient days spent</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Outcome</td>
<td>In-Hospital mortality</td>
<td>Death between admission and discharge among AMI and HF patients</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Outcome</td>
<td>Readmission and readmission mortality</td>
<td>Crude cardiac readmission rates or mortality rates of AMI patients at 30-day, 6-month, and 12-month from index admission</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Outcome</td>
<td>Complication rate</td>
<td>Patients experiencing any complication within 30 days after each discharge</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Category</td>
<td>Indicator</td>
<td>Description</td>
<td>Data source</td>
</tr>
<tr>
<td>--------------</td>
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<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Process</td>
<td>Outpatient visits</td>
<td>Number of outpatient visits with Neurology</td>
<td>Specialist clinic records</td>
</tr>
<tr>
<td>Process</td>
<td>Home deliveries</td>
<td>Number of home deliveries by pharmacist</td>
<td>Pharmacy services records</td>
</tr>
<tr>
<td>Process</td>
<td>Teleconsultations</td>
<td>Number of teleconsultations conducted</td>
<td>Specialist clinic records</td>
</tr>
<tr>
<td>Process</td>
<td>Rate of in-hospital rehabilitation</td>
<td>No. of sessions completed and percent complement (as a proportion of total number of sessions recommended)</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Process</td>
<td>Rate of community rehabilitation</td>
<td>No. of sessions completed and percent complement (as a proportion of total number of sessions recommended)</td>
<td>Community rehabilitation service provider records</td>
</tr>
<tr>
<td>Outcome</td>
<td>Hospital mortality</td>
<td>Death between admission and discharge with stroke as primary cause</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Category</td>
<td>Indicator</td>
<td>Description</td>
<td>Data source</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Process</td>
<td>Number of active treatments</td>
<td>Number of patients ongoing treatment (chemotherapy and radiotherapy)</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Process</td>
<td>Number of inpatient and outpatient visits</td>
<td>Any planned or unplanned inpatient or specialist outpatient clinic visit for chemotherapy or adverse drug reactions due to chemotherapy</td>
<td>Hospital record on case diagnosis and case movement, specialist clinic records</td>
</tr>
<tr>
<td>Process</td>
<td>Patients who received chemotherapy prior to death</td>
<td>Received chemotherapy in the last 14 days of life [Yes/ No]</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
<tr>
<td>Outcome</td>
<td>Overall survival</td>
<td>Time from initiation of first treatment to death from any cause. Derivation: Date of death or date of last follow-up minus date of initiation of first treatment</td>
<td>Hospital record on case diagnosis and case movement</td>
</tr>
</tbody>
</table>
Results – Adapted framework

Modified Donabedian Outcomes Model for the Evaluation of Pandemic Impact on non-communicable diseases
Results – Adapted framework

• Locally, COVID-19 pandemic responses were rolled out or recoiled in a calibrated manner, in line with pandemic response strategy of containment in the early days of the pandemic, followed by mitigation as the number of cases increased exponentially and then suppression as the numbers began to come down and local transmission is much reduced.

• Our framework attempted to reflect the changes over time to more accurately characterize the impact of the pandemic on the health system.
Discussion

• The framework provides a guidance for healthcare providers, researchers, health service planners and governments to objectively evaluate the impact of not just for COVID-19 but any infectious disease outbreak.

• It can be applied to different contexts, regardless of the scope, scale, and time horizon, and whether for short, medium, or long-term.
Discussion

• The interviews with stakeholders were essential

• The study team’s assumptions were inaccurate
  • We assumed that the number of patients undergoing active treatment (including those with cancer) will be affected by COVID-19. However, as there was sufficient capacity in the Singapore health system, the care of patients with cancer were prioritized and most cancer patients were able to receive the care that they need unless they choose not to go to the hospital.
Limitations

• The indicators were developed based on the inputs of a limited set of stakeholders in a single regional health system
  • Seek funding to set up an international Delphi panel
• There may be limited feasibility of collecting these data in a low resource country
  • An essential list version needs to be developed
Future Plan - Applying the framework

• Patient-level health services utilization data from a regional health system in Singapore
  • Hospital and primary care
  • Medicines, laboratory tests, procedures, etc
  • Feb 2018 to Aug 2021

• Construct the list of indicators

• Compare pre- and post-COVID-19
  • Stratify the analyses by waves of pandemic development
THANK YOU
Non-communicable disease prevention and control during the era of COVID-19


Wednesday, March 17, 2021

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Department of Epidemiology, UCLA Fielding School of Public Health
Department of Family Medicine, UCLA David Geffen School of Medicine
Population Health Program, UCLA Clinical and Translational Science Institute
Chronic Disease and Injury Prevention, Los Angeles County Department of Public Health
COVID-19 Deaths in the United States

Source: https://isqua.org/covid19-research-page.html
COVID-19 Deaths in Other Countries

Source: https://isqua.org/covid19-research-page.html
COVID-19 Deaths in California

Source: https://isqua.org/covid19-research-page.html
COVID-19 Cases and Deaths in Los Angeles County

Source: https://datastudio.google.com/reporting/73d854a3-bc4c-4cbc-b830-bf9da16d54ed/page/brFsB
The COVID-19 Pandemic in Los Angeles County

Roles in the Response:
- Use of data science in outbreak management
- Health plans & multi-county entities – efforts underway to address health equity and barriers to vaccine distribution
Leading Causes of Death in the United States

Number of deaths (2019)
• Heart disease: 659,041
• Cancer: 599,601
• Accidents (unintentional injuries): 173,040
• Chronic lower respiratory diseases: 156,979
• Stroke (cerebrovascular diseases): 150,005
• Alzheimer’s disease: 121,499
• Diabetes: 87,647
• Nephritis, nephrotic syndrome, and nephrosis: 51,565
• Influenza and Pneumonia: 49,783
• Intentional self-harm (suicide): 47,511

Source: Mortality in the United States, 2019, data table for Figure 2
Coronavirus Disease 2019 (COVID-19)

The coronavirus disease 2019 (COVID-19) pandemic resulted in 5,817,385 reported cases and 362,705 deaths worldwide through May 30, 2020, including 1,761,503 aggregated reported cases and 103,700 deaths in the United States. Previous analyses during February–early April 2020 indicated that age ≥65 years and underlying health conditions were associated with a higher risk for severe outcomes, which were less common among children aged <18 years (1–3). This report describes demographic characteristics, underlying conditions, and outcomes among COVID-19 patients with hospitalizations or deaths in the United States during March 1–May 30, 2020. Hospitalizations were 6 times higher and deaths 12 times higher for COVID-19 patients with reported underlying conditions.

**Most Frequently Reported Underlying Conditions**

- Cardiovascular Disease
- Diabetes
- Chronic Lung Disease

*Compared to those with no reported underlying health conditions.*

[CDC.gov](https://www.cdc.gov/MMWR)
Delays in Care Could Cause Surge in Non-Communicable Disease Conditions

Fear of COVID-19 Exposure Has Resulted in Reduced Healthcare Visits

- 17% worsening symptoms
- 18% delayed diagnosis of a condition
- 23% delayed treatment
- 31% greater stress about a health condition
- More than one-third have no plans to resume visits until better pandemic control or vaccine

Source: Quest Diagnostics, Health Trends™ study of more than 2,000 U.S. Adults
Other Delays and Pandemic Considerations

- Newly identified cancers declined from January 2019-February 2020 to March-April 2020 (e.g., breast cancer, from 132,513 to 9,475; colorectal cancer, from 56,744 to 4,377).¹
- In the first 8 weeks of March and April 2020, HbA1c testing volume was reduced by as much as 66% compared to baseline weekly test volumes.²
- Almost 2/3 (63.5%) of hospitalizations among U.S. adults as of November 2020 were attributable to 4 cardiometabolic conditions: 30% obesity, 26% hypertension, 21% diabetes, 12% heart failure (simulation analysis using data from CDC’s COVID-NET, COVID Tracking Project, and 2015-18 NHANES).³
- The Cleveland Clinic: Results suggest that cumulative exposure to cigarette smoke is an independent risk factor for hospital admission and death from COVID-19. OR=1.26 (0.75-2.10), adjusted for age, race, gender, medication, and comorbidity.⁴
- Slow to reopen K-12 schools – concerns over child development and mental health. Vaccine distribution and its importance to noncommunicable chronic disease management.

Heart Disease and Stroke in Los Angeles County

**HEART DISEASE**
Heart disease mortality has declined in recent years in Los Angeles County. However, among all groups, **Black men have the highest heart disease mortality rates.**

**STROKE**
Stroke mortality has been relatively stable between 2012 and 2016. However, Black men and Black women have higher stroke mortality rates than other racial or ethnic groups, and despite a recent decrease, rates for Black men have gotten worse.
Age-adjusted prevalence of hypertension, and awareness, treatment, and control of hypertension* among adults aged ≥18 years — Los Angeles County and United States, 1999–2006 and 2007–2014

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey

*Hypertension prevalence estimates were age-adjusted by the direct method to the 2000 U.S. census population using the age groups 18–39, 40–59, and ≥60 years. Estimates for awareness, treatment, and control of hypertension were age-adjusted using the subpopulation of persons who have hypertension (age groups of 18–39, 40–59, and ≥60 years) in NHANES 2007–2008.

*Statistically significant at p<0.05 level between Los Angeles County and the United States.

*Statistically significant at p<0.05 level between 1999–2006 and 2007–2014.
Annual Alzheimer’s Disease-Related Deaths and Age-Adjusted Mortality Rates per 100,000 population in the United States, 2009-2017

Source: U.S. multiple causes of death dataset
Life Expectancy in Los Angeles County by City and Unincorporated Communities
Electronic cigarettes and other vape devices are devices that deliver an aerosol to the user through inhalation by heating a liquid that usually contains nicotine, flavorings, and other substances (e.g., marijuana).

4.9 million middle and high school students in 2018 were current users of tobacco products, up from 3.6 million in 2017.¹

Among LA County High School Students³...

1 in 10 are current e-cigarette users

56% Rate of increase among e-cigarette users between 2015-16 to 2017-18.

15% Rate of current marijuana use—higher than any tobacco products.
VApING-ASSOCIATED PULMONARY INJURIES (VAPI) ARE LINKED TO E-CIGARETTE USE

Symptoms
Patients with VAPI injuries have experienced the following symptoms:

- **Respiratory**
  - Cough
  - Hemoptysis (coughing up blood)
  - Shortness of breath
  - Chest pain

- **Gastrointestinal**
  - Nausea
  - Vomiting
  - Diarrhea
  - Abdominal pain

- **Constitutional**
  - Fatigue or malaise
  - Fever
  - Weight loss
  - Chills

Complications during Hospitalization

Approximately **50%** of Los Angeles County patients who were hospitalized for VAPI required mechanical ventilation.

Compounds/Additives Found in VAPI Cases
Includes, but not limited to:
- Nicotine
- Tetrahydrocannabinol (THC)
- Cannabinoids (CBD)
- Synthetic cannabinoids
- Flavorings and other substances

Ongoing Epidemiologic Investigations
The etiology of VAPI is **undetermined** and current epidemiologic investigations involves:
- Identification of harmful aspects of e-cigarette use
- Understanding the underlining mechanisms and causes

Nearly **2 in 3** cases reported in Los Angeles County are ages 25 and younger.

2
Proposition 56 (2016) and other tobacco product tax

Tobacco Control and Prevention Program (TCPP) Priorities

• Reduce youth access to ALL tobacco products
  • Tobacco retailer licensing (TRL)
  • E-Cigarettes in TRL
  • Healthy Retail Initiative

• Reduce exposure to secondhand smoke
  • Smoke-free multi-unit housing (Housing Authority of City of Los Angeles and Housing Authority of County of Los Angeles)

• Increase access to cessation services (e.g., California Smokers Helpline 1-800-No-BUTTS)

• Media/public education campaigns (LA Quits webpage: https://www.laquits.com/, >44 quit stories (videos)
Changes to County Tobacco Retail Ordinances

- Require a Tobacco Retail License to sell electronic smoking devices (e.g., electronic cigarettes, vapes and other nicotine containing devices)
- Prohibit the sale, not use, of flavored tobacco products (e.g., watermelon, cherry, mint, gummy bears) and those that include menthol

Addressing the Dangers of Increased E-Cigarette Use Among Youth: A Call to Action for Clinicians

September 2019
Tony Kuo, MD, MSHS, FAAPP
Alice Kuo, MD, PhD, MBA, FAAP, FACP
and the Los Angeles County Medical Societies

Many in the medical and public health communities are increasingly concerned with the use of electronic cigarette products (e-cigarettes) among youth. These electronic products, which are handheld devices designed to "deliver emissions for inhalation by heating a solution that commonly contains nicotine, a humectant, and flavoring chemicals"[4] (i.e., designed for the act of vaping), are becoming all too common in youth sensitive areas such as schools, parks, and libraries. The devices are also often used to deliver other dangerous chemicals such as cannabis/tetrahydrocannabinol (THC). Although research is underway to further study the use of e-cigarettes as a cessation aid for helping adult smokers quit using conventional cigarettes,2,4 the highly addictive nature of nicotine combined with the heavy promotion of these products to youth through subversive marketing and use of flavorings has caused a public health crisis in younger populations.4,6

MONDAY RX | Clear Lungs, Clear Minds

Jun 24, 2019 · 0
Smoke-Free Car Legislation and Student Exposure to Smoking

Minal Patel, MPH, PhD, Chan L. Thai, MPH, PhD, Ying-Ying Meng, DrPH, Tony Kuo, MD, MSHS, Hong Zheng, MPH, Barbara Dietsch, PhD, RD, William J. McCarthy, PhD

abstract

**BACKGROUND:** Policies protecting children from exposure to secondhand smoke (SHS) may help prevent SHS-related negative health outcomes in children and discourage them from intending to smoke in the future. In this study, we assess the impact of California’s 2007 smoke-free vehicle law on changes in middle and high school students’ reported exposure to smoking in cars. Secondary aims included assessing the association of student-reported exposure to smoking in vehicles and lifetime asthma diagnosis and future intentions to smoke.

**METHODS:** Population-weighted data from the California Student Tobacco Survey and the National Youth Tobacco Survey were used to evaluate California and national trends, respectively. Weighted logistic regression models using California Student Tobacco Survey 2011 data assessed the association between the number of days of exposure to smoking in cars and student-reported lifetime asthma diagnosis as well as intention to smoke in the future.

**RESULTS:** The proportion of California students reporting exposure to smoking in cars in the last 7 days declined <1% annually from 2001 through 2005, but declined 12% annually from 2007 to 2011. National trends did not show comparable declines after 2006. Students
**FIGURE 1**

Predicted probability of SHS exposure in the car in the last 7 days in California from 2001 to 2011 ($n = 148,664$). The figure was adjusted for sex, race and/or ethnicity, and grade level (source: CSTS).

March through October 2007 SB 7 was deliberated, amended 3 times, passed, and signed by the governor.

October 2007 California's smoke-free car bill becomes law.
Community Design: Multiple Impacts on Well-being

Obesity & Chronic Disease
access to clean air, free water, public transportation, walkways, healthy foods and opportunities for physical activity

Crime & Violence
access to safe neighborhoods (street lightening, street/building maintenance, recreational spaces)

Social Cohesion
promoting civic engagement

Mental Health
density of alcohol, tobacco and marijuana dispensaries

Photo Credit: David McNew/Getty Images
Healthy Hospital Food Initiative

- Supports improvements in the nutritional quality of food and beverages offered in hospital cafeterias, cafés, and vending machines.

**Hospitals and Health Centers**
- Adventist Health White Memorial
- Children’s Hospital Los Angeles
- City of Hope National Medical Center
- Harbor-UCLA Medical Center
- High Desert Regional Health Center
- LAC +USC Medical Center
- Olive View-UCLA Medical Center
- Rancho Los Amigos Rehabilitation Center

Supported by CDC Funding: *Sodium Reduction in Communities Program* and 1422 grant, *State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke*
Los Angeles Food Policy Council (LAFPC)
Key Accomplishments

Healthy Neighborhood Market Network (HNMN)
Developed a curriculum with 8 modules focused on promoting and selling healthy food in corner stores
- Modules include marketing, store design and layout, social media
- Stores receive tailored TA based on their needs

COMPRA, the small store purchasing cooperative has 58 clients
- 49 stores
- 3 nonprofits
- 6 private food enterprises
Promoting Community Physical Activity at School Sites

Internet panel survey results: Self-reported relationship between using a school for physical activity and overall activity level among adults in Los Angeles (n=207).

**Using School Facilities for Physical Activity Has Caused Me To...**

<table>
<thead>
<tr>
<th>Exercise the same amount</th>
<th>Exercise more</th>
<th>Don’t know/not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.0%</td>
<td>30.6%</td>
<td>23.4%</td>
</tr>
</tbody>
</table>

**If the School Site I Use for Physical Activity Were No Longer Open to the Community, I Would...**

<table>
<thead>
<tr>
<th>Exercise the same amount</th>
<th>Exercise less</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>63.2%</td>
<td>23.2%</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

Stop exercising completely 1.6%
Implement Community Plans to Promote Walking

What is happening on César Chávez?
Nuestra Avenida and the Department of Public Health collected data along César Chávez to understand how recent changes could impact walking along the street.

Street improvements - new crosswalks and painted curb extensions

What did the community and DPH find along the street?

Lots of people are walking
Between Mott St. and Fickett St., we counted 1,689 walking every day

Many benefits to the street improvements so far
89% of people surveyed said...
- They felt safer with the improvements installed.
- They would visit César Chávez more often if the improvements were made permanent.
- The improvements made the street more inviting and attractive

A need for more street enhancements

Nuestra Avenida heard a need
- more trash cans and more frequent trash pick-up
- more street furniture, such as seating, and more lighting
- better sidewalks with fewer cracks

DPP found that...
- 100% of street segments had litter present
- only 29% of street segments had pedestrian lighting
- 71% of street segments had broken sidewalks

Unsafe driver behavior

Drivers appear to be running red lights or speeding
- community members suggested protected left turn phases, leading pedestrian intervals, and other ways to slow cars down and make it safer for people walking

Drivers entered crosswalks during red lights 19% of the time
- 42% of drivers exceeded the speed limit
- drivers failed to yield to pedestrians in the crosswalk 10% of the time
Growing Choose Health LA

Will launch Restaurant program
Will re-launch website
Continue to Grow, Develop and Expand
National Diabetes Prevention Program Resources

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 14, Issue 3
AUGUST 2017

ORIGINAL RESEARCH
A Framework for Implementing the National Diabetes Prevention Program in Los Angeles County
Jennifer T. Weed, PhD, MSW; MS PMH; Barbara E. McFadden, MPH; Laura S. Colle, PhD, MPH; Larisa Shuch, MPA; Alana Y. Kao, MD, MSHS

Results
We studied with 13 CDPH staff key informants to develop a 3-program framework of core actions to implement NDDP: expanding network and education, improving health care system readiness and protocols, and screening access to and awareness concerning NDDP. The framework will use a diverse partner network to achieve these goals.

Scaling Diabetes Prevention Program Efforts in Los Angeles
Executive Summary and Action Plan
Prepared by: Accure Consulting

Diabetes and Prediabetes: Screening Guidelines and the Expansion of the National Diabetes Prevention Program in Los Angeles County
Jennifer Torres Mosst, PhD, MS MPH, MSHS
Tony Kuo, MD, MSHS
July-August 2017
Diabetes is a major cause of morbidity and mortality and an important contributor to the rising health care costs in the United States. In Los Angeles County, an analysis of local National Health and Nutrition Examination Survey (NHANES) data indicates that approximately 10% of the county's adult population has prediabetes. The Centers for Disease Control and Prevention (CDC) estimate that 90% of persons with prediabetes are undiagnosed, underscoring the significant need for improved screening and linkage to effective strategies for preventing diabetes or its complications.

Expanding Health Insurance Coverage in California for the National Diabetes Prevention Program
May 2016

Let's talk about the care you need.
1-800-793-8090

WHY CALL
- 获取了解
- 女性健康热线：我们提供信息和转介，无须预约。
- 女性健康评估：我们提供信息和转介，无须预约。
- 服务：健康、经济适用房和教育。
- 心血管疾病风险评估：我们提供信息和转介，无须预约。

WHEN TO CALL
- 下午4点至下午8点
- 每月1日至15日
- 购买必需品，请发送电子邮件至
  wmn@healthinsuranceny.org。如果您购买了必需品，请发送电子邮件至
  wmn@healthinsuranceny.org。
Produce Prescription Project

• Patient eligibility:
  • Enrolled in Medicaid; and
  • Screened positive for food insecurity; and
  • Enrolled in the National Diabetes Prevention Program (DPP) OR with type 2 diabetes diagnosis

• Intended outcomes:
  • Increase PPR participants’ daily fruit and vegetable intake
  • Improve PPR participants’ household food security
  • Develop and implement a standardized program infrastructure to monitor PPR participants’ blood pressure and HgbA1c changes
Fresca y Saludable/Fresh & Healthy

Screen
- NEVHC Family Medicine Care Coordinators and DPP Lifestyle Coaches screen patients for eligibility

Refer
- Eligible patients will receive $40 debit card (6-month program)
- Referred to SNAP-Ed classes and grocery store tours

Access
- Patients use card to buy fresh fruits and vegetables at participating grocery stores
The Wellness Center at Historic General Hospital
Wellness Navigators conducted wellness checks on TWC clients to ensure they have access to available resources while stay at home orders are in place. Wellness checks are tracked by class or program.
The Wellness Center: Client navigation referrals before versus after COVID-19 pandemic started

Top referrals January through March 2020

1. Healthy Cooking/Phys. Act. (43%)
2. Health Insurance Enrollment (34%)
3. Trauma Informed Care (10%)
4. Legal Aid (10%)

Top referrals after “Safer at Home” Health Order

1. Food Insecurity (53%)
2. Health Insurance Enrollment (44%)
3. Trauma Informed Care (26%)
4. Legal Aid (23%)

Overall, by December 2020 >4,700 clients received health navigation and related services.
Volume of Phone-based Client Wellness Checks through January 2021

- **May**: 147
- **June**: 74
- **July**: 240
- **August**: 241
- **September**: 470
- **October**: 435
- **November**: 258
- **December**: 552
- **January**: 106
UCLA Clinical and Translational Science Institute

Source: https://ctsi.ucla.edu/overview/pages/pophealth-team
Factors Associated With Medical School Graduates’ Intention to Work With Underserved Populations: Policy Implications for Advancing Workforce Diversity

Andrea N. Garcia, MD, MS, Tony Kuo, MD, MSHS, Lisa Arangua, MPP, and Eliseo J. Pérez-Stable, MD

Abstract

Purpose
Given projected U.S. physician shortages across all specialties that will likely impact underserved areas disproportionately, the authors sought to explore factors most correlated with medical school graduates’ intention to work with underserved populations (IWUP).

Method
Data from the 2010–2012 Association of American Medical Colleges Medical School Graduation Questionnaire (n = 40,846) were analyzed. Variables (demographics, career preference, debt burden, intention to enter loan forgiveness programs) were examined using chi-square tests and logistic regression models.

Results
Respondents included 49.5% (20,228/40,846) women, 16.6% (6,771/40,837) underrepresented minorities (URMs), and 32.4% (13,034/37,342) with primary care intent. The median educational debt was $160,000. Respondents who were women (adjusted odds ratio [aOR] 1.59, 95% confidence interval [CI] 1.49, 1.70), URMs (aOR 2.50, 95% CI 2.30, 2.72), intended to enter loan forgiveness programs (aOR 2.44, 95% CI 2.26, 2.63), intended to practice primary care (aOR 1.65, 95% CI 1.54, 1.76), and intended to emphasize nonclinical careers (aOR 1.23, 95% CI 1.11, 1.37) had greater odds of reporting IWUP. Among those who chose specialties and careers with a nonclinical emphasis, and among those with greater burdens of educational and consumer debt, URMs were nearly twice as likely as other minorities and whites to report IWUP.

Conclusions
Findings suggest physician characteristics that may be associated with filling workforce gaps in underserved areas. Restructuring financial incentive programs to support physician leaders and specialists with characteristics associated with IWUP may complement similar policies in primary care and could have key impacts on health equity in underserved areas.
Factors that impact health outcomes

Health Outcomes
- Mortality (50%)
- Morbidity (50%)

Health Factors
- Health behaviors (30%)
  - Tobacco use
  - Diet & exercise
  - Alcohol use
  - Unsafe sex
- Clinical care (20%)
  - Access to care
  - Quality of care
- Social & economic factors (40%)
  - Education
  - Employment & Income
  - Racism
  - Family & social support
  - Community safety
- Physical environment (10%)
  - Environmental quality
  - Built environment

Source: http://www.countyhealthrankings.org/our-approach
QUESTIONS?
The impact of COVID-19 on physical activity

A/Prof Melody Ding, Sydney School of Public Health, FMH
Melody.ding@sydney.edu.au
@DrMelodyDing

For: APRU Crisis Management Webinar
We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.
What will happen if our living environment changes

From this

to this?
What does the evidence say?

• Increase? ✓

• Decrease? ✓

• Stayed the same ✓

• Mixed? ✓
Why is the evidence so heterogenous?

The conclusions depend on:

• Setting/policy/restrictions
• Physical activity vs exercise
• Context of physical activity
• Study design (e.g., retrospective)
• Sample characteristics
• Measurement of physical activity

Tison et al. 2020
Three case studies:
Study 1: Covid-19 and online inquiry

Is the COVID-19 lockdown nudging people to be more active: a big data analysis

Ding Ding, Borja del Pozo Cruz, Mark A Green, Adrian E Bauman

The COVID-19 pandemic has brought unparalleled destruction to global health, social and economic systems. To control the spread of COVID-19, most countries have enforced a societal-level lockdown. This mass disruption of civil life provides opportunities for observational ‘natural experiments’, mandating lifestyle changes overnight. Big data, such as Google Trends (GT), have been used to identify outbreaks and monitor risk communication strategies within a defined time frame and geography on a scale of 0–100, based on a topic’s search proportion out of all searches, representing population-level interest in selected topics (Google Relative Search Rate (GRSR)). To contextualise the trend in exercise, we contrasted the GRSR of ‘exercise’ with ‘television show’ as a proxy for population-level interest in television viewing, a common sedentary activity expected to increase during the lockdown. Population-level interest in exercise in April 2020 was at an all-time high since GT records began in January 2004. As expected, community interest in television also increased since the COVID-19 lockdown. Despite ‘television show’ remaining an overall more searched topic than ‘exercise’, the increase in ‘exercise’ was so large that it surpassed ‘television show’ for the first 2 weeks following the lockdown in Australia and the UK. In Australia, the UK and the USA, respectively, the mean (SD) GRSR for ‘exercise’ accounting for ‘television show’ was 47.1 (3.2), 36.6 (4.8) and 50.5 (5.2) before, and 77.3 (11.0), 78.9 (6.4) and 71.1 (4.1) after the lockdown, suggesting significant (all $p<0.01$) proportionate increases in ‘exercise’ interest when accounting for the rise in ‘television show’.

These data suggest that despite challenges to an active lifestyle, the COVID-19 lockdown may have led to increases in...
How the Pandemic Is Changing Our Exercise Habits

Many of us have been moving less since the pandemic began. But some, including many older men and women, seem to be moving more.
Study 2: Covid-19 and Step Counts in China

- Shanghai residents
- n=815 (202 days)
- Step counts through Wechat
- Opportunistic evaluation
Who were slower at recovering step counts

**During the lockdown**
- Older
- Married
- University educated
- Less active pre-COVID
- ‘At risk’ adiposity

**After the lockdown**
- Older
- Married
- Not University educated
- ‘At risk’ adiposity

Ding et al. Int J Behav Nutri Phys Act, in press
Study 3: Leisure-time physical activity in the USA

- Understanding America Study (UAS)
- Population representative
- n=4879 over 279 days
- Days of exercise/week
Who were less active during COVID-19

Sociodemographic
• Younger
• Female
• Non-White
• No university education

Pre-COVID health characteristics
• Less active
• Obese
• High blood pressure

Environment
Living in states with stringent containment policies (Oxford COVID-19 Government Response Tracker)
The impact of COVID-19 on physical activity

What we do not know?
Precisely how much change in each domain, by how much at the population level

What we do know:
• Very likely a negative impact
• Prolonged low activity levels has long-term health complications
• Affect population subgroup differentially
Lessons learned

The opportunity
• Potentially increased interest and awareness
• Interruption—fast tracked change
• Resilience in some people

The challenges
• Exacerbating gaps
• Competing policy priorities (trade-off)
• Increasing private car use
thank you
The impact of COVID-19 on diabetes in China

Jue Liu
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School of Public Health, Peking University
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Global burden of diabetes

- A metabolic disorder caused by genetic and environmental factors
- It has become a critical health concern worldwide owing to its high prevalence and related disability and mortality
- Among the top ten causes of DALYs (ranked eight)

Leading causes of global DALYs and percentage of total DALYs (1990 and 2019)

Burden of diabetes in China

Prevalence: 12.8% diabetes
Number: 113.9 million of global patients
Health care cost: 110 billion in 2017

0.67% in 1980 → 12.8% in 2017

BMJ 2020;369:m997
## Overview of the four national surveys of diabetes in mainland China

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Study objective</th>
<th>Geographical range</th>
<th>Participants</th>
<th>Study Design</th>
<th>Study Resource</th>
<th>Sampling Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Yu Xu, et al.</td>
<td>“To investigate the prevalence of diabetes and glycemic control in the Chinese adult population.”</td>
<td>31 provinces</td>
<td>98,658 participants aged 18 or older</td>
<td>Cross-sectional study</td>
<td>The China Noncommunicable Disease Surveillance 2010</td>
<td>Multistage, stratified sampling method</td>
</tr>
<tr>
<td>2013</td>
<td>Limin Wang, et al.</td>
<td>“To estimate the recent prevalence and to investigate the ethnic variation of diabetes and prediabetes in the Chinese adult population.”</td>
<td>31 provinces</td>
<td>170,287 participants aged 18 or older</td>
<td>Cross-sectional study</td>
<td>The China Chronic Disease and Risk Factors Surveillance study</td>
<td>Multistage, stratified sampling method</td>
</tr>
<tr>
<td>2017</td>
<td>Yongze Li, et al.</td>
<td>“To assess the current prevalence of diabetes and risk factors in mainland China, as well as the national trend in diabetes prevalence.”</td>
<td>31 provinces</td>
<td>75,880 participants aged 18 or older</td>
<td>Cross-sectional study</td>
<td>Thyroid disorders, iodine status and diabetes epidemiological survey</td>
<td>Multistage, stratified sampling method</td>
</tr>
</tbody>
</table>
### Overview of the four national surveys of diabetes in mainland China

<table>
<thead>
<tr>
<th>Weighted prevalence</th>
<th>2007 survey</th>
<th>2010 Survey</th>
<th>2013 Survey</th>
<th>2017 Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total diabetes, %</td>
<td>9.7</td>
<td>11.6</td>
<td>10.9</td>
<td>12.8</td>
</tr>
<tr>
<td>Diagnosed diabetes, %</td>
<td>N/A</td>
<td>3.5</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Undiagnosed diabetes, %</td>
<td>N/A</td>
<td>8.1</td>
<td>6.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Prediabetes, %</td>
<td>15.5</td>
<td>50.1</td>
<td>35.7</td>
<td>35.2</td>
</tr>
<tr>
<td>Awareness of diabetes, %</td>
<td>N/A</td>
<td>30.1</td>
<td>36.5</td>
<td>43.3</td>
</tr>
<tr>
<td>Treatment of diabetes, %</td>
<td>N/A</td>
<td>25.8</td>
<td>32.3</td>
<td>49.0</td>
</tr>
<tr>
<td>Control of diabetes, %</td>
<td>N/A</td>
<td>39.7</td>
<td>49.2</td>
<td>49.4</td>
</tr>
</tbody>
</table>
Global burden of COVID-19

Source: WHO
National Health Commission

Global

Mainland China

2021.3.16

327,255
new cases
119,960,700
confirmed cases
2,656,822
deaths
363,691,238
vaccine doses administered

4
new cases [all imported]
90066
confirmed cases
4636
deaths
>64,980,000
vaccine doses administered

Source: WHO
National Health Commission
COVID-19 & Diabetes

- A bidirectional relationship between COVID-19 and diabetes
  - Diabetes is associated with an increased risk of severe COVID-19
  - New-onset diabetes and severe metabolic complications of preexisting diabetes, including diabetic ketoacidosis and hyperosmolarity for which exceptionally high doses of insulin are warranted, have been observed in patients with COVID-19
The impact of diabetes on COVID-19 in China

• **Aim:** To systematically evaluate the prevalence of diabetes among COVID-19 patients in China and its impact on clinical outcomes (severe cases or death).

• **Methods:** We searched studies published in PubMed, Web of Science, and EMBASE from December 1, 2019 to March 31, 2020 to identify relevant observational study.

The impact of diabetes on COVID-19 in China

• Twenty-three eligible articles including 49564 COVID-19 patients (1573 with and 47991 without diabetes) were finally included.

• Nearly one in ten COVID-19 patients have diabetes in China.

• The pooled prevalence of diabetes was 10% (95%CI: 7%-15%) in COVID-19 patients.

The impact of diabetes on COVID-19 in China

- The pooled prevalence of diabetes:
  - patients aged > 50 years (13%; 95%CI: 11%-16%)
  - patients aged ≤ 50 years (7%; 95%CI: 6%-8%)
  - severe patients (17%; 95%CI: 14%-20%)
  - non-severe patients (6%; 95%CI: 5%-8%)
  - dead patients (30%; 95%CI: 13%-46%)
  - survivors (8%; 95%CI: 2%-15%)

Diabetes is associated with a higher risk of severe illness and death in patients with COVID-19.

- Compared with patients without diabetes:
  - the risk of severe cases was higher ($RR = 2.13$, 95%CI: 1.76-2.56, $I^2 = 49\%$) in COVID-19 patients with diabetes
  - the risk of death was higher ($RR = 3.16$, 95%CI: 2.64-3.78, $I^2 = 34\%$) in COVID-19 patients with diabetes

The impact of COVID-19 on diabetes in China

- Impact of the COVID-19 lockdown on diabetes patients
- Lifestyles?
- Glycemic control?
- Diabetes management?
- Severe metabolic complications of preexisting diabetes?
- COVID-19–related new-onset diabetes?
- ......
A cohort of 7,337 COVID-19 patients with or without diabetes was retrospectively studied (952 had T2D) in Hubei Province, China. Subjects with T2D required more medical interventions and had a significantly higher mortality (7.8% versus 2.7%; adjusted HR, 1.49).

Diabetes status increased the mortality risk of patients with COVID-19. Well-controlled blood glucose correlated with improved outcomes in infected patients (adjusted HR, 0.14).

These findings provide clinical evidence correlating more proper blood glucose control with improved outcomes in patients with COVID-19.
Glycemic control and lifestyles in children with type 1 Diabetes

• Aimed to investigate the impact of COVID-19 lockdown on glycemic control in children with type 1 diabetes
• Continuous glucose monitoring data during and after lockdown
• Demographics and lifestyle change-related information were collected

During lockdown, individuals:

- **reduced** their physical activity
- **received longer** sleep duration
- **spent more time** on diabetes management.

**Table 3 | Questionnaire-derived lifestyle and medical data around lockdown in the study participants**

<table>
<thead>
<tr>
<th>Lifestyle changes compared with pre-lockdown (n = 34)</th>
<th>During lockdown</th>
<th>After lockdown</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>More</td>
<td>Same</td>
<td>Less</td>
</tr>
<tr>
<td>Total physical activity (^{\text{a}})</td>
<td>4 (11.8%)</td>
<td>15 (44.1%)</td>
<td>15 (44.1%)</td>
</tr>
<tr>
<td>Food amount</td>
<td>0 (0.0%)</td>
<td>25 (73.5%)</td>
<td>3 (8.8%)</td>
</tr>
<tr>
<td>Regularity of mealtimes</td>
<td>0</td>
<td>26 (76.5%)</td>
<td>8 (23.5%)</td>
</tr>
<tr>
<td>No. snacks</td>
<td>11 (32.4%)</td>
<td>22 (64.7%)</td>
<td>1 (2.9%)</td>
</tr>
<tr>
<td>No. midnight snacks</td>
<td>3 (8.8%)</td>
<td>31 (91.2%)</td>
<td>0</td>
</tr>
<tr>
<td>Sleep duration</td>
<td>14 (41.2%)</td>
<td>19 (55.9%)</td>
<td>1 (2.9%)</td>
</tr>
<tr>
<td>Bedtime (^{\text{b}})</td>
<td>19 (55.9%)</td>
<td>13 (38.2%)</td>
<td>2 (5.9%)</td>
</tr>
<tr>
<td>Waking time (^{\text{c}})</td>
<td>20 (58.8%)</td>
<td>13 (38.2%)</td>
<td>1 (2.9%)</td>
</tr>
<tr>
<td>Study time</td>
<td>5 (14.7%)</td>
<td>11 (32.4%)</td>
<td>18 (52.9%)</td>
</tr>
<tr>
<td>Stress</td>
<td>1 (2.9%)</td>
<td>33 (97.1%)</td>
<td>0</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1 (2.9%)</td>
<td>33 (97.1%)</td>
<td>0</td>
</tr>
<tr>
<td>Self-perceived hypoglycemia</td>
<td>1 (2.9%)</td>
<td>9 (26.5%)</td>
<td>24 (70.6%)</td>
</tr>
<tr>
<td>Time in glycemic management</td>
<td>23 (67.6%)</td>
<td>11 (32.4%)</td>
<td>0</td>
</tr>
<tr>
<td>Access to outpatient clinics</td>
<td>0</td>
<td>12 (35.3%)</td>
<td>22 (64.7%)</td>
</tr>
<tr>
<td>Use of online medical service</td>
<td>10 (29.4%)</td>
<td>23 (67.6%)</td>
<td>1 (2.9%)</td>
</tr>
<tr>
<td>Insulin purchase</td>
<td>2 (6.1%)</td>
<td>26 (78.8%)</td>
<td>5 (15.2%)</td>
</tr>
<tr>
<td>Hypoglycemic coma</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hypoglycemic coma</td>
<td>No</td>
<td>34 (100.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Shortage of insulin</td>
<td>3 (8.8%)</td>
<td>31 (91.2%)</td>
<td>0</td>
</tr>
<tr>
<td>Online shopping for insulin</td>
<td>5 (14.7%)</td>
<td>29 (85.3%)</td>
<td>5 (14.7%)</td>
</tr>
</tbody>
</table>

Data are expressed as the number of participants (%). \(^{\text{a}}\) McNemar’s \(\chi^2\)-test. \(^{\text{b}}\) Based on the frequency and duration of physical activity. \(^{\text{c}}\) In bedtime and waking time, ‘more’ and ‘less’ referred to ‘later’ and ‘earlier’.

Glycemic control did not deteriorate in children with type 1 diabetes around the COVID-19 pandemic.
Excess mortality in Wuhan city and other parts of China during the three months of the COVID-19 outbreak: findings from nationwide mortality registries

• Setting: 605 urban districts and rural counties in China’s nationally representative Disease Surveillance Point (DSP) system.

• The DSP system recorded 0.58 million deaths from January to March 2020

• Findings: Except in Wuhan, no increase in overall mortality was found during the three months of the covid-19 outbreak in other parts of China. The lower death rates from certain non-covid-19 related diseases might be attributable to the associated behaviour changes during lockdown.

• The findings highlight the need for rapid and coordinated actions during major outbreaks of infectious diseases to contain, suppress, and eradicate transmission and minimise the impact on human health and societal and economic activities.

Liu et al. BMJ. 2021;372:n415

Fig. Trends in weekly observed (dashed orange lines) versus predicted (blue solid lines) mortality rates for selected major diseases between 1 January and 31 March 2020 in China across different DSP areas.
<table>
<thead>
<tr>
<th>Causes of death</th>
<th>Wuhan</th>
<th>Predicted per 100 000*</th>
<th>Rate ratio (95% CI)</th>
<th>Hubei without Wuhan</th>
<th>Predicted per 100 000*</th>
<th>Rate ratio (95% CI)</th>
<th>China without Hubei</th>
<th>Predicted per 100 000*</th>
<th>Rate ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>1147.2</td>
<td>734.7</td>
<td>1.56 (1.33 to 1.87)</td>
<td>867.3</td>
<td>871.2</td>
<td>1.00 (0.86 to 1.16)</td>
<td>675.4</td>
<td>715.4</td>
<td>0.94 (0.86 to 1.04)</td>
</tr>
<tr>
<td>Infectious diseases†</td>
<td>290.1</td>
<td>47.8</td>
<td>6.07 (4.02 to 10.98)</td>
<td>27.6</td>
<td>31.3</td>
<td>0.88 (0.68 to 1.22)</td>
<td>20.3</td>
<td>29.0</td>
<td>0.70 (0.61 to 0.81)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>275.2</td>
<td>33.1</td>
<td>8.32 (5.19 to 17.02)</td>
<td>11.4</td>
<td>15.8</td>
<td>0.72 (0.50 to 1.16)</td>
<td>9.5</td>
<td>17.8</td>
<td>0.53 (0.46 to 0.63)</td>
</tr>
<tr>
<td>Unspecified viral</td>
<td>34.6</td>
<td>0.6</td>
<td>56.39 (9.95 to ∞)</td>
<td>1.8</td>
<td>0.5</td>
<td>3.34 (0.96 to ∞)</td>
<td>0.4</td>
<td>0.9</td>
<td>0.43 (0.32 to 0.62)</td>
</tr>
<tr>
<td>Other</td>
<td>48.0</td>
<td>32.5</td>
<td>1.48 (0.92 to 2.30)</td>
<td>5.0</td>
<td>15.3</td>
<td>0.33 (0.23 to 0.53)</td>
<td>9.0</td>
<td>16.9</td>
<td>0.53 (0.46 to 0.63)</td>
</tr>
<tr>
<td>Covid-19</td>
<td>192.6</td>
<td>0.0</td>
<td>–</td>
<td>4.6</td>
<td>0.0</td>
<td>–</td>
<td>10.8</td>
<td>11.3</td>
<td>0.95 (0.84 to 1.08)</td>
</tr>
<tr>
<td>Other</td>
<td>14.9</td>
<td>16.1</td>
<td>0.92 (0.51 to 2.85)</td>
<td>16.2</td>
<td>15.3</td>
<td>1.06 (0.77 to 1.63)</td>
<td>10.8</td>
<td>11.3</td>
<td>0.95 (0.84 to 1.08)</td>
</tr>
<tr>
<td>Non-communicable diseases</td>
<td>757.6</td>
<td>625.5</td>
<td>1.21 (1.03 to 1.46)</td>
<td>744.1</td>
<td>760.1</td>
<td>0.98 (0.85 to 1.14)</td>
<td>606.7</td>
<td>635.7</td>
<td>0.95 (0.87 to 1.05)</td>
</tr>
<tr>
<td>Cancer</td>
<td>186.4</td>
<td>182.7</td>
<td>1.02 (0.81 to 1.33)</td>
<td>179.1</td>
<td>166.3</td>
<td>1.08 (0.94 to 1.25)</td>
<td>153.9</td>
<td>155.1</td>
<td>0.99 (0.93 to 1.06)</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>408.1</td>
<td>316.0</td>
<td>1.29 (1.05 to 1.65)</td>
<td>416.1</td>
<td>424.8</td>
<td>0.98 (0.83 to 1.18)</td>
<td>334.0</td>
<td>349.8</td>
<td>0.95 (0.86 to 1.07)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>139.9</td>
<td>114.0</td>
<td>1.23 (0.93 to 1.73)</td>
<td>150.4</td>
<td>157.6</td>
<td>0.95 (0.78 to 1.12)</td>
<td>135.9</td>
<td>145.9</td>
<td>0.93 (0.84 to 1.04)</td>
</tr>
<tr>
<td>Ischaemic stroke</td>
<td>96.9</td>
<td>77.3</td>
<td>1.24 (0.83 to 2.19)</td>
<td>70.0</td>
<td>64.0</td>
<td>1.03 (0.84 to 1.30)</td>
<td>82.2</td>
<td>85.2</td>
<td>0.96 (0.86 to 1.07)</td>
</tr>
<tr>
<td>Haemorrhagic stroke</td>
<td>56.6</td>
<td>45.7</td>
<td>1.25 (0.91 to 1.91)</td>
<td>90.8</td>
<td>88.5</td>
<td>1.09 (0.88 to 1.42)</td>
<td>58.5</td>
<td>61.0</td>
<td>0.96 (0.87 to 1.08)</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>59.9</td>
<td>29.9</td>
<td>2.00 (1.24 to 4.25)</td>
<td>48.3</td>
<td>58.7</td>
<td>0.82 (0.63 to 1.13)</td>
<td>24.4</td>
<td>25.6</td>
<td>0.95 (0.84 to 1.10)</td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td>55.6</td>
<td>51.8</td>
<td>1.07 (0.72 to 1.87)</td>
<td>73.4</td>
<td>94.9</td>
<td>0.77 (0.60 to 1.04)</td>
<td>55.2</td>
<td>67.2</td>
<td>0.82 (0.71 to 0.96)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>45.5</td>
<td>40.5</td>
<td>1.13 (0.73 to 1.91)</td>
<td>64.9</td>
<td>86.8</td>
<td>0.75 (0.58 to 1.01)</td>
<td>50.2</td>
<td>61.6</td>
<td>0.82 (0.71 to 0.95)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>7.2</td>
<td>4.8</td>
<td>1.51 (0.60 to 4.37)</td>
<td>17.5</td>
<td>17.7</td>
<td>0.99 (0.72 to 1.49)</td>
<td>18.5</td>
<td>19.6</td>
<td>0.94 (0.84 to 1.07)</td>
</tr>
<tr>
<td>Other</td>
<td>54.6</td>
<td>49.3</td>
<td>1.11 (0.77 to 1.74)</td>
<td>49.5</td>
<td>48.6</td>
<td>1.02 (0.84 to 1.28)</td>
<td>40.8</td>
<td>39.1</td>
<td>1.04 (0.95 to 1.15)</td>
</tr>
<tr>
<td>Injury</td>
<td>53.7</td>
<td>46.2</td>
<td>1.16 (0.77 to 2.03)</td>
<td>83.6</td>
<td>74.8</td>
<td>1.12 (0.88 to 1.47)</td>
<td>37.7</td>
<td>40.9</td>
<td>0.92 (0.84 to 1.02)</td>
</tr>
<tr>
<td>Road traffic incident</td>
<td>4.6</td>
<td>7.2</td>
<td>0.63 (0.28 to ∞)</td>
<td>9.4</td>
<td>15.0</td>
<td>0.63 (0.44 to 0.99)</td>
<td>8.7</td>
<td>11.3</td>
<td>0.77 (0.68 to 0.88)</td>
</tr>
<tr>
<td>Suicide</td>
<td>11.7</td>
<td>7.0</td>
<td>1.66 (0.74 to ∞)</td>
<td>32.2</td>
<td>19.9</td>
<td>1.62 (1.15 to 2.53)</td>
<td>5.3</td>
<td>4.9</td>
<td>1.09 (0.93 to 1.30)</td>
</tr>
<tr>
<td>Fall</td>
<td>24.5</td>
<td>17.1</td>
<td>1.43 (0.81 to 2.92)</td>
<td>22.0</td>
<td>19.0</td>
<td>1.16 (0.83 to 1.77)</td>
<td>12.4</td>
<td>12.8</td>
<td>0.97 (0.87 to 1.09)</td>
</tr>
<tr>
<td>Other</td>
<td>13.0</td>
<td>15.1</td>
<td>0.86 (0.45 to 2.87)</td>
<td>20.0</td>
<td>20.8</td>
<td>0.96 (0.64 to 1.64)</td>
<td>11.3</td>
<td>12.3</td>
<td>0.92 (0.77 to 1.11)</td>
</tr>
<tr>
<td>All other diseases</td>
<td>45.8</td>
<td>23.8</td>
<td>1.92 (1.17 to 3.42)</td>
<td>11.9</td>
<td>9.0</td>
<td>1.33 (0.86 to 2.48)</td>
<td>10.8</td>
<td>9.9</td>
<td>0.85 (0.91 to 1.15)</td>
</tr>
</tbody>
</table>

*Sum of rates from different diseases might not add up to the category sum or overall total owing to rounding in the models.
†Includes a small number of deaths from maternal, perinatal, and nutritional diseases.
‡For certain less common diseases, the upper limits of the rate ratio become infinitely large because they involved zero predicted cases in certain circumstances.
Impact of the COVID-19 lockdown on diabetes patients in other countries

• Among diabetes patients in Brazil (including type 1, type 2, GDM, etc.), compliance with medication use significantly reduced after the lockdown.

• These patients also showed fewer healthy lifestyle habits after the lockdown.

• Among patients with type 2 diabetes, the psychological effect of lockdown was significantly more in women than men.

<table>
<thead>
<tr>
<th>Blood Glucose (BG) Impact</th>
<th>n</th>
<th>%</th>
<th>Physical Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>People monitoring BG</td>
<td>1557</td>
<td>91.53%</td>
<td>High increase</td>
<td>39</td>
<td>2.29%</td>
</tr>
<tr>
<td>Deteriorated BG</td>
<td>925</td>
<td>59.41%</td>
<td>Low increase</td>
<td>79</td>
<td>4.64%</td>
</tr>
<tr>
<td>Higher BG</td>
<td>312</td>
<td>20.04%</td>
<td>No change</td>
<td>571</td>
<td>33.57%</td>
</tr>
<tr>
<td>Lower BG</td>
<td>128</td>
<td>8.22%</td>
<td>Low reduction</td>
<td>250</td>
<td>14.70%</td>
</tr>
<tr>
<td>Greater variation</td>
<td>485</td>
<td>31.15%</td>
<td>High reduction</td>
<td>762</td>
<td>44.80%</td>
</tr>
<tr>
<td>No changes</td>
<td>632</td>
<td>40.59%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No BG measuring</td>
<td>144</td>
<td>8.47%</td>
<td>TV Time</td>
<td>n</td>
<td>%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Meals</th>
<th>n</th>
<th>%</th>
<th>Physical Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High increase</td>
<td>88</td>
<td>5.17%</td>
<td>High increase</td>
<td>499</td>
<td>29.34%</td>
</tr>
<tr>
<td>Low increase</td>
<td>292</td>
<td>17.17%</td>
<td>Low increase</td>
<td>332</td>
<td>19.52%</td>
</tr>
<tr>
<td>No change</td>
<td>1009</td>
<td>59.32%</td>
<td>No change</td>
<td>656</td>
<td>38.57%</td>
</tr>
<tr>
<td>Low reduction</td>
<td>256</td>
<td>15.05%</td>
<td>Low reduction</td>
<td>141</td>
<td>8.29%</td>
</tr>
<tr>
<td>High reduction</td>
<td>56</td>
<td>3.29%</td>
<td>High reduction</td>
<td>73</td>
<td>4.29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food Intake</th>
<th>n</th>
<th>%</th>
<th>Physical Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High increase</td>
<td>110</td>
<td>6.47%</td>
<td>High increase</td>
<td>616</td>
<td>36.21%</td>
</tr>
<tr>
<td>Low increase</td>
<td>397</td>
<td>23.34%</td>
<td>Low increase</td>
<td>294</td>
<td>17.28%</td>
</tr>
<tr>
<td>No change</td>
<td>815</td>
<td>47.91%</td>
<td>No change</td>
<td>652</td>
<td>37.15%</td>
</tr>
<tr>
<td>Low reduction</td>
<td>319</td>
<td>18.75%</td>
<td>Low reduction</td>
<td>124</td>
<td>7.29%</td>
</tr>
<tr>
<td>High reduction</td>
<td>60</td>
<td>3.53%</td>
<td>High reduction</td>
<td>35</td>
<td>2.06%</td>
</tr>
</tbody>
</table>

Impact of the COVID-19 lockdown on diabetes patients in other countries

- Overall **Glycemic control got deranged** among diabetic patients in **India** during the lockdown period.
- **Lifestyle changes and psychological stress** identified as possible factors responsible for derangement of glycemic control.
- The duration of lockdown is **directly proportional to the worsening of glycemic control and diabetes-related complications**.
- Multidisciplinary approach is required which is patient centric for achieving good glycemic control.

Future research

- Long term effect of COVID-19 on diabetes
- COVID-19–related new-onset diabetes
  - Epidemiology
  - How it develops
  - The natural history

Gain clues regarding appropriate care for patients with diabetes during and after the course of COVID-19

Thanks!