Introduction

More than 1.2 million adults are incarcerated in US prisons. Although these individuals generally receive primary and urgent care within the prison facility, those who need more specialized care often need to leave the prison facility for health care at a local or regional health care facility, a process that is expensive and logistically challenging and may fragment care and pose security risks. In response to the COVID-19 pandemic, prison facilities necessarily limited movement of individuals who were incarcerated within and between facilities, restricting their ability to access secondary and tertiary health care. The North Carolina Department of Public Safety, UNC Health, and University of North Carolina School of Medicine responded by expediting the implementation of a law passed in North Carolina to enable individuals who are incarcerated to receive specialty care via telemedicine. The purpose of this study was to evaluate the implementation of a telemedicine program for specialty care in North Carolina prisons during the COVID-19 pandemic.

Methods

This cross-sectional study was deemed exempt from review by the University of North Carolina at Chapel Hill institutional review board because the evaluation protocol met the definition of a limited data set under 45 CFR§164.514 (e). The North Carolina Department of Public Safety obtained written informed consent from all patients. A Data Use Agreement was executed between the North Carolina Department of Public Safety and the University of North Carolina at Chapel Hill. Since this research was limited to secondary data use with no contact with practitioners, the University of North Carolina at Chapel Hill institutional review board did not require research consent from practitioners or telepresenters. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

We conducted a cross-sectional study of the use of telemedicine to deliver secondary and tertiary health care by specialist physicians, nurse practitioners, (NPs), and physician assistants (PAs) to individuals who were incarcerated within 55 North Carolina prison facilities. We procured and implemented telemedicine software and equipment, developed a telemedicine workflow, and trained administrative and nursing staff as telepresenters to schedule and assist with telemedicine visits. Likewise, we designated practitioners in each participating specialty to provide care via telemedicine, reassigned established patients who were incarcerated to those practitioners, built practitioner schedules, developed a scheduling web portal and referral triage process, and trained practitioners to perform telemedicine visits and document these encounters in the prison electronic health record.

Between June 1 and November 30, 2020, we distributed in-prison surveys for 1252 visits and collected 1584 surveys from patients (482 visits; response rate, 38.5%) and telemedicine presenters (739 visits; response rate, 59.0%). Patient race was self-identified and collected to assess whether there were racial disparities in telemedicine satisfaction. Additionally, we collected electronic surveys from practitioners at the end of each telemedicine shift, which covered 3232 visits performed by 60...
practitioners (316 telemedicine shifts; 58 practitioners [96.7%] among all participating practitioners completed ≥1 survey).

The survey instrument contained six 5-point scale questions regarding overall satisfaction (all participants), comfort using telemedicine technology (all participants), visit duration (patients only), explanation of treatment plan (patients only), quality of telemedicine call (practitioners and telepresenters), and ability to assess patient condition (practitioners only). We used descriptive statistics to analyze the survey responses. Kruskal-Wallis χ² test was used to compare satisfaction scores between professional roles. P values were 2-sided, and statistical significance was set at P < .05. Data were analyzed from November 1, 2020, to March 1, 2021, using R statistical software version 1.4.1106 (R Project for Statistical Computing).

Table. Patient, Practitioner, and Telepresenter Telemedicine Experience Ratings by Age, Sex, and Race

| Characteristic          | Participants, Rating, Mean (SD), pointsa | Overall satisfaction | Personal comfort | Visit duration or call qualityb | Treatment explained or ability to assess patientc |
|-------------------------|------------------------------------------|----------------------|------------------|-------------------------------|-----------------------------------------------|
|                         | Total 1584                               | 4.24 (0.98)          | 4.18 (1.00)      | NA                            | NA                                            |
| Patients                | Total 482 (100)                           | 4.22 (0.98)          | 4.17 (1.02)      | 4.21 (0.96)                   | 4.33 (0.93)                                   |
| Race                    | American Indian or Alaska Native 25 (5.2)| 4.04 (1.27)          | 3.96 (1.23)      | 3.83 (1.27)                   | 3.91 (1.34)                                   |
|                         | Asian 3 (0.6)                             | 3.67 (1.15)          | 4.00 (1.00)      | 3.67 (1.15)                   | 3.67 (1.15)                                   |
|                         | African American 225 (46.7)              | 4.14 (1.02)          | 4.07 (1.09)      | 4.16 (0.97)                   | 4.31 (0.91)                                   |
|                         | Native Hawaiian or other Pacific Islander | 4.40 (0.97)          | 4.20 (1.23)      | 4.50 (0.97)                   | 4.50 (0.97)                                   |
|                         | White 195 (40.5)                          | 4.34 (0.93)          | 4.33 (0.88)      | 4.32 (0.91)                   | 4.40 (0.88)                                   |
|                         | Not reported 24 (5.0)                     | 4.20 (0.81)          | 4.00 (1.00)      | 4.11 (0.90)                   | 4.26 (0.78)                                   |
| Sex                     | Men 424 (88.0)                            | 4.18 (0.99)          | 4.12 (1.04)      | 4.17 (0.98)                   | 4.30 (0.94)                                   |
|                         | Women 24 (5.0)                            | 4.75 (0.53)          | 4.79 (0.51)      | 4.75 (0.53)                   | 4.83 (0.48)                                   |
|                         | Not reported 34 (7.1)                     | 4.33 (1.04)          | 4.34 (0.88)      | 4.21 (0.94)                   | 4.33 (0.94)                                   |
| Age, y                  | 18-34 69 (14.3)                           | 3.96 (1.33)          | 3.99 (1.24)      | 4.02 (1.25)                   | 4.03 (1.21)                                   |
|                         | 35-50 156 (32.4)                          | 4.31 (0.88)          | 4.13 (1.04)      | 4.18 (0.92)                   | 4.38 (0.84)                                   |
|                         | ≥51 244 (50.6)                            | 4.25 (0.95)          | 4.26 (0.94)      | 4.29 (0.91)                   | 4.38 (0.88)                                   |
|                         | Not reported 13 (2.7)                     | 4 (0.81)             | 3.89 (0.87)      | 3.67 (0.94)                   | 4 (0.82)                                      |
| Practitioners           | Total 316 (100)                           | 4.06 (1.17)          | 4.27 (1.09)      | 4.24 (0.95)                   | 3.97 (1.12)                                   |
|                         | Sex                                        |                       |                  |                               |                                               |
|                         | Men 217 (73.1)                            | 4.12 (1.17)          | 4.37 (0.94)      | 3.43 (0.92)                   | 4.22 (1.00)                                   |
|                         | Women 80 (26.9)                           | 3.36 (1.10)          | 3.59 (1.17)      | 3.96 (0.98)                   | 3.31 (1.18)                                   |
| Professional title      | Physician 211 (71.5)                      | 3.68 (1.24)          | 3.92 (1.14)      | 4.11 (0.99)                   | 3.72 (1.12)                                   |
|                         | Physician assistant 60 (20.3)             | 4.63 (0.94)          | 4.78 (0.88)      | 4.71 (0.69)                   | 4.73 (0.83)                                   |
|                         | Nurse practitioner 45 (14.2)              | 3.76 (0.99)          | 4.19 (0.68)      | 3.79 (0.64)                   | 3.71 (0.85)                                   |
| Telepresenters          | Total 786 (100)                           | 4.29 (0.93)          | 4.17 (0.96)      | 4.34 (0.84)                   | NA                                            |
|                         | Telehealth medium                         |                       |                  |                               |                                               |
|                         | Video 743 (94.5)                           | 4.35 (0.89)          | 4.20 (0.95)      | 4.38 (0.81)                   | NA                                            |
|                         | Telephone 22 (2.8)                        | 3.67 (1.06)          | 3.67 (1.06)      | 3.83 (0.89)                   | NA                                            |
|                         | Not reported 21 (2.7)                     | 3.67 (1.28)          | 3.84 (1.02)      | 3.95 (1.31)                   | NA                                            |

Abbreviation: NA, not applicable.

a Survey metrics used a 5-point scale, with 1 indicating poor; 2, fair; 3, good; 4, very good; and 5, excellent.

b Patients reported on visit duration, and practitioners and telepresenters reported on call quality.

c Patients reported on explanation of treatment, and practitioners reported on the ability to assess the patient.
Results

A total of 482 patients (244 patients [50.6%] aged ≥51 years; 424 [88.0%] men; 225 African American individuals [46.7%]) were included. Of 316 practitioners included, 228 (72.7%) were men and 221 (69.9%) were physicians (Table).

Among all patients, 453 patients (94.0%) reported a positive overall telemedicine experience (Figure, A-B). The aspect of telemedicine with the highest patient rating was practitioner communication regarding the treatment plan (mean [SD] rating, 4.33 [0.93] points), and personal comfort using telemedicine was the lowest rated aspect (mean [SD] rating, 4.17 [1.02] points) (Table).

Among all practitioners, 272 practitioners (86.1%) were satisfied with the telemedicine visits and 284 practitioners (89.9%) felt comfortable using telemedicine (Figure, C-D). The aspect of telemedicine with the highest practitioner rating was comfort using telemedicine (mean [SD rating, 4.27 [1.09] points), and ability to assess patient condition was rated the lowest (mean [SD rating, 3.28 [0.86] points). Physicians were significantly less satisfied with the overall telemedicine experience (mean [SD rating, 3.68 [1.24] points) compared with PAs (mean [SD rating, 4.63 [0.94] points) and NPs (mean [SD rating, 3.76 [0.99] points) ($\chi^2 = 20.86; P < .001$).

Among all telepresenters, 739 telepresenters (94.0%) were satisfied using telemedicine and 731 telepresenters (93.0%) were comfortable using telemedicine (Figure, C-D). The aspect of telemedicine with the highest rating among telepresenters was telemedicine call quality (mean [SD rating, 4.34 [0.84] points), and comfort using telemedicine was rated the lowest (mean [SD rating, 4.17 [0.96] points).

Figure. Patient, Practitioner, and Telepresenter Satisfaction Survey Responses Regarding Overall Telemedicine Experience and Comfort Level
Discussion

This cross-sectional study evaluated the implementation of a telemedicine program in North Carolina prisons based on survey responses from individuals who were incarcerated, health care practitioners, and telepresenters. In the face of the COVID-19 pandemic, we rapidly implemented a telemedicine program across the North Carolina prison system. We found that telemedicine was well received by patients, nursing staff, and practitioners. There were differences in satisfaction rating based on professional roles. This supports previously reported rates of satisfaction among patients, practitioners, and telepresenters. 4,5 The telemedicine program was critical for maintaining care access and ensuring care continuity during the pandemic. 6

This study has limitations. There were no pre–COVID-19 satisfaction data to serve as a baseline measure. Additionally, social desirability bias, such as lack of empowerment among individuals who are incarcerated, was not accounted for.

The findings of this cross-sectional study emphasize that populations at increased risk, including people who are incarcerated, along with health care practitioners and nursing staff, found merit in using telemedicine to continue specialty care during the pandemic.

ARTICLE INFORMATION

Accepted for Publication: June 10, 2021.

Published: August 16, 2021. doi: 10.1001/jamanetworkopen.2021.21102

Open Access: This is an open access article distributed under the terms of the CC-BY License. © 2021 Khairat S et al. JAMA Network Open.

Corresponding Author: Saif Khairat, PhD, MPH, School of Nursing, University of North Carolina at Chapel Hill, 438 Carrington Hall, Chapel Hill, NC 27514 (Saif@unc.edu).

Author Affiliations: Carolina Health Informatics Program, University of North Carolina at Chapel Hill (Khairat, Bohlmann, Wallace, Lakdawala); School of Nursing, University of North Carolina at Chapel Hill (Khairat); Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill (Khairat); UNC Health, Chapel Hill, North Carolina (Edson); Healthcare Administration, North Carolina Department of Public Safety, Raleigh (Catlett); Department of Medicine, University of North Carolina at Chapel Hill (Dorn).

Author Contributions: Dr Khairat and Ms Catlett had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Khairat, Bohlmann, Lakdawala, Edson, Catlett, Dorn.

Acquisition, analysis, or interpretation of data: Khairat, Bohlmann, Wallace, Lakdawala.

Drafting of the manuscript: Khairat, Bohlmann, Wallace, Lakdawala, Dorn.

Critical revision of the manuscript for important intellectual content: Bohlmann, Lakdawala, Edson, Catlett, Dorn.

Statistical analysis: Bohlmann, Wallace, Lakdawala.

Administrative, technical, or material support: Wallace, Lakdawala, Edson, Catlett.

Supervision: Khairat, Lakdawala, Edson, Dorn.

Conflict of Interest Disclosures: None reported.

Additional Contributions: Ashlyn Zebrowski, PSM; Kaitlyn Stabile, PSM; and Yuxiao Yao, MSIS (University of North Carolina at Chapel Hill) assisted with the digital transformation of survey data; Britney Walden, MHSA (UNC Health) assisted with the practitioner survey design and distribution; and Rusty Cuthrell, Heather Sullivan, RN; Gregory Heath, RN; Joy Baugham; and Felicia Byrd (North Carolina Department of Public Safety) assisted with the implementation of the telemedicine program within correctional facilities. None of these individuals were compensated for this work.

REFERENCES

1. Kang-Brown J, Montagnet C, Heiss J. People in jail and prison in 2020. Vera Institute of Justice. January 2021. Accessed February 10, 2021. https://www.vera.org/publications/people-in-jail-and-prison-in-2020

2. Saloner B, Parish K, Ward JA, DiLaura G, Dolovich S. COVID-19 cases and deaths in federal and state prisons. JAMA. 2020;324(6):602-603. doi:10.1001/jama.2020.12528
3. North Carolina General Assembly. Inmate Health Care & 340B Program. House bill 106/SL 2019-135. 2019-2020 Session. Accessed February 2, 2021. https://www.ncleg.gov/BillLookup/2019/H106

4. Glaser M, Winchell T, Plant P, et al. Provider satisfaction and patient outcomes associated with a statewide prison telemedicine program in Louisiana. *Telemed J E Health*. 2010;16(4):472-479. doi: 10.1089/tmj.2009.0169

5. Mekhjian H, Turner JW, Galliun M, McCain TA. Patient satisfaction with telemedicine in a prison environment. *J Telemed Telecare*. 1999;5(1):55-61. doi: 10.1258/1357633991932397

6. Peraksilis E, Ginsburg GS. Digital health—the need to assess benefits, risks, and value. *JAMA*. 2021;325(2):127-128. doi:10.1001/jama.2020.22919