Second Survey of County Health Departments of Kansas and COVID-19: Time for Change in Model for Pandemic Response

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ABSTRACT

Introduction. SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) causing COVID-19 (Coronavirus Disease 2019) continues to be widespread in Kansas. County health departments are trying to contain this pandemic.

Methods. This second survey of Kansas county health department directors occurred from August 7 to September 7, 2020. Since the first survey in April, there have been significant increases in the number of positive cases of COVID-19 and related deaths. Thus, the aim of the study was to re-evaluate county-level containment efforts and assess shortfalls that were identified in the April 2020 survey.

Results. In total, 41 out of 105 directors responded to the survey. Generally, respondents said there were increased supplies for testing, increased testing centers, shorter time to get test results, and in some cases, increased funding. However, the number of people involved in contact tracing had not increased substantially, which was one of the recommended changes for improving containment. Moreover, of those persons who were tested, only a few (18%) counties inquired if they wear masks in public. From comments reported, there was a sense of employees being overwhelmed, especially among the smaller county health departments.

Conclusion. As the cases of and deaths from COVID-19 are increasing in the state, especially in high density areas, the respondents to our survey indicated there was continued need for additional funding with easy access, increased staffing, especially for contact tracing, and significant help for effective messaging to improve adherence to public health directives.

INTRODUCTION

A new Coronavirus SARS-CoV-2 was identified in December 2019 in China.1 Subsequently, it has caused infections worldwide. The World Health Organization (WHO) identified the infection caused by SARS-CoV-2 as Coronavirus Disease 2019 (COVID-19). The virus initially enters the upper respiratory cells through the ACE2 receptor, replicates in these cells, and can migrate to the lower respiratory tract. Clinical infection from the virus may lead to a spectrum of illness (mainly respiratory) and may result in death.

To prevent the ongoing spread of SARS-CoV-2, it is important to understand routes of transmission. Contact with an infected person can lead to infection via droplets, aerosols, and possibly from airborne transmission.2 Individuals with infection can shed the virus, as particles of different sizes, while talking, coughing, singing, sneezing, and from aerosol-generating procedure. Respiratory droplets greater than five microns in diameter, an important source of transmission of infection, can settle on surfaces within a three- to six-foot radius. An individual can acquire the infections if in close contact of an infected person (symptomatic or asymptomatic) or in contact with contaminated surfaces.3 These droplets can form aerosols that can survive several hours, and with air currents, spread more than three feet. When in contact with various surface types, the virus may survive longer: for copper surfaces, up to 4 hours; cardboard, 24 hours; stainless steel, 48 hours; and for plastic surfaces, up to 72 hours.2

Droplets less than five microns in diameter (droplet nuclei) can lodge directly on the mucous membranes of the distal lower respiratory tract. However, it is unknown how much multipathway competent virus is present in the droplet nuclei; further, the amount of droplet nuclei needed to infect a susceptible person is unknown.4 Transmission of the virus through droplet nuclei, beyond six feet in closed spaces with poor ventilation, is possible and needs further study. There also may be transmission of the virus via air-conditioning units.4

The persons transmitting the virus may have mild or no symptoms and may be undiagnosed.5 Simulated mathematical models show these individuals contribute to 79% of all documented cases of COVID-19. Moreover, cluster transmission may account for a significant number of total cases of COVID-19.6 Persons with infections, diagnosed or undiagnosed, who come in contact with large numbers of people are termed “super spreaders”.

As yet, there is no chemoprophylaxis to prevent COVID-19. The vaccine trials are on-going. In the meantime, “non-pharmaceutical interventions” (NPI) can be lifesaving. Among the measures employed as NPI are social distancing, face mask (face covering), hand washing, isolation of those diagnosed with COVID-19, and quarantine for close contacts of infected individuals.

County health departments (CHD) have an important role in deploying non-pharmaceutical measures and sentinel surveillance in the community to contain COVID-19. To be effective in these containment measures, CHDs need enough staff, resources, guidance, and funds. Our first survey in April 2020 showed that CHDs in Kansas needed increases for the following: 1) supplies for COVID-19 testing, 2) personal protective equipment (PPE), 3) number of staff, 4) number of trained personnel for contact tracing, and 5) help with public education. Since May 1, 2020, cases of COVID-19 have increased more than 10-fold in the state of Kansas, from 4,449 to 49,899 on September 14, 2020. Thus, the aim of this study was to re-evaluate the shortfalls that were identified in our study in April 2020 and assess the current effort at containing the pandemic.

METHODS

The Institutional Review Board of the University of Kansas School of Medicine approved this study. A listing of the directors of the CHD was obtained from the Kansas Department of Health and Environment (KDHE) website. A 25-item survey instrument was developed. All CHD directors were invited to participate in the electronic survey using...
RESULTS

Survey Responses. The KDHE email listing from 2020 for health department directors included 105 email addresses. Each address was sent an invitation to participate in the survey through REDCap®. Of those contacted, 41 directors responded to the survey with a response rate of 39%. Table 1 shows survey responses by item. Most directors (61%) reported the number of testing sites had increased and that testing supplies on hand had increased (80%). Almost 93% said they were conducting nucleic acid assays (PCR), with 82% receiving a test result between one and seven days. For those who tested positive, health departments overwhelmingly (85%) reported they were conducting daily phone calls, although about 32% were sending text messages. However, less than 18% were collecting information about wearing a face mask in public from those they tested. Of those that did collect face mask information, they estimated between 1% and 50% wore the masks in public places.

The number of clusters reported per county ranged from 0 to 30, with up to 10 currently active; most were traced to social gathering (34%), private business (32%), and long-term care facilities (29%). With regards to contact tracing, over 32% of directors reported the number of staff had increased, with most (33%) reporting that two people were dedicated to the task. Eighty-five percent reported an increase in funding.

Of the 41 respondents, 12 directors sent in their comments (Table 2). Common themes were being overwhelmed with COVID-19, taking most of their time and efforts, even over weekends, leaving them with very little time or staff to deal with any of their usual work; difficulty in getting extra funding; limited staff for contact tracing; difficulty in sending out unified messages to the public due to differences of opinion; and last, wanting to do the best for their community.

Comparisons of April and August Survey Results. Select questions were compared between responses to the April and August survey; results are shown in Figure 1. There appeared to be a reduction in the time to get test results from COVID-19 testing; over 52% of results were returned within three days in August compared to 32% for April. With regards to contact tracing, results from the current survey showed health departments were more likely to use texts and emails than previously reported. Also, health departments were more likely to report some increase in current funding, 85% versus 70% reported in April. However, little change occurred by county for the number of people involved in contact tracing, most (74% to 77%, respectively) reported one to three people were dedicated to the task (not shown in figure).

Table 3 shows a comparison of positive cases in Kansas by county from May through September 23, 2020. During this period, the average daily increase in COVID-19 cases across the state was 357.58, with an average death toll of 3.5 cases per day. Median age was reduced from 44 to 35 years over time. The counties with the highest daily increases in positive cases were Johnson (72%), Sedgwick (58%), Wyandotte (44%), Shawnee (18%), and Ford (14%).

DISCUSSION

Upon the close of the second health directors survey (Sept. 14, 2020), KDHE reported there were 49,899 positive cases of COVID-19 (408,482 negative cases) in the state of Kansas since the onset of the pandemic. Of interest, the median age for positive cases dropped nine years, indicating that more young people may be contracting COVID-19. The number of negative cases increased from 28,585 to 408,482; thus, the number of people being tested has increased dramatically.

As reported on the KDHE website, of the positive cases, 2,572 persons (5.15%) needed hospitalization. Of those hospitalized, 534 died (an increase of 404 deaths since the end of last survey); the mortality rate was 20.8%. With regards to clusters, 558 have been documented in the state, which led to 11,253 positive cases, 661 hospitalizations, and 312 deaths. Clusters were reported most often in long-term care facilities (160, 28.7%), leading to 2,235 cases and 254 deaths. Current active clusters are in college and university campuses across the state and at correction facilities. The total case rate per 1,000 for the state of Kansas in September was 17.3. This case rate was not spread uniformly across the state and ranged from 0.4 per 1,000 in Elk County (1 case) to 75.4 per 1,000 (2,534 cases) in Ford County. Thus, at the end of September 2020, cases of COVID-19

KANSAS JOURNAL of MEDICINE COVID-19 AND COUNTY HEALTH DEPARTMENT continued.
KANSAS JOURNAL of MEDICINE

(58,629) and deaths (637) from COVID-19 continued to increase in the state of Kansas.

Table 1. Survey responses from Kansas health department county directors.

| Questionnaire                                                                 | N = 41 | %   | 95% CI       |
|------------------------------------------------------------------------------|--------|-----|--------------|
| As of today, the median number of people tested positive for COVID-19 per county. | 40 (range 0 to 4916) |     |              |
| Yes, compared to April 2020, the number of COVID-19 testing sites has increased. | 25     | 61.0 | (45.7, 74.7) |
| Yes, compared to April 2020, COVID-19 testing supplies on hand have increased. | 32     | 800  | (658, 901)   |
| What is the COVID-19 test that you are doing now? (choose all that apply)     |        |     |              |
| Nucleic Acid assay (PCR)                                                     | 38     | 92.7 | (81.7, 97.9) |
| Rapid antigen assay                                                          | 9      | 22.0 | (11.5, 36.2) |
| If other type of testing, please specify.                                    |        |     |              |
| Antibody                                                                     | 1      | 2.4  | (0.3, 10.8)  |
| None                                                                         | 1      | 2.4  | (0.3, 10.8)  |
| As of today, how fast do you get the results of COVID-19 tests?              |        |     |              |
| Almost immediately                                                           | 3      | 7.5  | (2.2, 18.7)  |
| Less than 1 day (in a matter of hours)                                       | 3      | 7.5  | (2.2, 18.7)  |
| 1 to 7 days                                                                  | 33     | 82.5 | (68.7, 91.8) |
| More than 7 days                                                             | 1      | 2.5  | (0.3, 11.1)  |
| How many hours does it take to get the results of COVID-19 tests?            |        |     |              |
| 2 hours                                                                      | 1      | 33.3 | (0.3, 10.8)  |
| 6 hours                                                                      | 1      | 33.3 | (0.3, 10.8)  |
| 12 hours                                                                     | 1      | 33.3 | (0.3, 10.8)  |
| Yes, the county health department is offering the COVID-19 serology test (antibody test). | 1      | 2.5  | (0.3, 11.1)  |
| What do you advise people to do who test positive for COVID-19? (choose all that apply) |        |     |              |
| Self-isolate at home                                                          | 40     | 97.6 | (89.2, 99.7) |
| Self-isolate in a hotel                                                       | 5      | 12.2 | (4.8, 24.7)  |
| How do you monitor people who are positive for COVID-19 to ensure that they are in self-isolation? (choose all that apply) |        |     |              |
| Daily phone calls                                                             | 35     | 85.4 | (72.3, 93.7) |
| Physically go to address to check                                             | 3      | 7.3  | (2.1, 18.3)  |
| Send email                                                                    | 4      | 9.8  | (3.4, 21.5)  |
| Send text                                                                     | 13     | 31.7 | (19.1, 46.8) |
| If you use other method to monitor, please explain.                          |        |     |              |
| Call every other day                                                          | 1      | 2.4  | (0.3, 10.8)  |
| Every other day phone calls                                                   | 1      | 2.4  | (0.3, 10.8)  |
| Phone calls three times per week                                              | 1      | 2.4  | (0.3, 10.8)  |
| Telephone calls, but not daily. Usually every 2-3 days                        | 1      | 2.4  | (0.3, 10.8)  |
| We issue isolation orders to positive cases. KDHE case investigators contact our cases. | 1      | 2.4  | (0.3, 10.8)  |
| Yes, we periodically test for COVID-19 in a random sampling of people with no symptoms. | 4      | 9.8  | (3.4, 21.5)  |
| If yes, what percent of people are positive for COVID-19 among those who are asymptomatic in your county? |        |     |              |
| 0%                                                                           | 1      | 25.0 | (0.3, 10.8)  |
| 1%                                                                           | 1      | 25.0 | (0.3, 10.8)  |
| 5%                                                                           | 1      | 25.0 | (0.3, 10.8)  |
| 6%                                                                           | 1      | 25.0 | (0.3, 10.8)  |
| From the people tested for COVID-19, we collect information on whether they wear a face mask in public places (as advised). | 7      | 17.5 | (8.2, 31.3)  |
Table 1. Survey responses from Kansas health department county directors, cont.

| Questionnaire                                                                 | N = 41 | %   | 95% CI         |
|-------------------------------------------------------------------------------|--------|-----|----------------|
| If so, among those who were positive, what proportion said they wore masks when in public places? ______ % of positive cases. | 2      | 28.6| (1.0, 14.7)    |
| 1%                                                                            | 4      | 14.3| (0.3, 10.8)    |
| 4%                                                                            | 1      | 14.3| (0.3, 10.8)    |
| 25%                                                                           | 1      | 14.3| (0.3, 10.8)    |
| 30%                                                                           | 1      | 14.3| (0.3, 10.8)    |
| 50%                                                                           | 2      | 28.6| (10.14.7)      |
| Yes, there have been clusters of positive cases in the county.                | 26     | 63.4| (48.2, 76.8)   |
| If yes, overall, how many clusters have been in your county?                  |        |     |                |
| 1                                                                             | 4      | 16.0| (3.4, 21.5)    |
| 2                                                                             | 7      | 28.0| (8.0, 30.6)    |
| 3                                                                             | 5      | 20.0| (4.8, 24.7)    |
| 4                                                                             | 3      | 12.0| (2.1, 18.3)    |
| 7                                                                             | 1      | 4.0 | (0.3, 10.8)    |
| 8                                                                             | 1      | 4.0 | (0.3, 10.8)    |
| 10                                                                            | 2      | 8.0 | (10.14.7)      |
| 20                                                                            | 1      | 4.0 | (0.3, 10.8)    |
| 30                                                                            | 1      | 4.0 | (0.3, 10.8)    |
| If yes, as of today, how many active clusters of COVID-19 are currently in your county? | 7      | 28.0| (80.306)       |
| 1                                                                             | 10     | 40.0| (33.3, 39.0)   |
| 2                                                                             | 4      | 16.0| (3.4, 21.5)    |
| 3                                                                             | 1      | 4.0 | (0.3, 10.8)    |
| 4                                                                             | 1      | 4.0 | (0.3, 10.8)    |
| 5                                                                             | 1      | 4.0 | (0.3, 10.8)    |
| 10                                                                            | 1      | 4.0 | (0.3, 10.8)    |
| If yes, the clusters of positive cases were traced to what type(s) of location? (choose all that apply) | 14     | 34.1| (21.1, 49.3)   |
| Social gathering                                                              | 13     | 31.7| (19.1, 46.8)   |
| Private business                                                              | 12     | 29.3| (17.1, 44.2)   |
| Long-term care facility                                                       | 6      | 14.6| (6.3, 277)     |
| Correctional facility                                                         | 6      | 14.6| (6.3, 277)     |
| Meat-packing plant                                                            | 5      | 12.2| (4.8, 24.7)    |
| Hospital                                                                      | 4      | 9.8 | (3.4, 21.5)    |
| Daycare                                                                       | 4      | 9.8 | (3.4, 21.5)    |
| Schools                                                                       | 3      | 7.3 | (2.1, 18.3)    |
| In situations of cluster(s) of positive cases, what action have you taken? (check all that apply) | 22     | 53.7| (38.6, 68.2)   |
| Advised quarantine                                                            | 23     | 56.1| (40.9, 70.4)   |
| Advised self-monitoring for symptoms                                         | 1      | 2.4 | (0.3, 10.8)    |
| Checked air ventilation                                                       | 16     | 39.0| (25.3, 54.3)   |
| If other actions are taken, please specify.                                   |        |     |                |
| Helped identify other mitigation strategies they can use to protect their staff, residents, patrons, family, etc. | 1      | 2.4 | (0.3, 10.8)    |
| KDHE was on site and tested                                                   | 1      | 2.4 | (0.3, 10.8)    |
| Tested those with symptoms                                                    | 1      | 2.4 | (0.3, 10.8)    |
Table 1. Survey responses from Kansas health department county directors, cont.

| Questionnaire | N = 41 | %   | 95% CI       |
|---------------|--------|-----|--------------|
| Since April 2020, the number of staff who primarily do contact tracing has increased in the county. | 13     | 32.5 | (19.6, 47.8) |

As of today, how many staff primarily do contact tracing in your county?

| 0 | 1 | 2.6 | (0.3, 10.8) |
|---|---|-----|-------------|
| 1 | 8 | 20.5 | (9.7, 33.5) |
| 2 | 13 | 33.3 | (19.1, 46.8) |
| 3 | 8 | 20.5 | (9.7, 33.5) |
| 4 | 3 | 7.7 | (2.1, 18.3) |
| 5 | 2 | 5.1 | (1.0, 14.7) |
| 6 | 1 | 2.6 | (0.3, 10.8) |
| 15 | 1 | 2.6 | (0.3, 10.8) |
| 20 | 1 | 2.6 | (0.3, 10.8) |
| 24 | 1 | 2.6 | (0.3, 10.8) |

Since April 2020, how has the funding for managing COVID-19 changed in your county?

| Funding increased | 34 | 85.0 | (71.7, 93.5) |
| No change in funding | 6 | 15.0 | (6.5, 28.3) |

If we have any questions, may we call you? (Yes) | 31 | 75.6 | (61.8, 86.7) |

Table 2. Comments from responders.

| Comments about county COVID-19 management efforts |
|--------------------------------------------------|
| 1 | We have not had any extra money allocated by our county, all extra money has come from grants such as BCBS. Currently we are filling out the CRF funds and ELC grant. |
| 2 | I marked that the average time to get test results is 3 days. We have one that we got back 14 days after collection and one 15 days later, and we are currently waiting on that was done 18 days ago. This is frustrating for our patients. We released the first one on day 14 from test due to still having a cough that she had had for a month prior to being tested but couldn’t take the chance. We got neg test results later that day. The second one was released on day 14 due to prolonged cough. Got neg results the next day. The last one was direct contact to a positive case. She only had symptoms for a few days. We were able to release her 10 days after start of symptoms but are still waiting. Our hospital lab collects tests and sends to Quest. |
| 3 | Several pending COVID-19 grant applications as everything is due in the next two weeks. |
| 4 | We are a small rural health department with a staff of 4. I have been tracking our hours per pay period and between 47-52% of our time is going toward COVID response. This is in addition to our regular duties as we have not stopped WIC, FP, Imm, Foot Care or any of the other services we offer. With school starting (we are also the school nurses for 4 area schools) and flu season, we are trying to prepare as best we can for what lies ahead. |
| 5 | We are very limited staff wise to conduct contact tracing. We have requested case investigating through our emergency manager, and we have opted into KDHE contact tracing via the Salesforce application. When there are other services that require some attention-immunizations, family planning, WIC, we just don’t have the manpower to devote 100% to COVID. We are in the process of bringing on another RN who will start as a case investigator, and we will continue to refer our contacts out to contact tracers. |
| 6 | Pawnee County Health Department is not at this time testing, we have 2 full time nurses and 1 full time office staff, our Hospital and FQHCC are testing, this may change in the future. We have received funding to support wages, COVID response through KDHE, also some funding through SPARKS. |
| 7 | Just managing a day at a time. Anxious to get school going. Do not feel that the State plan is a one-size-fits all. Want to do what is best for OUR community. |
| 8 | We are frantically trying to get a handle on the testing and case investigation aspect of all of this. I personally don’t feel like we have a good way for everyone in our community to report testing and results to KDHE. House Bill 2016 has created a public health nightmare which I wish I was no longer a part of. |
| 9 | We have very little mask wearing in our county. Our commissioners opted out of the gov. order. Our school is implementing masks due to the school mask gov. order. |
| 10 | Our local hospital is using Cephiad to test most patients. We are still sending some tests to Quest or the KHEL. We did request KDHE to conduct the majority of our contact tracing. Gove County rescinded the mask order on Monday; some were delighted, most were dismayed, especially with school starting August 20th in 2 school districts. I appreciate your support. |
| 11 | Without proper enforcement and divided thoughts of action, the mitigation strategies, Executive Orders are not taken seriously. Fighting an uphill battle. City and County Commissioners do not communicate and therefore do not have a united front. Our local hospital wants to run the show, but has no experience in Public Health. |
| 12 | I am struggling to keep up and we’ve not had many cases at all, I can’t remember the last time that my weekends and evenings did not involve COVID. We’ve had many contacts to follow but probably the hardest part has been answering questions for the schools, nursing homes, hospitals, business, and general public. Guidance changes, people not wanting to wear masks and politics have added to the stress. Our county works very well together and that has helped so much. |
| Kansas County  | First Survey 5/1/2020 | Second Survey 9/14/2020 | Current 9/23/2020 | Increased Cases (5/1/2020 to 9/23/2020) | Average Daily Increase |
|----------------|-----------------------|--------------------------|-------------------|------------------------------------------|------------------------|
| Allen*         | 0                     | 39                       | 43                | 43                                       | 0.30                   |
| Anderson*      | 0                     | 56                       | 73                | 73                                       | 0.51                   |
| Atchison*      | 10                    | 243                      | 270               | 260                                      | 1.83                   |
| Barber*        | 1                     | 5                        | 6                 | 5                                        | 0.04                   |
| Barton         | 9                     | 305                      | 398               | 389                                      | 2.74                   |
| Bourbon*       | 6                     | 132                      | 166               | 160                                      | 1.13                   |
| Brown          | 0                     | 88                       | 104               | 104                                      | 0.73                   |
| Butler         | 16                    | 803                      | 906               | 890                                      | 6.27                   |
| Chase*         | 1                     | 78                       | 80                | 79                                       | 0.56                   |
| Chautauqua*    | 4                     | 15                       | 16                | 12                                       | 0.08                   |
| Cherokee*      | 8                     | 397                      | 462               | 454                                      | 3.20                   |
| Cheyenne*      | 2                     | 10                       | 54                | 52                                       | 0.37                   |
| Clark*         | 1                     | 50                       | 50                | 49                                       | 0.35                   |
| Clay           | 4                     | 40                       | 49                | 45                                       | 0.32                   |
| Cloud*         | 4                     | 62                       | 64                | 60                                       | 0.42                   |
| Coffey         | 48                    | 103                      | 113               | 65                                       | 0.46                   |
| Comanche*      | 0                     | 10                       | 11                | 11                                       | 0.08                   |
| Cowley         | 2                     | 302                      | 359               | 357                                      | 2.51                   |
| Crawford       | 6                     | 891                      | 1,011             | 1,005                                    | 7.08                   |
| Decatur*       | 0                     | 6                        | 17                | 17                                       | 0.12                   |
| Dickinson      | 2                     | 87                       | 132               | 130                                      | 0.92                   |
| Doniphan*      | 3                     | 87                       | 96                | 93                                       | 0.65                   |
| Douglas        | 51                    | 1,783                     | 2,032             | 1,981                                     | 13.95                  |
| Edwards        | 4                     | 33                       | 44                | 40                                       | 0.28                   |
| Elk*           | 1                     | 1                        | 4                 | 3                                        | 0.02                   |
| Ellis          | 8                     | 725                      | 895               | 887                                      | 6.25                   |
| Ellsworth*     | 0                     | 27                       | 32                | 32                                       | 0.23                   |
| Finney         | 386                   | 1,852                     | 1,961             | 1,575                                     | 11.09                  |
| Ford           | 702                   | 2,534                     | 2,756             | 2,054                                     | 14.46                  |
| Franklin       | 14                    | 286                      | 330               | 316                                      | 2.23                   |
| Geary*         | 14                    | 372                      | 407               | 393                                      | 2.77                   |
| Gove           | 1                     | 20                       | 28                | 27                                       | 0.19                   |
| Graham*        | 0                     | 28                       | 30                | 30                                       | 0.21                   |
| Grant*         | 5                     | 155                      | 222               | 217                                      | 1.53                   |
| Gray*          | 5                     | 103                      | 116               | 111                                      | 0.78                   |
| Greeley*       | 0                     | 5                        | 8                 | 8                                        | 0.06                   |
| Greenwood*     | 3                     | 39                       | 47                | 44                                       | 0.31                   |
| Hamilton*      | 2                     | 44                       | 45                | 43                                       | 0.30                   |
| Harper*        | 1                     | 120                      | 120               | 119                                      | 0.84                   |
| Harvey         | 7                     | 325                      | 347               | 340                                      | 2.39                   |
| Haskell*       | 7                     | 68                       | 113               | 106                                      | 0.75                   |
| Hodgeman*      | 0                     | 16                       | 19                | 19                                       | 0.13                   |
Table 3. Comparison of positive cases by county, cont.

| Kansas County | First Survey 5/1/2020 | Second Survey 9/14/2020 | Current 9/23/2020 | Increased Cases (5/1/2020 to 9/23/2020) | Average Daily Increase |
|---------------|------------------------|--------------------------|-------------------|------------------------------------------|------------------------|
| Jackson*      | 2                      | 226                      | 234               | 232                                      | 1.63                   |
| Jefferson*    | 9                      | 161                      | 181               | 172                                      | 1.21                   |
| Jewell*       | 4                      | 14                       | 16                | 12                                       | 0.08                   |
| Johnson       | 471                    | 9,687                    | 10,697            | 10,226                                   | 72.01                  |
| Kearny*       | 19                     | 80                       | 84                | 65                                       | 0.46                   |
| Kingman*      | 0                      | 63                       | 84                | 84                                       | 0.59                   |
| Kiowa         | 1                      | 17                       | 23                | 22                                       | 0.15                   |
| Labette*      | 22                     | 212                      | 230               | 208                                      | 1.46                   |
| Lane*         | 0                      | 11                       | 13                | 13                                       | 0.09                   |
| Leavenworth*  | 372                    | 1,870                    | 2,023             | 1,651                                    | 11.63                  |
| Lincoln*      | 0                      | 11                       | 12                | 12                                       | 0.08                   |
| Linn*         | 5                      | 66                       | 74                | 69                                       | 0.49                   |
| Logan         | 0                      | 6                        | 12                | 12                                       | 0.08                   |
| Lyon          | 210                    | 924                      | 990               | 780                                      | 5.49                   |
| McPherson*    | 22                     | 85                       | 86                | 64                                       | 0.45                   |
| Marion*       | 5                      | 18                       | 20                | 15                                       | 0.11                   |
| Marshall      | 0                      | 232                      | 248               | 248                                      | 1.75                   |
| Meade*        | 6                      | 93                       | 116               | 110                                      | 0.77                   |
| Miami*        | 5                      | 312                      | 357               | 352                                      | 2.48                   |
| Mitchell      | 3                      | 40                       | 44                | 41                                       | 0.29                   |
| Montgomery*   | 17                     | 308                      | 374               | 357                                      | 2.51                   |
| Morris        | 3                      | 26                       | 31                | 28                                       | 0.20                   |
| Morton*       | 3                      | 13                       | 14                | 11                                       | 0.08                   |
| Nemaha        | 1                      | 71                       | 102               | 101                                      | 0.71                   |
| Neosho*       | 2                      | 115                      | 144               | 142                                      | 1.00                   |
| Ness*         | 0                      | 51                       | 74                | 74                                       | 0.52                   |
| Norton*       | 1                      | 26                       | 29                | 28                                       | 0.20                   |
| Osage*        | 5                      | 85                       | 99                | 94                                       | 0.66                   |
| Osborne*      | 2                      | 6                        | 6                 | 4                                        | 0.03                   |
| Ottawa*       | 4                      | 48                       | 52                | 48                                       | 0.34                   |
| Pawnee*       | 0                      | 266                      | 368               | 368                                      | 2.59                   |
| Phillips*     | 1                      | 77                       | 111               | 110                                      | 0.77                   |
| Pottawatomie  | 13                     | 187                      | 235               | 222                                      | 1.56                   |
| Pratt*        | 1                      | 57                       | 71                | 70                                       | 0.49                   |
| Rawlin*       | 0                      | 2                        | 20                | 20                                       | 0.14                   |
| Reno*         | 36                     | 911                      | 1,065             | 1,029                                    | 7.25                   |
| Republic*     | 4                      | 40                       | 48                | 44                                       | 0.31                   |
| Rice*         | 3                      | 61                       | 72                | 69                                       | 0.49                   |
| Riley         | 48                     | 1,171                    | 1,345             | 1,297                                    | 9.13                   |
| Rooks         | 6                      | 44                       | 61                | 55                                       | 0.39                   |
| Rush*         | 0                      | 41                       | 53                | 53                                       | 0.37                   |
| Russell       | 0                      | 54                       | 80                | 80                                       | 0.56                   |
| Saline        | 21                     | 551                      | 657               | 636                                      | 4.48                   |
### Table 3. Comparison of positive cases by county, cont.

| Kansas County | First Survey 5/1/2020 | Second Survey 9/14/2020 | Current 9/23/2020 | Increased Cases (5/1/2020 to 9/23/2020) | Average Daily Increase |
|---------------|------------------------|--------------------------|-------------------|-----------------------------------------|-----------------------|
| Scott         | 1                      | 91                       | 94                | 93                                      | 0.65                  |
| Sedgwick      | 384                    | 8,040                    | 8,577             | 8,193                                   | 6.84                  |
| Seward        | 514                    | 1,371                    | 1,485             | 971                                     | 17.96                 |
| Shawnee       | 121                    | 2,496                    | 2,671             | 2,550                                   | 0.08                  |
| Sheridan*     | 2                      | 12                       | 14                | 12                                      | 0.19                  |
| Sherman*      | 4                      | 19                       | 31                | 27                                      | 0.03                  |
| Smith*        | 2                      | 6                        | 6                 | 4                                       | 0.37                  |
| Stafford*     | 1                      | 49                       | 53                | 52                                      | 0.37                  |
| Stanton       | 4                      | 46                       | 57                | 53                                      | 0.74                  |
| Stevens*      | 9                      | 83                       | 114               | 105                                     | 1.29                  |
| Summer*       | 3                      | 167                      | 186               | 183                                     | 0.87                  |
| Thomas        | 0                      | 76                       | 123               | 123                                     | 0.23                  |
| Trego         | 0                      | 29                       | 33                | 33                                      | 0.32                  |
| Wabaunsee*    | 22                     | 66                       | 67                | 45                                      | 0.04                  |
| Wallace*      | 0                      | 14                       | 17                | 17                                      | 0.12                  |
| Washington*   | 0                      | 14                       | 17                | 17                                      | 0.12                  |
| Wichita*      | 0                      | 5                        | 5                 | 5                                       | 0.04                  |
| Wilson        | 1                      | 38                       | 59                | 58                                      | 0.41                  |
| Woodson*      | 6                      | 15                       | 20                | 14                                      | 0.10                  |
| Wyandotte     | 710                    | 6,578                    | 6,906             | 6,196                                   | 0.32                  |
| **Total cases** | **4,449**              | **49,899**               | **55,226**        | **50,777**                              | **357.58**           |
| Total counties | 81                     | 105                      | 105               | 24                                      | --                    |
| Deaths        | 130                    | 534                      | 621               | 491                                     | 3.46                  |
| Negative cases | 28,585                 | 408,482                  | 437,055           | 408,470                                 | 2876.55              |
| Age range, years | 0 to 99               | 0 to 106                 | 0 to 107          | --                                      | --                    |
| Median age    | 44 years               | 35 years                 | 35 years          | --                                      | --                    |
| Positive cases at KHEL | 1,587                 | 12,452                   | 13,205            | 11,648                                  | 81.82                |
| Positive cases at private labs | 2,862                 | 35,557                   | 39,460            | 36,598                                  | 257.73               |
| Female cases | 2,045                  | 24,306                   | 27,118            | 25,073                                  | 176.57               |
| Male cases   | 2,359                  | 28,410                   | 27,265            | 24,906                                  | 175.39               |
| Unknown cases | 45                     | 783                      | 843               | 798                                     | 5.62                 |

*Medically Underserved Areas for Medicare designated Rural Health Clinics; Kansas Governor Certified Counties, February 2020
Top 5% increase in COVID-19 cases by county: Ford, Johnson, Sedgwick, Shawnee, Wyandotte
Important, airborne transmission of COVID-19 may occur, similar to the spread of other viruses such as SARS, Middle Eastern Respiratory Syndrome (MERS), and influenza. However, airborne transmission of SARS-CoV-2 in closed spaces needs to be studied in more detail to understand the importance of this route in the ongoing pandemic. Meanwhile, infectious disease experts recommended these important steps to reduce transmission of SARS-CoV-2: avoid closed spaces, crowded spaces, close contact, and prevent expelling respiratory secretions by wearing a face mask.

The main limitation of the current survey is the low response rate. Only 41 out of 105 directors participated in the August 2020 survey compared to 78 responders in the April 2020 survey. As such, every effort was aimed at encouraging a higher response rate. Given the overwhelming workload for health departments, a survey response may have been unmanageable and deemed less important than efforts toward pandemic containment.

According to Halpern et al., there are a number of cognitive errors that have occurred during this pandemic. Four errors were indicated: a) identifiable victim effect: humans responding more to threats to family than to hidden “statistical” deaths reported in media, b) tendency to have optimism bias and act as if the best case scenario was most likely instead of the worst case scenario, c) people tend to prefer immediate benefits (“present bias”) over larger benefits in the future (i.e., saving a life today compared to policy option of taking steps to prevent deaths over the long term), d) omission bias, the tendency to prefer that harm occur by failure to act rather than due to action taken, (i.e., why some people may refuse to wear a mask). To counteract the above cognitive errors, it is important to communicate effectively to the public the reasons for difficult decisions, understand the “identifiable victim effect”, avoiding routine use of terms such as “nonpharmaceutical interventions”, heavily support funding for contact tracing by characterizing such efforts as “lifesaving”, and by passing laws that require estimating the effects of policy on lives saved.

The COVID-19 pandemic has resulted in 7.1 million positive cases in the U.S. with 204,000 deaths (33 million in the world with 996,000 deaths), as of September 2020. It is obvious that the pandemic is having a significant impact on the economy of Kansas (and the U.S.); how big an impact is yet to be determined. In addition, the pandemic has disrupted regular life and has led to increased stress and mental health issues.

The COVID-19 pandemic presents an opportunity for strong collaboration between state health departments, county health departments, physicians, and researchers. Calonge et al. recommended research and learning in real time to control and flatten the curve of this and future pandemics. After the survey, we were left with a number of questions. To our knowledge, our studies (this survey and from April 2020) were the only ones to study the efforts of CHDs. Why are there not more studies of CHDs in the U.S.??
When a safe and effective vaccine becomes available, the question is who would be entrusted to educate and administer the vaccine effectively? The CDC, as it previously led the 2009 H1N1 influenza vaccine response, will play an important role of selecting and distributing the vaccine to be administered in medical offices, clinics, hospitals, pharmacies, and possibly CHDs.21

In lieu of the fact that CHDs are overstretched, there is a need to develop carefully a model and system for pandemic planning and management. Would it make sense to consider creating an independent state department of public health emergency, one that is dedicated solely to the control of current and future pandemics, and empowered with enough funding, staffing, and legal authority to do so?

CONCLUSIONS

In August compared to April 2020, Kansas has increased the number of COVID-19 cases and deaths significantly. Results from this survey showed CHDs in general have more supplies to test for COVID-19, more testing sites, and reduced time to get results of testing. Funding has improved in many locations, but not all. There was a sense of being overwhelmed, especially among the smaller CHDs; however, there was no change in the number of staff involved in contact tracing. Only a few CHDs inquired if persons being tested were wearing masks. Based on the CDC guidelines and available scientific evidence, wearing masks while in public and better messaging regarding public health directives may help to stem the tide of the ongoing pandemic. Although, there is an urgent need for additional collaboration and research in this area. Perhaps we should consider a different model for managing current and future pandemics that is economically and politically feasible.

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REFERENCES

1 Gabutti G, d’Anchera E, Sandri F, Savio M, Stefanati A. Coronavirus: Update related to the current outbreak of COVID-19. Infect Dis Ther 2020; 9(2):1-13. PMID:32292686.
2 Wang J, Pan L, Tang S, Ji JS, Shi X. Mask use during COVID-19: A risk adjusted strategy. Environ Pollut 2020; 266(Part 1):115099. PMID: 32623270.
3 Meissner CH. Why is there so much uncertainty about SARS-CoV-2 transmission? AAP News. July 28, 2020. https://www.aappublications.org/news/2020/07/28/sarscov2transmission072820. Accessed September 29, 2020.
4 Du Z, Wang X, Dai E, et al. Examination of SARS coronavirus in air and air conditioner samples. Chinese Journal of Disinfection 2003; 22:156-158.
5 Li H, Pu S, Chen B, et al. Substantial undocumented infection facilitates rapid dissemination of novel coronavirus (SARS-CoV-2). Science 2020; 368(6490):489-493. PMID: 32179701.
6 Raghuveer TS, Zackula RF, Wittler RR. A survey of County Health Departments of Kansas regarding COVID-19. Kans J Med 2020; 13:112-126. PMID: 32499864.

7 Kansas Department of Health and Environment. COVID-19 Cases in Kansas. https://www.coronavirus.kdheks.gov/160-COVID-19-in-Kansas. Accessed September 15, 2020.
8 Rasmussen SA, Khoury MJ, del Rio C. Precision public health as a key tool in the COVID-19 response. JAMA 2020; 324(10): 933-934. PMID: 32805001.
9 Kansas Department of Health and Environment. KDHE Coronavirus (COVID-19) Response. https://www.coronavirus.kdheks.gov. Accessed September 23, 2020.
10 Emeruwa UN, Ora S, Shaman JL, et al. Associations between built environment, neighborhood socioeconomic status, and SARS-CoV-2 infection among pregnant women in New York City. JAMA 2020; 324(4):390-392. PMID: 32556085.
11 Jefferson T, Del Mar CB, Dooley L, et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. Cochrane Database Syst Rev 2011; 2011(7):CD006207. PMID: 21735402.
12 Lau JTF, Tsui H, Lau M, Yang X. SARS transmission, risk factors and prevention in Hong Kong. Emerg Infec Dis 2004; 10(4):587-592. PMID: 15200846.
13 Ngonghala CN, Iboi E, Eikenberry S, et al. Mathematical assessment of the impact of non-pharmaceutical interventions on curtailing the 2019 novel coronavirus. Math Biosci 2020; 325:108364. PMID: 32360770.
14 Wang X, Ferro EG, Zhou G, Hashimoto D, Bhatt DL, Association between universal masking in a healthcare system and SARS-CoV-2 positivity among healthcare workers. JAMA 2020; 324(7):703-704. PMID: 32663246.
15 Brooks JT, Butler JC, Redfield RR. Universal masking to prevent SARS-CoV-2 transmission - The time is now. JAMA 2020; 324(7):635-637. PMID: 32663243.
16 Furukawa NW, Brooks JT, Sobel J. Evidence supporting transmission of severe acute respiratory syndrome coronavirus 2 while pre-symptomatic or asymptomatic. Emerg Infect Dis 2020; 26(7):e20159. PMID: 3264890.
17 Nardell EA, Nathavitharana RR. Airborne spread of SARS-CoV-2 and a potential role for air disinfection. JAMA 2020; 324(2):141-142. PMID: 32478797.
18 Halpern SD, Truong RD, Miller FG. Cognitive bias and public health policy during the COVID-19 pandemic. JAMA 2020: 324(4):337-338. PMID: 32579763.
19 Calonge N, Brown L, Downey A. Evidence-based practice for public health. Infect Dis Ther 2020; 9(2):1-13. PMID: 32292686.
20 McNeil MD, Mink E, Paluck E, et al. A potential role for air disinfection. JAMA 2020; 324(2):141-142. PMID: 32478797.
21 Weise E. ‘Mind-bogglingly complex: Here’s what we know about how COVID-19 vaccine will be distributed when it’s approved. September 6, 2020. https://www.usatoday.com/story/news/health/2020/09/06/covid-vaccine-complex-distribution-supply-chain-follow-approval/5712053002/. Accessed September 23, 2020.

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