

COVID-19-related queries received by the National Health Laboratory Service and the National Institute for Communicable Diseases in South Africa: January to August 2020

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Data from the NHLS-NICD hotlines reflected trends in case numbers, knowledge gaps, and distribution of concerns related to COVID-19.

The National Institute for Communicable Diseases – a division of the National Health Laboratory Service – launched a clinician and public hotline, adapted from an existing NICD clinicians' hotline, to guide healthcare workers and members of the public on COVID-19-related queries. The hotlines received over 150 000 queries within eight months. We describe the queries so as to inform recommendations for tailoring clinician training, improving access to information, and guiding health promotion.

A retrospective description of data from the NHLS-NICD clinician and public hotlines from January to August 2020 was performed. Queries were analysed by province, caller type and sector. A thematic analysis with a deductive and semantic approach was used to describe the reason for each query.

From January to August 2020, 99.9% (152 766/152 985) of queries attended to on the hotlines were related to COVID-19, with most queries being made in April (n=53 471).

The majority of queries were from members of the public (95.0%), and from the public sector (97.0%). Gauteng Province accounted for most queries (42.9%). General information on COVID-19, advice for testing and administrative/systems issues (related to nationwide announcements/events), together accounted for the largest proportion of COVID-19 queries, at 86.0%.

The hotline provided general and clinical COVID-19 advice. Data from the hotline mirrored information gaps and distributions of concerns related to COVID-19, and could be used to guide clinician training and public information-sharing. A significant proportion of the queries did not fall within the NHLS-NICD scope of practice, indicating a need for targeted public engagement and education. Future outbreak hotline services could be planned on the basis of this experience to define the objectives of contact centres and establish these in awareness campaigns.

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Introduction

South Africa's first confirmed case of Coronavirus disease 2019 (COVID-19) was announced on 5 March 2020.¹ As the numbers of cases in the country increased, the South African government took active measures in response to the evolution of the pandemic by invoking the National Disaster Management Act², National Lockdown³, and other Regulations.

As part of national preparedness activities in response to the COVID-19 pandemic, the existing National Institute for Communicable Diseases (NICD) 24-hour clinician hotline was identified as a platform to guide clinicians on testing and addressing COVID-19-related queries.⁴ The hotline was established in 2002 and primarily served as a resource for healthcare workers (HCWs) to access emergency information pertaining to the management of suspected rabies exposures, viral haemorrhagic fevers, and other infectious diseases. It had previously performed a similar function in relation to the 2003 Severe Acute Respiratory Syndrome Coronavirus 1 (SARS-CoV-1) pandemic, by providing advice for diagnostic tests and case management.⁵

As the number of COVID-19-related queries increased rapidly, so did the need for clinicians staffing the hotline. From a standard of one clinician per week managing a single phone, by mid-February at least six were managing the service. Additional human resources were drawn, and by the start of March, 16 community service medical officers were operating the clinician hotline on a rotational basis, with guidance from over 20 specialist consultant clinicians.

A large volume of calls from members of the public for general information about COVID-19 and related Regulations began to inundate the clinician hotline. To meet the increasing demand, a 24-hour national public hotline was launched on 31 January 2020^b and announced by the NICD on 7 February 2020. It was staffed by over 120 HCWs, primarily nurses.

All testing for SARS-CoV-2 – the pathogen responsible for COVID-19 – was initially conducted by the NICD and had to be authorised by one of its clinicians via the hotline, which also functioned as a mechanism for surveillance of the outbreak. As the number of cases increased locally, tests were being authorised in private laboratories and regional National Health Laboratory Service (NHLS) laboratories. After 14 March 2020, clinicians were able to test patients without NICD authorisation, provided that they met the patient under investigation (PUI) criteria.⁵

A review of data from a similar service – the South African National HIV & TB Healthcare Worker Hotline, launched in 2008 to provide assistance primarily to nurses managing

patients with HIV and tuberculosis (TB) – found that the hotline was beneficial in providing them with clinical help and identifying knowledge gaps.⁶ Internationally, after Hurricane Katrina in Mississippi in the United States of America, a hotline was determined to be an effective surveillance system to investigate potentially infectious disease outbreaks and provide assistance with patient care.⁷ Additionally, the use of call centres with easy access to rapidly evolving screening guidelines has allowed for effective support in outbreak management.⁸ The NHLS-NICD hotline could offer useful support, as many of the initial national management guidelines were developed with input from its departments.

Methodology

The aim of this study was to describe the COVID-19-related queries made to the public and clinician hotlines from 1 January to 31 August 2020, so as to identify knowledge gaps and guide recommendations for clinician training, improving access to information, and health promotion. A retrospective, descriptive study was conducted to describe all COVID-19-related calls received by the NHLS-NICD public and clinician hotlines from 1 January to 31 August 2020. Queries to the hotlines were captured by the HCW responding to the call onto a standardised digital form recorded on the NICD Outbreak Response Unit (ORU) secure web-based query database. The database was initially established in 2014/15 in response to the Ebola virus disease outbreak in the Democratic Republic of Congo.⁹

Among other fields, data included: date of query; province; caller type; sector; scenario description (a free-text box narrating the query); and name of the healthcare worker attending to the call.

To describe the COVID-19-related queries made to the public and clinician hotlines, a two-tiered approach was used. First, queries were analysed by province, caller type (whether a member of the public, doctor, nurse, other healthcare worker, laboratorian or journalist), and sector (public or private). Calls were classified as 'public sector' if the caller was from any public institution or was a member of the public, whereas 'private sector' referred to any profit-making institution or entity (e.g. businesses, private hospitals, doctors in private practice). A thematic analysis of the scenario description together with a deductive and semantic approach was used to generate reasons for the calls, categorised into the following groups:

- Administrative/systems issues, concerning guidelines and related Regulations, and further sub-categorised based on commonly occurring themes
- 'General information' addressing frequently asked questions about COVID-19, such as its mode of transmission, signs and symptoms, treatment and prevention
- 'Management of cases and/or contacts' guidance on the management of specific confirmed cases or contacts of cases

a Personal communication: L Blumberg, National Institute for Communicable Diseases, 7 October 2020.

b Personal communication: N Govender, National Institute for Communicable Diseases, 7 November 2020.

- Media (calls by media personnel or those relating to misinformation circulating on a media platform)
- Patient(s) investigation: advice for testing, discussions with HCWs regarding patient testing, or members of the public reporting suggestive symptoms
- Results: requesting or reporting test results
- Other: prank/dropped calls, or calls during which there was not enough information to categorise.

The International Organization for Standardization (ISO) week-numbering system¹⁰ was used to present a timeline of queries related to events of importance in the national COVID-19 response. Data from the National Department of Health’s Notifiable Medical Conditions Surveillance System (NMCSS), hosted by the NHLS-NICD, was used to graphically compare laboratory-confirmed COVID-19 case numbers to these events. A comparison of queries to the clinician and public hotlines was conducted.

In this paper, the ‘clinician hotline’ refers to calls that were either transferred from the public hotline and then addressed by a medical doctor or received directly and responded to by a medical doctor. ‘Public hotline’ refers to calls that were received on or transferred to the public hotline to be addressed by a nurse or epidemiologist. The field ‘name

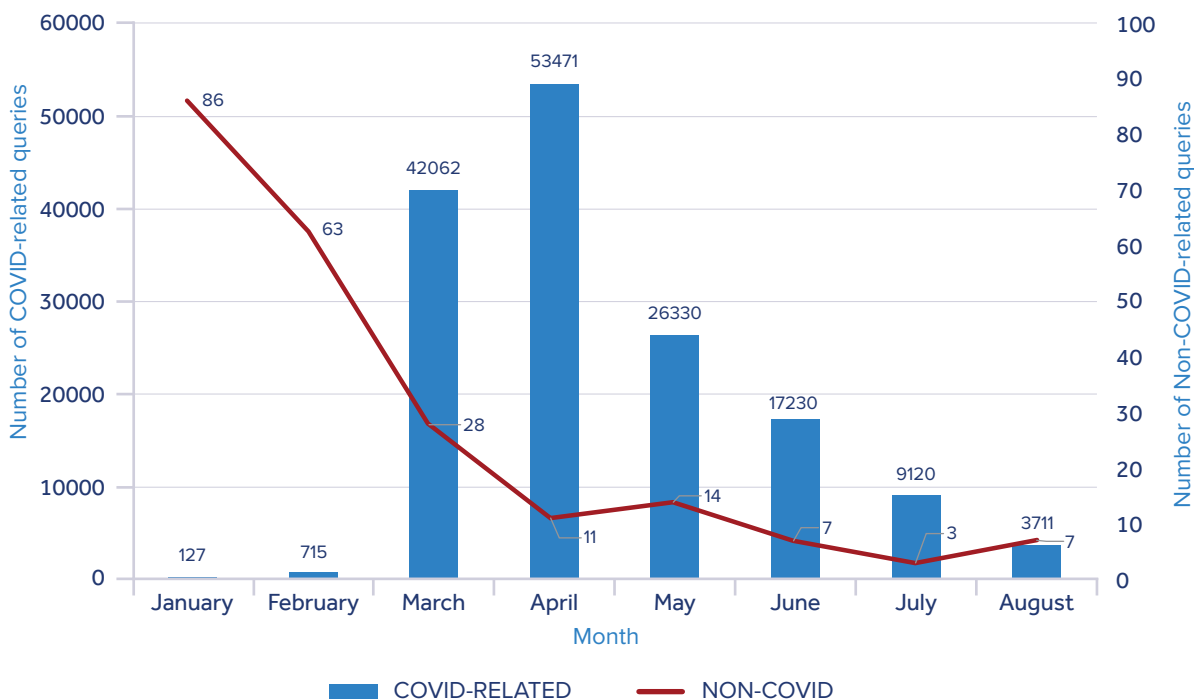
of healthcare worker attending to the call’ was used to differentiate queries from the clinician and public hotlines. The Human Research Ethics Committee of the University of the Witwatersrand approved this study (Reference No. M200544). Ethical clearance from the NICD was also obtained (Reference No. M160667). Gatekeeper permission to access the NHLS-NICD database was received. No personal identifiers were used.

Results

Total calls to public and clinician hotlines

For the period 1 January to 31 August 2020, 152 985 calls were made to the NHLS-NICD hotlines (public and clinician). This far exceeded the 633 recorded calls in the same time period in 2019. Of the total calls, 152 766 (99.9%) were related to COVID-19. Of the 213 total calls in January, 127 (59.6%) were COVID-19-related, with none in the first two weeks of the year, and the remainder primarily related to rabies or malaria. The number of COVID-19-related calls rose significantly in February to 91.9% (715/778), and thereafter remained consistently above 99.8%, reaching a peak of 53 471 calls in April. This decreased successively thereafter, as shown in Figure 1.

Figure 1: Total number of queries per month, 1 January–31 August 2020



Public and clinician hotlines COVID-19 calls

As shown in Table 1, doctors represented the majority of incoming COVID-19-related calls in January (74%) and February (53%), with queries mainly relating to person under investigation (PUI) criteria and authorisation for testing of

patients for SARS-CoV-2. In March, doctors accounted for a larger number, but a substantially reduced proportion (6.1%) of all caller types. This further decreased from April to August, which is attributable to the increased number of calls from members of the public.

Table 1: Total number of COVID-19-related queries by caller type, sector, and call reason, per month, 1 January–31 August 2020

CALLER TYPE n (%)	MONTH								TOTAL n (%)
	January	February	March	April	May	June	July	August	
Doctor	94 (74.0)	379 (53.0)	2 573 (6.1)	909 (1.7)	421 (1.6)	106 (0.6)	107 (1.2)	74 (2.0)	4 663 (3.1)
Journalist/media	1 (0.8)	2 (0.3)	15 (0.04)	4 (0.01)	4 (0.02)	1 (0.0)	0 (0.0)	0 (0.0)	27 (0.0)
Laboratorian	3 (2.4)	30 (4.2)	63 (0.2)	74 (0.1)	15 (0.06)	21 (0.1)	7 (0.1)	4 (0.1)	217 (0.1)
Member of the public	12 (9.5)	183 (25.6)	38 398 (91.3)	51 785 (96.9)	25 617 (97.3)	16 667 (96.7)	8 927 (97.9)	3 607 (97.2)	145 196 (95.0)
Nurse	7 (5.5)	87 (12.2)	626 (1.5)	484 (0.9)	199 (0.8)	40 (0.2)	51 (0.6)	18 (0.5)	1 512 (1.0)
Other healthcare worker	10 (7.9)	34 (4.8)	387 (0.9)	215 (0.4)	74 (0.3)	395 (2.3)	28 (0.3)	8 (0.2)	1 151 (0.8)
Sector n (%)									
Private	97 (76.4)	469 (65.6)	2 362 (5.6)	586 (1.1)	405 (1.5)	413 (2.4)	188 (2.1)	97 (2.6)	4 617 (3.0)
Public	30 (23.6)	246 (34.4)	39 700 (94.4)	52 885 (98.9)	25 925 (98.5)	16 817 (97.6)	8 932 (97.9)	3 614 (97.4)	148 149 (97.0)
Reasons for call n (%)									
Administrative (systems issues)	23 (18.1)	140 (19.6)	7 333 (17.4)	14 061 (26.3)	5 010 (19.0)	3 604 (20.9)	1 710 (18.8)	626 (16.9)	32 507 (21.3)
General Information	5 (3.9)	73 (10.2)	19 797 (47.1)	22 367 (41.8)	14 898 (56.6)	2 612 (15.2)	316 (3.5)	304 (8.2)	60 372 (39.5)
Management of cases and/or contacts	0 (0.0)	3 (0.4)	1 300 (3.1)	1 932 (3.6)	1 202 (4.6)	3 993 (23.2)	2 238 (24.5)	841 (22.7)	11 509 (7.5)
Media	1 (0.8)	20 (2.8)	52 (0.1)	54 (0.1)	1 (0.00)	2 (0.01)	0 (0.0)	0 (0.0)	130 (0.1)
Other	1 (0.8)	12 (1.7)	1 649 (3.9)	1 781 (3.3)	1 130 (4.3)	172 (1.00)	95 (1.0)	38 (1.0)	4 878 (3.2)
Patient investigation(s)/ advice for testing	96 (75.6)	446 (62.4)	11 696 (27.8)	12 888 (24.1)	3 343 (12.7)	5 616 (32.6)	3 070 (33.7)	1 290 (34.8)	38 445 (25.2)
Results	1 (0.8)	21 (2.9)	235 (0.6)	388 (0.7)	746 (2.8)	1 231 (7.1)	1 691 (18.5)	612 (16.5)	4 925 (3.2)
Grand total	127 (0.1)	715 (0.5)	42 062 (27.5)	53 471 (35)	26 330 (17.2)	17 230 (11.3)	9 120 (6.0)	3 711 (2.4)	152 766 (100.0)

Calls from the private sector predominated in January and February (76.4% and 65.6% respectively), but this distribution reversed in subsequent months, following the launch of the public hotline which received calls mainly from members of the public, as seen in Table 1.

Most (65 483, 42.9%) COVID-19-related calls originated from Gauteng, followed by KwaZulu-Natal (23 794, 15.6%), and then the Western Cape (20 468, 13.4%) Provinces, as depicted in Figure 2 and Table 2. Gauteng remained the province with the highest proportion of calls over the study period.

Overall, the majority of queries to the hotline were for 'General information' (39.5%), followed by queries on 'Patient(s) investigation: advice for testing' (25.2%), and then 'Administrative' queries (21.3%), as presented in Table 1. In January and February, most queries were regarding 'Patient(s) investigation' and represented mainly HCWs enquiring about whether their patients met the PUI criteria. The number of calls requesting 'General information' declined over time, while those requesting assistance with 'Management of cases and/or contacts' increased from week 23 onwards, as illustrated in Figure 3.

Table 2: Comparison of COVID-19-related queries between public and clinician hotlines by caller type, sector, province and reason, 1 January–31 August 2020

	HOTLINE			
	Clinician n (%)		Public n (%)	
Caller Type				
Doctor	3 152	65.60%	1 511	1.00%
Journalist/media	1	0.00%	26	0.00%
Laboratorian	43	0.90%	174	0.10%
Member of the public	623	13.00%	144 573	97.70%
Nurse	544	11.30%	968	0.70%
Other healthcare worker	441	9.20%	710	0.50%
Total	4 804	100.00%	147 962	100.00%
Sector				
Private	2 827	58.80%	1 790	1.20%
Public	1 977	41.20%	146 172	98.80%
Total	4 804	100.00%	147 962	100.00%
Province				
Eastern Cape	260	5.40%	10 598	7.20%
External to South Africa	21	0.40%	677	0.50%
Free State	129	2.70%	4 627	3.10%
Gauteng	1 876	39.10%	63 607	43.00%
KwaZulu Natal	898	18.70%	22 896	15.50%
Limpopo	174	3.60%	9 918	6.70%
Mpumalanga	189	3.90%	8 975	6.10%
North West	188	3.90%	5 780	3.90%
Northern Cape	99	2.10%	1 204	0.80%
Not Stated	39	0.80%	143	0.10%
Western Cape	931	19.40%	19 537	13.20%
Total	4 804	100.00%	147 962	100.00%
Reasons				
Administrative (systems issues)	1 013	21.10%	31 495	21.30%
General Information	107	2.20%	60 265	40.70%
Management of cases and/or contacts	941	19.60%	10 568	7.10%
Media	11	0.20%	119	0.10%
Other	85	1.80%	4 793	3.20%
Patient(s) investigation (advice for testing)	2 512	52.30%	35 933	24.30%
Results	135	2.80%	4 789	3.20%
Total	4 804	100.00%	147 962	100.00%

Figure 2: Number of COVID-19-related queries to the NHLS-NICD hotlines by Province, 1 January–31 August 2020

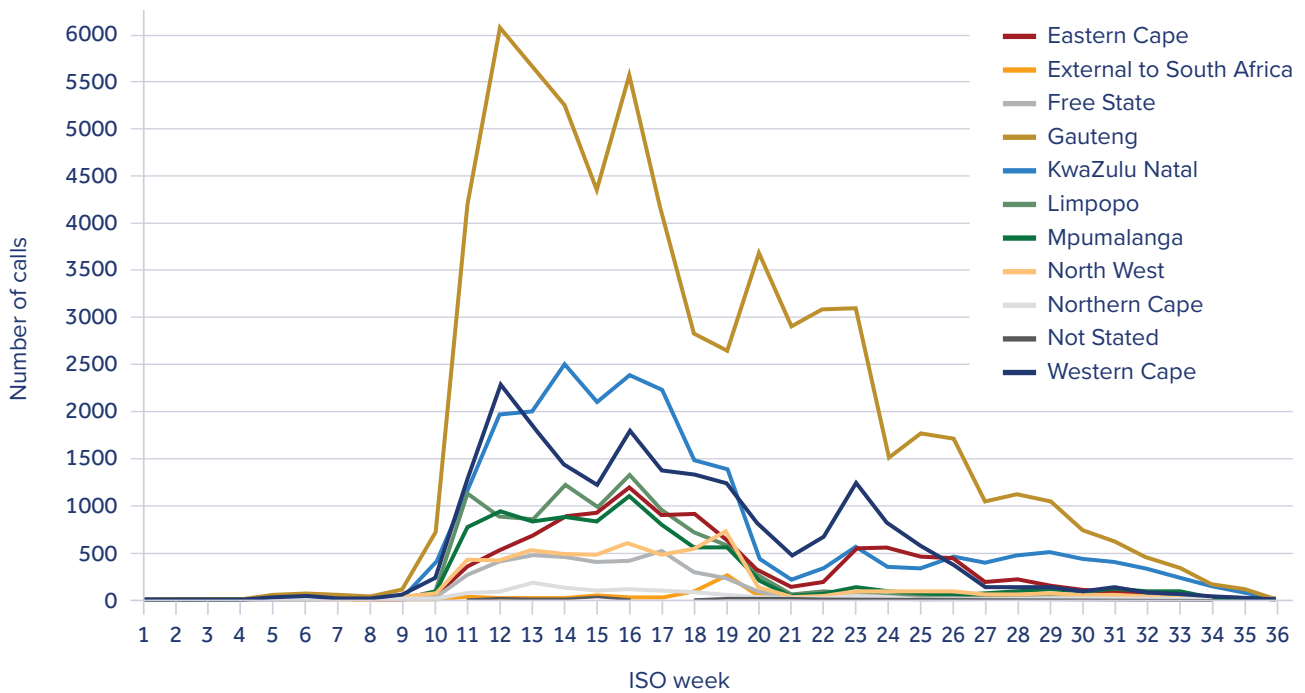
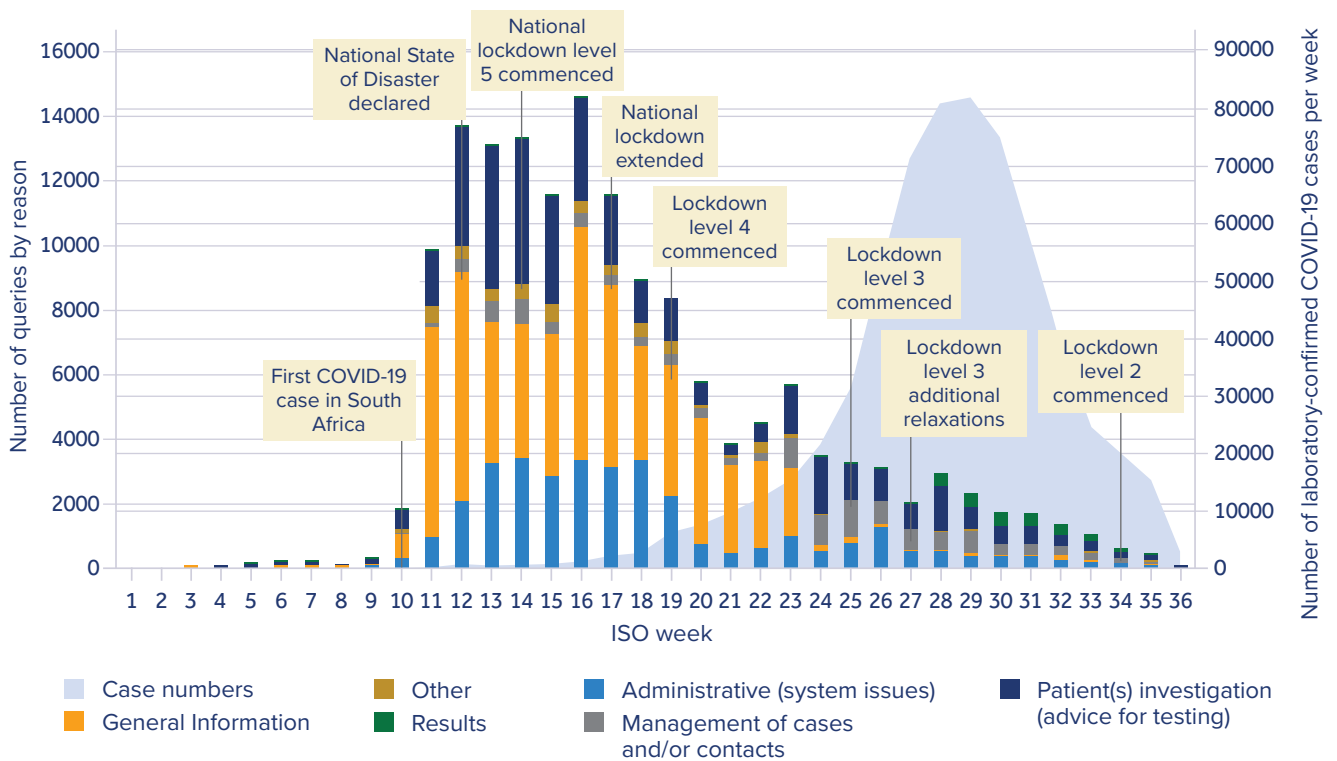


Figure 3: Number of COVID-19-related queries to the NHLS-NICD hotlines by reason and national COVID-19 cases by ISO week, 1 January–31 August 2020



There were peaks in 'Administrative' queries in weeks 14, 16, 18, 23 and 26, coinciding with the announcement and commencement of the different lockdown levels. There was a notable increase in the proportion of calls regarding requests for 'Results', from 7.1% (1 231/ 17 230) in June to 18.5% (1 691/ 9 120) in July and 16.5% (612/ 3 711) in August, as shown in Table 1 and Figure 3.

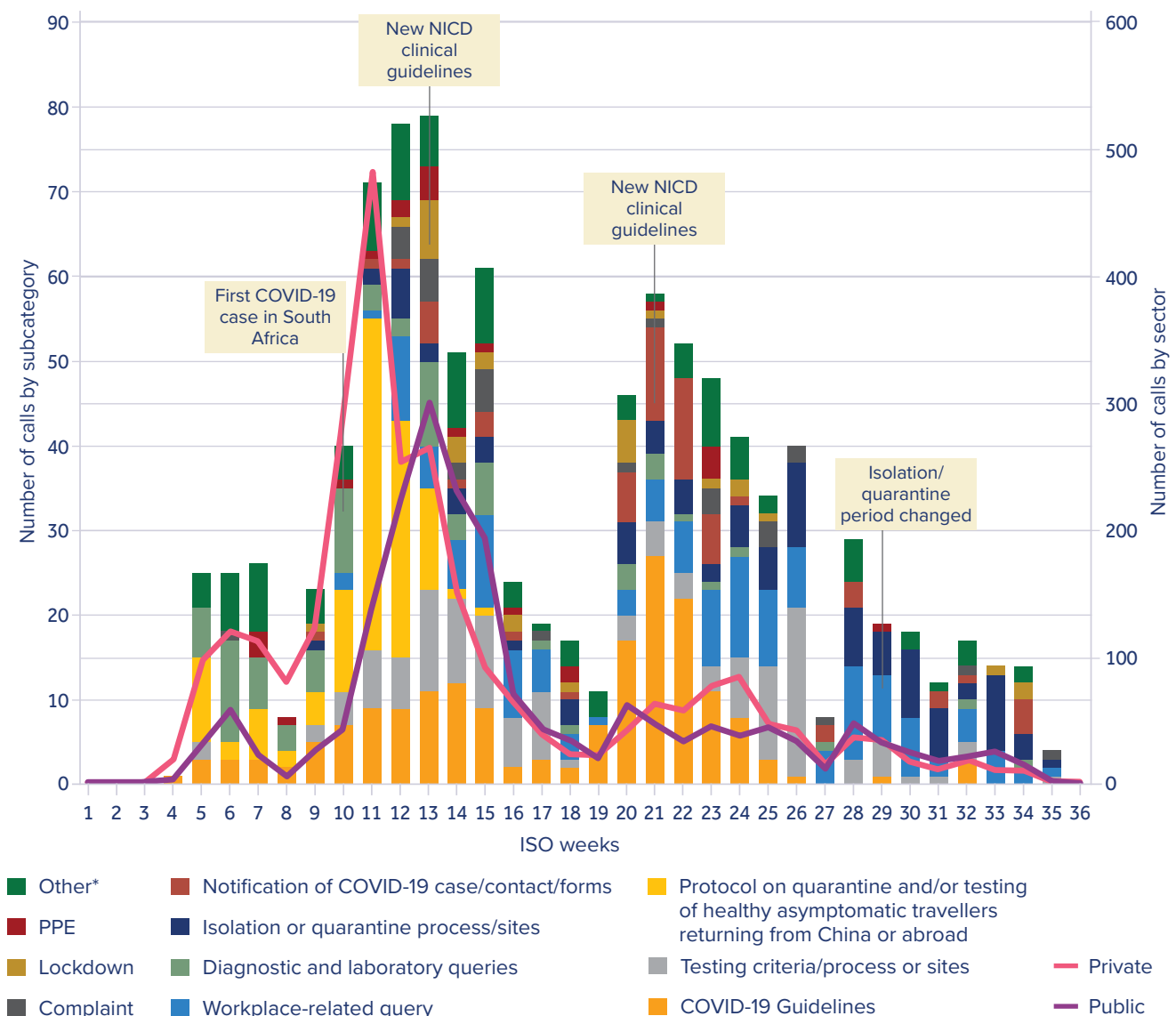
Queries to the public hotline were mostly from members of the public, at 97.7%. However, the majority of queries made to the clinician hotline over the study period were from doctors (65.6%), followed by members of the public (13.0%), and then nurses (11.3%). The provincial distribution of queries to both hotlines was relatively similar, with Gauteng contributing the most queries.

Public versus clinician hotlines COVID-19 calls

The calls received by the hotlines were categorised into the clinician or public hotline. Over the study period, 147 962/152 766 (96.9%) COVID-19-related queries were recorded to the public hotline, with 4 804 (3.1%) to the clinician hotline (see Table 2).

From January to March (weeks 1 to 13, Figure 4), the volume of queries to the clinician hotline from the private sector was higher than from the public sector.

Figure 4: Combination graph demonstrating trends in top 10 most common sub-categories of administrative COVID-19-related queries and queries by sector, to the clinician hotline 1 January–31 August 2020



* In descending order of total frequency thereafter: Test requested in asymptomatic person for work or travel, Travel-related, Statistics, School-related, Suspected patient refuses medical care, Social Relief of Distress grant, Request for training of staff, Quarantine of vessels/goods from China or abroad, Contact numbers (SAPS, ambulance, DoH, presidential), Non-COVID-19-related medical query, Masks and sanitisers, Food parcel, Water, electricity and sanitation, Repatriation

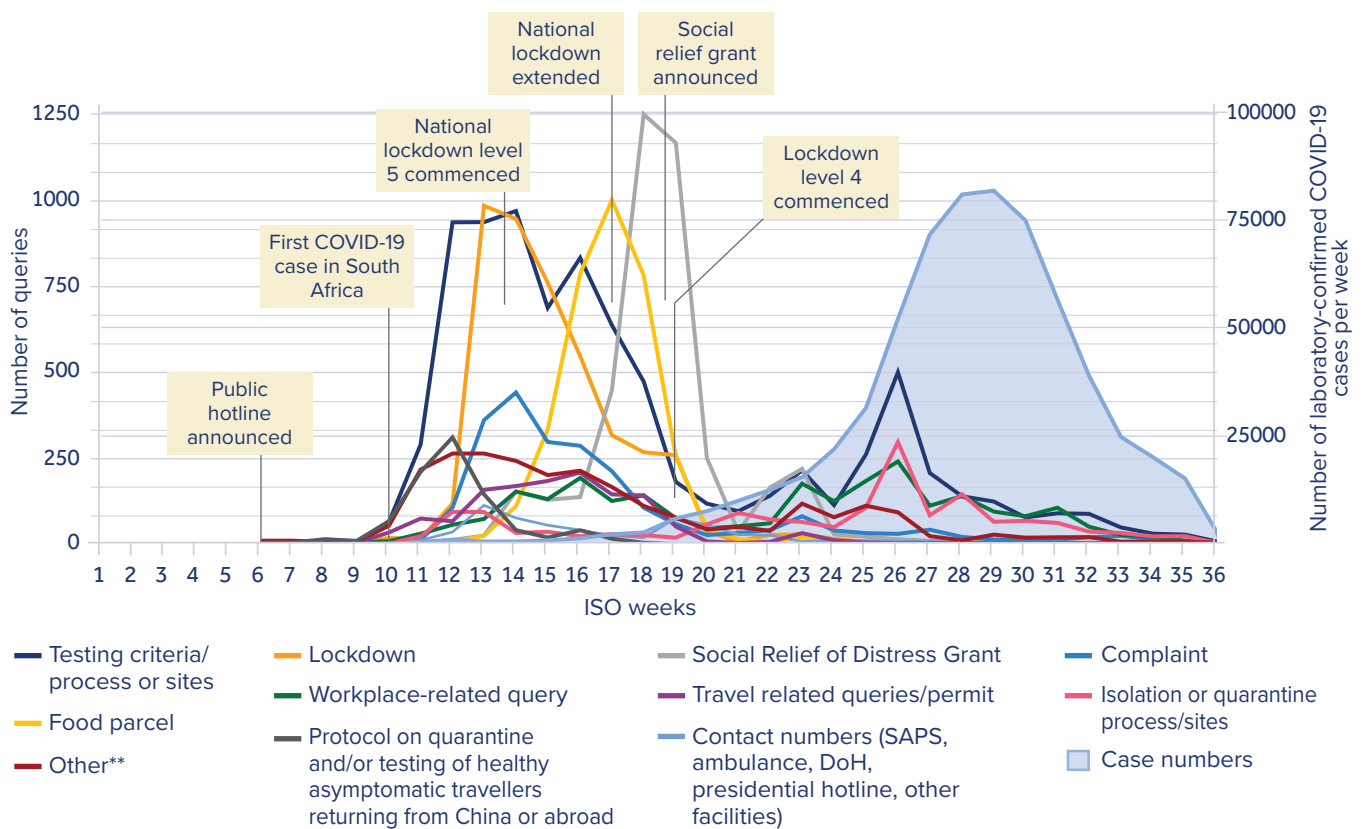
From weeks 13 to 20 (late March to May), the volume of queries from the public sector outweighed that of the private sector.

In contrast to the public hotline, wherein 40.7% of callers requested 'General information', the majority (52.3%) of queries to the clinician hotline were for advice on 'Patient(s) investigation', followed by 'Administrative' queries (21.1%), and then 'Management of cases and/or contacts' (19.6%) – see Table 2.

For the 'Administrative' subcategories, queries on 'Testing criteria/process or sites', 'Lockdown', 'Food parcel' and

'Social Relief of Distress Grant' dominated the public hotline, as shown in Figure 5. Although call numbers to the public hotline were low in February (weeks 6 to 9), the majority were related to the 'Protocol of quarantine and/or testing of healthy asymptomatic travellers' sub-category. In March, April and June (weeks 10 to 18 and 23 to 27, respectively), the most common sub-category was on 'Testing criteria/process or testing sites'. 'Food parcel' queries (relating to food parcels being distributed to vulnerable families most affected by the lockdown restrictions), started to increase in week 14, and peaked in week 17. Queries concerning the 'Social Relief of Distress (SRD) grant' increased dramatically in week 17 and decreased after week 19.

Figure 5: Line graph demonstrating trends in top 10 most common sub-categories of administrative COVID-19-related queries to the public hotline, 1 January–31 August 2020



** In descending order of total frequency thereafter: COVID-19 guidelines, Statistics, School-related, PPE, Water, electricity and sanitation, Notification of COVID-19 cases/forms, Masks and sanitisers, Diagnostic and laboratory queries, Suspected patient refuses medical care, Test requested in asymptomatic person for work or travel, Non-COVID-19-related medical query, Repatriation, Request for training of staff, Quarantine of vessels/goods from China or abroad, Requesting transport to healthcare facility (e.g. ambulance or taxi)

Unlike the public hotline, the majority of the sub-category queries received on the clinician hotline during the initial phase of the pandemic were 'Protocol on quarantine and/or testing of healthy asymptomatic travellers returning from China or abroad', 'Diagnostic and laboratory queries', and 'COVID-19 Guidelines', as seen in Figure 4. Queries on the 'Protocol on quarantine and/or testing of healthy asymptomatic travellers returning from China and abroad' were mainly received in January to March (weeks 1–13), while 'Diagnostic and laboratory' queries were most

common from weeks 5 to 10. Queries regarding 'COVID-19 guidelines' were seen from week 5, and increased in weeks 13 and 14, later peaking in week 21.

From June onwards (especially during weeks 24 to 27), both the clinician and public hotlines saw similar rises in queries regarding 'testing criteria/process or sites', 'isolation or quarantine process/sites', and 'workplace-related queries' – see Figures 4 and 5.

Discussion

The initial drastic increase in call volumes necessitated the rapid hiring and training of HCWs to respond to the demand. The rise in COVID-19-related calls coincided with a decline in non-COVID-19-related calls. This is probably attributable to the increase in calls from members of the public after the public hotline was established, and to changes in focus of healthcare facilities and health-seeking behaviours by the public. Another possibility is that the non-pharmaceutical interventions implemented to reduce SARS-CoV-2 transmission – including restrictions on the movement of people, physical distancing, mask use and hand sanitisation – reduced the likelihood of certain exposures and the transmission of other communicable diseases (a trend that can be correlated with NICD surveillance reports on influenza and meningitis¹¹), resulting in fewer calls to the hotline for related guidance. The large call volumes from members of the public may also have meant that HCWs encountered difficulties in getting through to the hotline, and possibly avoided doing so for their queries about other diseases. From May (week 19), there was a successive decrease in calls to both hotlines, even into the peak of the ‘first wave’ of COVID-19 cases in July and August. This is likely to have resulted from increased general and clinical knowledge regarding the virus.

Throughout the study period, calls from Gauteng remained the highest proportion of calls, possibly because there was no dedicated provincial hotline, and the province has the highest population in the country, is an economic hub, and initially received many of the ‘imported’ cases from other countries.⁵

In week 13, KwaZulu-Natal (which saw the first imported case) overtook the Western Cape as the second-most common origin of calls. This coincides with the Western Cape provincial hotline being instituted on 18 March.¹² Weeks 20 to 25 saw a resurgence in the number of calls from the Western Cape over KwaZulu-Natal, with a reversal of these rankings thereafter, for the remainder of the period. These findings correspond closely with relative case incidences reported at each point in time, suggesting increased demand for guidance by HCWs in those regions.^{13,14}

In reviewing the reasons for calls, there was a decline in the need for ‘General information’ over the months across the public and clinician hotlines. This is probably due to growing public awareness and professional knowledge about COVID-19, whilst the increase in local/community cases in the country led to more calls being received on the hotlines for advice in the management of cases and/or contacts. There was a notable increase in calls requesting ‘Results’ from June into July and August 2020, which is likely to have represented the reported increase in turnaround times for test results (highest in week 29)¹⁵ caused by increasing case numbers and testing volumes (with a peak in week 28)¹⁵ experienced during the first wave.

The initial predominance of private sector calls to the clinician hotline was in keeping with the majority of initial (mostly ‘imported’) cases being managed in the private health sector. The reversal of this from late March is in line with the private versus public sector distribution of cases from 8 April 2020 onwards.^{16,17}

The initial reason for calls to the public hotline such as the ‘Protocol of quarantine and/or testing of healthy asymptomatic travellers’ sub-category coincides with the spread of the virus to numerous countries outside of China. Between weeks 12 and 18, the reasons for calls to the public hotline coincided with the various lockdown Level 5 and 4 announcements and Regulations.¹⁸ Often these queries (about issues such as food parcels, SRD grants, and lockdown rules) were not within the jurisdiction of the NHLS and NICD.

The sub-categories of the ‘Administrative’ queries to the clinician hotline often mirrored events and showed gaps in HCWs’ knowledge related to the evolution of the pandemic, ranging from seeking guidance on quarantine/testing of returning travellers, to diagnosis, to COVID-19 management guidelines. The peaks in the sub-category ‘COVID-19 guidelines’ followed the declaration of the first case of COVID-19 in South Africa¹, and coincided with the release of the NICD ‘Clinical Management of Suspected or Confirmed COVID-19 Disease’ (version 2 and version 4) guidelines, and of the ‘Guide to the management of staff in healthcare and laboratory settings with COVID-19 illness and exposure’.¹⁹

Following the Minister of Health’s announcement on the reduction in the mandatory isolation and quarantine period for COVID-19 infection or exposure on 17 July²⁰, the clinician hotline saw a rise in the proportion of queries from HCWs seeking clarity on ‘Isolation or quarantine process/sites’. Many of these queries were requesting clarity on elements of the new guidelines and how to apply them to the particular contexts in which the callers practised.

However, from June, although call numbers to both hotlines had declined, the focus of the two hotlines was aligned and indicated a common need for guidance on management of rising case numbers from both perspectives. With the noted decline in call numbers despite the rise in cases during the ‘first wave’, further ongoing analysis of this trend should be explored. While ‘wave’ grouped data analysis is unlikely to add further to this discussion, regular ongoing weekly or monthly call review would be impactful to identify knowledge gaps timeously.

The wide advertisement and endorsement of the NHLS-NICD hotlines by local authorities and the media resulted in an influx of queries from different parts of the country, contributing to a large volume of data that, when described, represents concerns prevailing in the country as a whole and the evolution of the epidemic in South Africa. This was further achieved by its adaptation of an existing hotline that was well-known to clinicians from all nine provinces.

Since there was no standardised training of the users of the database and language barriers were evident in some queries, there were inconsistencies in data capturing, with some entries missing relevant variables. De-duplication of the entries representing transfers of the same caller from the public to the clinician hotline proved to be difficult to accomplish, as there were often few matching fields recorded to which a filter or algorithm could be applied. However, they probably represent a negligible total which is not considered to significantly alter overall results.

Conclusions

Both the clinician and public hotlines provided a tool for mass information-sharing at a time when few other structures were in place to effectively disseminate information. This developed into one of the service's primary roles, in addition to its initial use as an outbreak surveillance mechanism.

Data from the NHLS-NICD hotlines reflected trends in case numbers, knowledge gaps, and distribution of concerns related to COVID-19, and justified the hotline's necessity. As such, it could be used as an adjunctive tool to inform and monitor similar diseases and outbreaks, particularly in the initial period.

The pandemic required responsiveness from all sectors, and the reasons for which callers contacted the hotline mostly differed between the public and clinician hotlines. The information requested by members of the public was often beyond the scope of the NHLS-NICD's practice, signifying a need for additional information, and related training of hotline staff, on various topics of public administration related to COVID-19. The knowledge gaps evident from queries to the clinician hotline evolved over time with the progression of the response to the pandemic.

It is evident that prior preparation is essential in developing an effective system for use in emergency situations, and the findings of this study can be used as foundational lessons.

Recommendations

- The ongoing weekly and monthly analysis of data from the hotline should be used to engage with relevant stakeholders for delivery of targeted public health education based on identified knowledge gaps.
- Other sectors and government departments should use the analysis of queries in this report, which could not be managed by the NHLS-NICD adequately, as the basis for the establishment of their own hotlines and awareness campaigns, or by sharing relevant information with the NHLS-NICD to assist these callers more effectively. The establishment of future hotline services could also draw from this experience to define and clearly state the

mechanism's objectives in order to encourage queries of a more appropriate nature. These calls can then be afforded more time and dedicated attention.

- The establishment of such services for similar future outbreaks should be investigated and anticipated. This would involve the formation of a specific task team, and a focus on enabling the receipt of non-pandemic-related queries to remain uninterrupted.
- Continuous, focused analyses of the HCWs' queries on 'COVID-19 guidelines' should be conducted to review persistent knowledge gaps among this user group and accordingly improve the clinical management and Infection Prevention and Control (IPC) guidelines published by the NICD.
- Data were often not recorded in a consistent manner; a standardised approach should be adopted and related training should be implemented to improve the quality of entries on the database.
- The linguistic capacity of call agents should be diversified to assist all callers more effectively in their home languages. Implementation of these improvements may strengthen the value of the hotline as a surveillance tool in future outbreaks.
- The preferred communication method for members of the public seeking to access information should be determined.
- Further research may answer questions regarding how to optimally involve particular groups in community health education.

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