

Refining Community Grid Management in Medium/High-Risk Regions when SARS-COV-2 Delta Variant Attack in Yangzhou: A Qualitative Study

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Abstract

Background: Community grid management has been proved to be effective in the outbreak, but previous studies have all been carried out in China's first-tier cities, while Yangzhou, as a second-tier city, seemed to have deficiencies in epidemic control. The aim of this research was to understand the experiences and feelings of residents and social workers in the grid, so as to develop more detailed community grid management strategies in the context of mandatory quarantine.

Methods: Qualitative research was conducted with 21 residents and 10 social workers based on a semi-structured qualitative interview guide. Thematic analysis was employed to analysed data.

Results: The outbreak has put pressure on both residents and social workers, and the implementation of community grid management has revealed many deficiencies, such as quarantine strategies, human resource management, material supply and information transmission. As the four overarching themes identified from the analysis: "inadequate quarantine strategies may create greater risks", "human resource management in the grid is considered lagging", "duplicate/missing information" and "another way to meet daily needs.

Conclusions: This study used the perspective of residents and social workers within the grid to help explained why there was still confusion in the seemingly tight management. Analysed the quarantine strategy, human resources management, supply chain and information technology. Flexible and responsive community grid management was conducive to reducing the risk of transmission and economic losses.

Background

Struck by SARS-COV-2 delta variant, Yangzhou caused a concentrated outbreak in a short period of time. It is reported that in 15 days Yangzhou Municipal Government has made 15 adjustments to risk regions[1].As of August 14, 2021, there are 9 high-risk areas and 29 medium-risk regions, covering almost the entire city[1]. Internal and external problems are the key that make Yangzhou City become a problem in the rapid development of the virus. From an external perspective, since July 31, Yangzhou has successively closed off external channels (airports, major traffic roads, and high-speed rail station), but the daily number of confirmed cases has still increased at a steady rate. Which bought us to turn the eyesight to the inside[2].

Delta variant is an "improved" version of the alpha variant, making it easier to propagate[3, 4]. It is fitter human airway cells, so there is an increased amount of the virus in the infected person, which means the virus is more transmissible[3]. And what worries us most is that Delta is moderately resistant to vaccines[4, 5]. Dense urban areas have become hotbeds for the spread of the virus[6]. Therefore, higher-level prevention and control requirements have been put forward for identifying the source of infection and cutting off the transmission route.

Some guidelines set out basic measures in the event of an epidemic including travel bans, household quarantine, border closure and so on[7, 8]. Since the outbreak of the epidemic in Wuhan in 2019, China has developed a series of powerful measures in a difficult process. Including the continuation of the 2004 Beijing community grid management model[9]. This management model was initially used in non-public management fields such as electricity and agriculture[10–12]. In view of grid management, a large area can be divided reasonably and orderly, and then each part of the area can be refined management[12]. Therefore, it has been introduced into public management in recent years[13, 14]. Public health emergencies are essentially caused by the same trend of various factors and the public will easily fall into short-term social disorder after these factors are intertwined[15, 16]. Therefore, when the community grid management was used to respond, the service level of the community and the local government can be effectively improved. Furthermore, it was more conducive to the management of the community's diverse subjects. With the development of network information, community grid management uses a modern information technology platform for community information collection and comprehensive management of the grassroots management model[17, 18].

Although the epidemic control in Wuhan is the latest favourable evidence, compared with first-tier cities such as Beijing and Wuhan, Yangzhou, as a second-tier city, does not have the medical resources and anti-risk capability of first-tier cities[18, 19]. It has been found that the ability of community affairs governance and mature management system are crucial to the perfect completion of community grid management[9]. However, the implementation process is challenging. Because, from the current situation, in the face of the surge of the epidemic and the high intensity of prevention and control is obviously insufficient. This is confirmed by the fact that the momentum of the epidemic in Yangzhou has not been stopped. Historically, Yangzhou has never experienced large-scale natural disasters or epidemics, and the city may not have the experience and perception to deal with them quickly.

This research was carried out in Yangzhou city to gain an in-depth understanding of the many aspects involved in community grid management in medium/ high-risk regions. First of all, prevention and control, as the primary measure of epidemic management, involves the control of community entrances and exits, and the flow adjustment of the trajectory of people in the community as the basic means of community grid external defence. Secondly, the transportation and supply of daily necessities and food in the grid was the means of maintaining the survival of the residents who are quarantined in the grid. Thirdly, whether information sharing within the grid can be achieved depending on the modern information platform. Fourth, doing a good job in the emotional management of individual and group residents were the finishing touch to the implementation of grid management. The implementation of perfect community grid management will be a tripe-win issue involving epidemic prevention, community workers and residents. The aims of this research were: (i) What did residents feel and experience when they were subjected to community grid management in the face of mandatory quarantined? (ii) As the people who maintain grid management, how did social workers reacted and felt?

Methods

Design

This qualitative research was carried out in different risk regions in order to have a more comprehensive understanding of the development of community grid management during SARS-COV-2 delta variant attack in Yangzhou[20]. The aim of this research was to understand the experiences and feelings of residents and social workers in the grid, so as to help decision-makers develop more detailed community grid management strategies in the context of mandatory quarantine.

Participants And Settings

Snowball sampling was used. We contacted three grid managers from different risk regions who were willing to participate in the study and sent a recruitment letter about the study to residents who lived within the grid through them. Participants included residents (n = 21) and social workers (n = 10). A broad definition of 'social worker' was used, including those related the original grid workers, volunteers from other administrative departments and social volunteers. The inclusion criteria for participants were: (i) Living or working as a social worker in the grid; (ii) clear consciousness and normal hearing and speaking (iii) understand the purpose of this study and volunteer to participate. Interested residents and social workers signed and returned the consent form to us. All participants were required to be able to be interviewed in a separate space. There were no drop-out participants during the process of study, and the sample size was considered based on the saturation of available information. Due to quarantine restrictions, all interviews will be conducted by WeChat video (a chat app). Their demographic characteristics are presented in Table 1.

Table 1
Demographic characteristics of participants

	Community 1 (medium risk)	Community 2 (medium risk)	Community 3 (high risk)	Total number
Mean age (range)	55 (23–67)	58 (17–62)	51 (32–59)	-
Male	5	5	7	17
Female	3	6	5	14
Residents	7	6	8	21
Social Workers	3	4	3	10
Total number	10	10	11	31

Data Collection

Data collection was done via semi-structured consisted of open-ended questions and based on Internet individual interviews (Table 2) [20]. Each interview conducted for approximately 30–60 minutes. The interviews were recorded with voice recorders with consent. The recordings were transcribed by a professional transcriptionist and verified for accuracy by participants.

Table 2
Semi-structured questions

1	Have you learned about community grid management?
2	How do you feel about living in quarantine under the community grid management?
3	What worries you about the current management?
4	What's behind these concerns?
5	What suggestions do you have for improving the current management?

Data Analysis

The transcripts of participants were imported into NVivo 12 software[21, 22]. Thematic analysis was adopted in this research, which was performed as described by Braun and Clarke and is an analytical approach well-suited to exploring subjects' views[23]. 2 researchers followed a six-step guide of thematic analysis, including data familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the report[24].

Results

The outbreak has put pressure on both residents and social workers, and the implementation of community grid management has revealed many deficiencies. As the four overarching themes identified from the analysis: "inadequate quarantine strategies may create greater risks", "human resource management in the grid is considered lagging", "duplicate/missing information" and "another way to meet daily needs.

Inadequate Quarantine Strategies May Create Greater Risks

Quarantine strategy was one of the effective defensive lines of epidemic prevention and control[25]. But a major theme in our research was the concern that inadequate quarantine strategies could create potential risks.

During the quarantine period, it was necessary to carry out the nucleic acid testing of the residents in the whole grid every 1–2 days. However, the chaotic nucleic acid testing scene made them wondered whether being in a gathering environment would put them at risk of infection.

"The exit of the queue channel for nucleic acid testing would overlap with the line" (community 3, resident 7)

"We were not asked to do nucleic acid testing in different batches, so the queue was very long and there were only a few social workers to maintain the order of the queue." (Community 2, resident 3)

Others described the existence of inclusiveness in mandatory management, which may become a loophole of strict compliance and created risks. For example, social workers and nucleic acid testers belong to the floating population and were not subject to the community grid management.

"One social worker was a positive patient, but he had been working in the grid for many days before he was diagnosed." (Community 3, resident3)

Many residents realized that the existence of 're-entry grid' may pose a potential risk of infection. They believed that the grid under mandatory management is relatively safe, and that unstable external factors will bring risks inside.

"For those who leave the grid for medical treatment (non-Delta-positive patients) or other emergency reasons, when they return to the grid, they will still be allowed to return to their own home for quarantine." (Community 1, resident 5)

The medical waste generated after nucleic acid testing was initially handled by ordinary cleaners, but this was obviously unreasonable. Pollution from medical waste, which would cause secondary damage to the environment, was also listed as a potential hazard caused by inadequate jurisdiction. As nucleic acid testing were conducted throughout Yangzhou, there was a shortage of medical waste handling relevant personnel. Therefore, the process of waiting for professionals to dispose of medical waste was extremely long.

"The medical waste after nucleic acid test is just thrown on the roadside, and no one comes to collect it. There was a heavy rain last night, and the rain would spread the contaminated area." (Community 1, resident 10)

Human Resource Management in The Grid is Considered Lagging

One theme that exists was related to lagging human resource management. We understand that in the early management process. We learned that in the early stage of management process, most of the confusion that occurred was related to the unclear work responsibilities. Because, due to emergency dispatch, social workers include people from all walks of life and their daily work needs to be run-in to enter the state. At the later stage when the workflow has been clearly defined, the high requirements for epidemic prevention in the grid was at odds with insufficient manpower. Due to quarantine restrictions, many social workers were quarantined in their original communities and unable to reach their workplaces. This is because once a positive case was found in one place, that area would be subject to mandatory quarantine. That means it's almost impossible for social workers to know if they' would be able to return to work the next day, because the mandatory quarantine was done overnight. This putted the community gird facing the dilemma of uncertainty in the number of social workers.

*"There were no permanent social workers, no one knew who would be fighting side by side the next day."
(Community 2, social worker 4)*

Many social workers did not have management or medical backgrounds, and it was difficult to deal with outbreaks without uniform training. Since the call-out process to social workers was completed in a very short time, thus, the grid manager assigned tasks without background knowledge and training on the social workers. There would be many flaws during the work process, especially the hidden risks of infection.

*"Many social workers didn't have a strong awareness. They go in and out of different buildings without self-disinfection."
(Community 3, resident 2)*

Duplicate/Missing Information

The demands of residents would lead to information duplication through multiple platforms demands, while the demands of those residents who were not good at using the information platform would be missed.

*"We had a lot of WeChat groups, but I found that many residents would send the same message in different groups, it would cause a waste of resources, such as: duplicate statistics by social workers or waste of distribution materials."
(Community 3, social worker 2)*

The problem of information would also arise in epidemic prevention and control, especially the investigation of every resident. The announcement of an upcoming nucleic acid test was also unplanned

*"Some elderly people without smartphones have no way to fill out Excel forms (include names, ID numbers, number of nucleic acid tests, vaccinations, etc.)."
(Community 1, social worker 2)*

*"It's been the sixth nucleic acid testing, but it still hurried to inform, only to use the loudspeaker to shout, some people would miss the nucleic acid testing because of Bad notification method."
(Community 1, resident 2)*

Another Way to Meet Daily Needs

Official channels did not seem to be able to meet the needs of residents, so many spontaneous group purchases have emerged.

*"They (social workers) said the supplies were coming, but there were no more supplies when it's our turn... disappointed... coordination was not in place."
(Community 2, resident 7)*

*"I try to join various WeChat groups that spontaneously deliver supplies, because the food I ordered from the official channel five days ago was rotten because there was no staff to deliver it..."
(Community 1, resident 3)*

But spontaneous organizations were not allowed to enter the quarantine regions. Over time, the distribution of supplies began to become orderly, but problems remained. Due to the hot weather, even if the residents' needs were met at the material distribution centre, the food spoiled when it was delivered to the destination. New problem aroused because someone has to pay for the rotten food.

"Although it's the food I ordered, but the meat has gone bad, I don't think I should pay for it." (Community 3, resident 9)

Discussion

We found four themes in the implementation of community grid management for social workers and residents, all of which reflected the immaturity of community grid management when the Delta virus broke out.

There is no doubt that community grid management undertakes the task of precise control when the outbreak occurs[18]. Obviously, when we interviewed residents and social workers, we found that there were deficiencies in the implementation process in community grid management. Social workers' deviation in the concept and actual actions of grid management, coupled with their lack of in-depth understanding of the virus, led to inevitable flaws and lack of flexibility in the implementation process. The services that were urgently needed in the intensive outbreak of the epidemic seem to exceed the original cognitive scope of social workers, which made them took greater risks to face the chaotic situation. The state of community grid management seemed to be a strained rubber band[26]. It was not the elastic strategy of the think tank that can maintain the operation, but the persistence of the social workers to fill the vacancy blindly. Resilient community theory views risk management as building community capacities to adapt to, respond to, and recover from adverse events. By emphasizing building capacity to act effectively when needed, rather than focusing solely on choosing acts[26]. Therefore, although Yangzhou has made great efforts to control the development of the epidemic, given that new positive cases were still emerging in the grid, the flexible governance capabilities of grid management are not satisfactory.

Yangzhou carried out eight nucleic acid testing in just half a month, which means large-scale nucleic acid testing were required every two days. Even though 12 other cities in Jiangsu province have provided medical support to Yangzhou, the workload of 1.5 million people at a time was expected to require extremely fast work speed. Fast and high-intensity work would bring a series of problems[27]. Droplet spray in short range, fomite (contact) transmission and aerosol in long range were the main transmission methods of SARS-COV-2 delta variant[28]. Even if nucleic acid testing was performed outdoors, the dense crowd made transmission possible[29]. Therefore, it was necessary to maintain the distance maintained when queuing. Yet there was still a chaos at the actual nucleic acid testing site, even though the ground has been delimited one-meter line. It was necessary to implement planned batch nucleic acid testing in the grid to reduce crowd gathering, and to disinfect the environment after each batch was completed. In our study, we found that social workers who without medical background were in charge of the

quarantine site rather than professional medical personnel, so there were many unreasonable settings. In grid management, although social worker-led, it was necessary to include personnel with medical background or basic training when performing tasks related to the epidemic. For resident with special needs who needed to leave the grid temporarily, there should be a clear process, such as the formulation of destination routes to avoid the risk of passing through other medium-high risk regions. For resident who returning to the grid, setting up a quarantine buffer area could ensure the continuation of the hard-won epidemic prevention results.

Material transportation was an inevitable problem involved in the implementation of closed management[30]. Almost everyone expressed concern about the shortage of materials, and this was where residents were most dissatisfied with community grid management. The reasons for concern included the uneven distribution of materials to meet individual needs (e. g. nutritional supplements, medicines). In this study, the management in the grid was messy, and there was no overall planning and distribution. Residents' self-rescue behaviour was contrary to strict quarantine strategy. Because the virus could spread through the surface of the object[28], only specific suppliers (with relevant certificates of transportation during an outbreak) could guarantee the safety of materials. This was a dilemma, and tracking down was a matter of reasonable material management and distribution. Appropriate material management in the grid should have dedicated social workers responsible for registration and distribution, coordination of safe material procurement channels and storage sites, and predictive storage of emergency materials.

Timely information transmission and feedback would be an important part of grid management[9]. Capturing the information well was beneficial to investigating the hidden risks and plugging the air defence loopholes[31]. Relying solely on the network platform would cause the omission of information aggregation, especially in the statistics of key information such as whether nucleic acid testing has been carried out. Fully considered the coverage of information transmission, and adopted a mode that combines online and offline.

A meta-analysis suggests a general negative effect on mental health in the majority population during social isolation for COVID-19. Including higher levels of anxiety, depression and poorer sleep quality, which is consistent with the results of our study[32]. Since the community grid management relied on the network platform, the emotional catharsis of the residents was exposed to each other nakedly through the network, so that the group's emotions are ignited. This reflected the duality of relying on the network platform as an information medium. In the process of our research, we found that when residents dealt with unreasonable phenomena or arrangements, their opinions often did not received feedback from social workers and the accumulated information and dissatisfaction gradually increase. The reason for falling into a full-blown situation is that social workers cannot guarantee in their own name, and the emergence and resolution of problems cannot reach a dynamic balance. The social workers all said that they were under tremendous pressure. On the one hand, the control of the epidemic was beyond their reach, and they needed to respond to both the demands of residents and the directives of leaders. On the other hand, physiological stress, lack of sleep and huge workload were ubiquitous in the work of social

workers[33, 34]. Almost all social workers said that the sheer volume of messages from WeChat groups was a powerful source of stimulus. Chaos was caused by the lack of detailed responsibilities and clear division of labour in the grid management. Even in the face of social workers being quarantined at any time, flexible adjustment management strategies should be initiated. With the help of the network platform, social workers who were quarantined could work from home, classified and dealt with new problems, and then sent them network to social workers who could walk in the quarantine for working. It could not only reduce their viewing of chat records but also eliminated the psychological stimulation of bad comments on them, while improving the efficiency of their work in the grid. Thus, the allocation of mobile responsibilities in the community grid management was needed.

The study was carried out in different risk regions to understand the experience of residents and social workers with grid management. However, due to quarantine restrictions, this study could only be conducted over the network. Since most elderly people did not use smartphones or have difficulty communicating due to hearing loss, the lack of elderly people in our study population introduced some bias.

Although community grid management has been proved to be effective during the pandemic outbreak, but there were still shortcomings in the application process. This study used the perspective of residents and social workers within the grid to help explain why there was still confusion in the seemingly tight management. Analysed the quarantine strategy, human resources management, supply chain and information technology. Flexible and responsive community grid management was conducive to reducing the risk of transmission and economic losses.

Conclusions

Although community grid management has been proved to be effective during the pandemic outbreak, but there were still shortcomings in the application process. This study used the perspective of residents and social workers within the grid to help explain why there was still confusion in the seemingly tight management. Analysed the quarantine strategy, human resources management, supply chain and information technology. Flexible and responsive community grid management was conducive to reducing the risk of transmission and economic losses.

Declarations

Ethics approval and consent to participate

The Ethical Committees of School of Nursing of Yangzhou University approved this study (YZUHL2021016). All participants were informed about the study through an informed consent.

Consent for publication

The details will be freely available on the internet and may be seen by the general public.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

None.

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Authors' contributions

Conceptualization, PTZ and QWW; methodology, PTZ and QWW; software, XYL and CC; validation, PTZ and QWW; formal analysis, XYL and QYJ; investigation, QWW, XYL, CC, QYJ and TX.; writing—original draft preparation, QWW; writing—review and editing, PTZ.; supervision, PTZ. All authors have read and agreed to the published version of the manuscript.

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