On the work of the Tselinograd city disinfection station (1968)

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Abstract. The article notes that after the beginning of the process of developing virgin lands in Kazakhstan in the 1950s, the health authorities faced the question of creating a disinfection station in the city of Tselinograd. The problem in those years was acute, since sewage treatment plants were under construction in the virgin land city and often sewage water was pumped without treatment and discharged into the Taldy-Kul storage lake, located 12 km from the city. The high population density led to an annual increase in the number of infections. The ongoing and final disinfection measures carried out by the health authorities undoubtedly gave certain positive results. However, in infectious diseases hospitals, the regime of chamber disinfection was constantly violated, there were not enough staff, which together lowered the quality of the complex of special measures aimed at destroying pathogens of infectious diseases. The authors of the article came to the conclusion that the measures carried out by the health authorities could not meet the needs of the local and visiting population, and the insufficient organization of the sanitary service was one of the reasons for the high incidence of various infections among the population.

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1 Introduction

Since the 1950s, the city of Akmolinsk (since 1961 – the city of Tselinograd) has become the center of the development of virgin and fallow lands in Kazakhstan. Specialists of various professions began to gather from all the former Soviet republics to develop virgin lands, turning it into a large agricultural and industrial center [1-11].

The city of Tselinograd was located on a territory with a smooth, flat relief. The total area of urban land was 35 thousand hectares in 1968. The radius of public service was 60 km. The population at the end of 1968 was 195.6 thousand people. The total length of the streets was 480.9 km. Many houses on the periphery did not have number plates. Of all the existing number plates, the signs were illuminated only on the central streets, which undoubtedly hindered the work of medical services, especially in the evening hours of the winter period [12].

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Residential, industrial, transport-warehouse and suburban zones were allocated on the territory of the city. The city was dominated by one-story private houses. There were also seven public baths with 480 washing places, instead of the required 1620. The water supply of the city of Tselinograd was represented by municipal water supply, 5 departmental water supply and local water supply. In 1968, the main source of water supply of Tselinograd was the Vyacheslav reservoir commissioned in 1968. On average, there were 200 liters per person per day (taking into account industrial enterprises) [13].

There were 8 public wells and 237 standpipes in the city. The length of the sewer network was 76.3 km. The treatment facilities were under construction. In 1968, sewage water was pumped through city pumping stations, fed into a country pressure collector and then discharged into the Taldy-Kul storage lake, located 12 km from the city, without purification.

In the city of Tselinograd, a special base was engaged in cleaning, fully provided with transport, as well as an agency (a branch of the railway, housing and communal services of the Kazakhselmash plant, housing and communal services of the Tselintransstroy trust, housing and communal services of the Tselinogradstroy trust, etc.). Several cleaning systems were used, i.e., the planned one per apartment, the planned one per yard, and the one on request. Cleaning in private sector households was carried out according to the on-request system. Cleaning inside the city block was carried out by the janitors of the relevant departments and house administrations. An organized landfill for solid waste and garbage was located at a distance of 6 km from the city [14].

Medical care of the city of Tselinograd was carried out according to the neighbourhood principle. The adult population was served by the I-th and II-th adult polyclinics, the children's population was served by 5 children's polyclinics.

2 Materials and Methods

The article uses a complex of interdisciplinary methods, when methods of various scientific humanities and medical disciplines are used to achieve the final result, which is very important in modern natural sciences and humanities research. The main principles when working on the article were objectivity and scientific approach, involving a thorough analysis of important events, verification of sources and facts from the contemporary history in relation to Kazakhstan.

3 Discussion of the results

3.1 Disinfection staff

The 2nd category municipal disinfection station in the city of Tselinograd was organized in 1964. According to the staff schedule, there were 5 medical units, all were busy at that time. Of these, there are 4 individuals: the chief physician, the head of the department of hospitalization, the head of the department of focal disinfection and the head of the bacteriological laboratory. The medical rate of the epidemiologist for control was shared between doctors. There were 43 posts for nursing staff, 39.25 were occupied and 3.75 were vacant. Thus, the disinfection station was not fully staffed [15].

There was an increase in the number of infections in the city of Tselinograd. See Table 1.

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Table 1. Comparative data of 1967–1968 on the number of applications received for hospitalization in terms of 100 thousand population.

Name of infectious diseases	Total for 1967		Total for 1968		Growth or decline submitted received
	Examined	Per 100 thousand of population	Examined	Per 100 thousand of population	
Typhoid fever	48	26.2	35	18.2	– 1.43
Paratyphoid fever	21	11.4	29	15.1	+1.32
Hepatitis	475	259.5	125	273.4	+1.05
Acute dysentery	1760	961.7	1035	539.6	–1.78
Dysentery	254	138.7	153	78.7	–1.78
Chronic dysentery	94	51.3	71	36.9	–1.39
Diphtheria	19	10.8	18	9.3	–1.17
Diphtheria	16	8.7	122	63.6	+7.3
Enterocolitis	774	422.9	840	437.5	+1.03
Colienteritis	5	2.5	63	32.9	+12.1
Toxic dyspepsia	70	38.3	77	40.1	+1.04
Salmonellosis	67	36.6	49	26.04	–1.36

As can be seen from the table, there was an increase in the number of registered emergency notifications for the following infections: epidemic hepatitis by 1.05 times, paratyphoid fevers by 1.32 times, diphtheria by 7.3 times, colienteritis by 12.1 times. For the following infections, there was a decrease in the number of registered emergency notifications: acute dysentery by 1.78 times, typhoid fever by 1.43 times, chronic dysentery by 1.39 times, dysentery by 1.76 times, salmonellosis by 1.37 times. In total, in 1968, 49 emergency applications for hospitalization were submitted for salmonellosis, 134 confirmed cases were at the city sanitary and epidemiological station, 133 were hospitalized, which was explained by the fact that most cases of infectious patients were hospitalized under a different diagnosis [15].

3.2 Final disinfection in infectious foci

The Focal Disinfection Department performed the following work:

a) final disinfection in the foci;

b) since December 1968, it has been organizing the current disinfection in the foci when leaving the patient at home;

c) quality control of disinfection, both final and ongoing;

d) conducting seminars on disinfection issues.

Upon receipt of an emergency notification, a final disinfection order was issued. If, after finding out, it turned out that the patient had already been hospitalized, then an independent disinfection team went for treatment. If the patient was not hospitalised, one evacuator and a disinfection team usually went to the outbreak at the same time. In cases where the apartment was closed, removal from the place of work was practiced on time for final disinfection. As a rule, they left for the final disinfection in preschool institutions after 5 pm. This was due to the fact that when treating in the group, the transfer of children to other places was difficult.

In the foci of infectious diseases such as hepatitis, typhoid, paratyphoid fever, diphtheria, tuberculosis, the final disinfection was carried out in a combined way [16]. In the foci of microsporia, trichophytosis, scabies, pediculosis, disinfection was carried out by the chamber method. In the foci of other infectious diseases, disinfection was carried out in a wet way. Quality control of the final disinfection was carried out by taking swabs by

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assistant epidemiologists for control. Along with laboratory control, visual control was carried out by the head of the focal department, epidemiologists for control and evacuators at a one-time departure with a disinfection team. See Table 2.

Table 2. Comparative data on the scope of work for the final disinfection.

Year	Applications received	executed	%	Not completed	%	In the first 6 hours	%	More than 6 hours	%
1967	6392	4792	74	1601	25.1	2007	43.9	2784	58.1
1968	5445	4799	88.1	645	11.8	3500	75.01	1299	27

As can be seen from the table, 5445 applications for disinfection were received in 1968, 4799 of them were processed, which was 88.1%. Out of the total number of applications, 645, or 11.8%, were not fulfilled. Compared to 1967, the percentage of unfulfilled applications has decreased by 14%. The number of completed applications in the first 6 hours was 3500, which was 75.01% of the number of completed ones. This figure has increased in comparison with 1967, and the number of completed applications over 6 hours in 1968 decreased by 2 times. The number of unfulfilled applications was 645, representing 11.8% due to the following infectious diseases: scabies 344 cases, dysentery 25 cases, enteritis 69 cases, gastroenteritis 30 cases, microsporia 40 cases and trichophytosis 33 cases. The main reasons for failed final disinfection were: change of diagnosis - 24, no residency – 328, refusals – 108, expired – 110, passing through – 18, permanent locks – 56. Of all untreated cases due to not residing at the address: for scabies – 257 cases, for microsporia – 25 cases, for trichophytosis – 21 cases. The reason for such a high figure was the registration of patients with scabies in a skin and venereological dispensary not according to a passport, and patients often incorrectly said the addresses [17].

Due to the reason, the deadline expired, in total – 110 cases, of which 29 cases were on enteritis, bacteriocarrier of dysentery – 2 cases, gastroenteritis – 10 cases, salmonellosis – 27 cases, toxic dyspepsia – 21 cases were explained by the fact that children were admitted to a somatic hospital with other diagnoses, after lying for 10-15 days, fell ill with dysentery, enteritis, after which they were transported by the disinfection station transport to the infectious diseases' hospital. As a result, the deadline for final processing expired. Of the untreated cases due to refusals – 109 cases, 56 cases of scabies, 12 cases of microsporia, 11 cases of trichophytosis and 7 cases of dysentery. Refusals and permanent locks (29 cases) were the result of poorly conducted explanatory work among the population about the importance of final disinfection, both on the part of the medical network and on the part of disinfection stations, sanitary and epidemiological stations. 27 cases of salmonellosis were not treated due to expiration, as these patients were hospitalized with other diagnoses [18].

3.3 Organization of current disinfection

The organization and conduct of current disinfection until December in 1968 were carried out by the city sanitary and epidemiological station. The disinfection station dealt with this issue for only one month in 1968. Control over the organization of current disinfection in infectious foci was carried out by employees of the disinfecting station, doctors and average medical workers for control. See Table 3.

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Table 3. Control by health authorities over the organization of current disinfection.

№	Name of infectious diseases	Total infectious patients left at home	Current disinfection organized	Terms of organization	
				Patients were identified on the day	more than
1	Acute dysentery	156	156	110	46
2	Bacteriocarrier of dysentery	64	64	50	14
3	Chronic dysentery	8	8	8	–
4	Bacteriocarrier of diphtheria	26	26	26	–
5	Enteritis	127	127	80	47
6	Enterocolitis	40	40	30	10
7	Gastroenteritis	84	84	60	24
8	Colienteritis	23	23	18	5
9	Toxic dyspepsia	8	8	8	–
10	Salmonellosis	4	4	4	–
	Total	540	540	394	146

3.4 Monitoring of current disinfection

In 1968, 888 chemical analyses of medical institutions were carried out by the city sanitary and epidemiological station. At that time there were one infectious diseases hospital, one maternity hospital, tuberculosis hospital, somatic hospital, 60 children's institutions in the city. Responsible persons were appointed to ensure compliance with the disinfection regime for institutions [18]. The quality control of the current disinfection was carried out visually and by taking swabs. At each visit to the institution for the control of current disinfection, an inspection report was written, where all the shortcomings were noted, suggestions were given and specific deadlines were outlined. See Table 4.

Table 4. Monitoring of current disinfection.

№		Number of examinations	Number of tests performed			
			bacteriological		chemical	
			Total	Of these unsatisfactory	Total	Of these unsatisfactory
1	Foci at home	135	140	15	–	–
2	Medical institutions	59	2160	152	1076	204
3	Infectious Diseases Hospital	14	394	20	135	46
4	Maternity hospital	8	425	20	56	20
5	Children's Somatic Hospital	4	212	14	35	10
6	Children's institutions	266	9199	446	1347	476
7	Other	9	380	26	121	35

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3.5 Laboratory work

A semi-basement with a usable area of 48 m^2 was allocated for the laboratory. The laboratory consisted of a working room, a pre-box, a box, an autoclave and a washing room. The laboratory was equipped with such equipment as an autoclave, thermostats, a drying cabinet and a refrigerator.

The laboratory carried out quality control of final, current and chamber disinfection, as well as chemical analyses (determination of active chlorine in chloramine, in bleach and compliance with the percentage of disinfection solutions). The quality control of the final disinfection was carried out by doctors and an assistant epidemiologist for control by visual inspection and taking swabs. 5–10 swabs were taken in each focus. In total, 320 foci were monitored for final disinfection, which was 10.2% of the number of treated foci. 2600 swabs were taken, of which 29 E. coli were isolated in 22 foci, which was 1.1% [15].

The quality control of the current disinfection was visually carried out by doctors and assistants of the epidemiologist for control with the writing of the act and by taking swabs. Quality control of current disinfection in medical and preschool institutions was carried out once a quarter. During the examination, 20–50 swabs were taken per visit. See Table 5

Table 5. Comparative data on laboratory control indicators 1967–1968.

Name of institutions	Quantity of examined		Quantity of swabs		Quantity of sticks		% of contamination	
	1967	1968	1967	1968	1967	1968	1967	1968
Foci on the final disinfection	317	320	2800	2600	55	22	1.9	1.1
Medical institutions	27	27	1191	989	114	58	9.5	5.8
Including maternity hospital	4	4	240	215	15	12	6.2	5.6
Children's institutions	220	235	7967	8250	844	446	10.6	5.4

From the comparative data, it can be seen that laboratory control contributed to improving the quality of disinfection. The laboratory carried out selective control of the current disinfection at home – only 110 foci were examined. The quality control of chamber disinfection was carried out once a quarter. The chambers of the disinfecting station, maternity hospital, infectious diseases hospitals, dermatovenerologic dispensary and somatic city hospitals were examined.

In the infectious disease hospital, the chamber disinfection regime was constantly violated, since the chamber was outdated, worked poorly, i.e. its replacement was required. The rest of the disinfection chambers in medical institutions worked generally according to plan.

In 1968, 1152 chemical analyses were carried out. 206 chemical analyses were carried out in the foci for final disinfection, of which 178 corresponded to the norm, 28 did not correspond, which was 13.6%. 1346 chemical analyses were carried out in medical-preventive and preschool institutions. Of these, 579 did not meet the norm, which was 43%.

In 1967, a total of 915 chemical analyses were carried out. In the foci of final disinfection, 87 out of 260 analyses did not meet the norm, which was 33%, and in 1968 this percentage was only 13.6%. In medical and preventive institutions in 1967 655 analyses were carried out, the percentage of unsatisfactory analyses was equal to 55%, and in 1968 1346 chemical analyses were carried out, unsatisfactory analyses – 43% [18].

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At each visit to hospitals, laundries were examined, quality control of disinfection of linen was carried out. It should be noted that in all medical institutions, linen was disinfected, but not everywhere this disinfection achieved its goal. Very often, E. coli from clean linen was allocated to infectious diseases hospitals, where, due to the heavy load of laundry, linen was not always disinfected according to the instructions.

Quality control of the disinfectants entering the region was not carried out.

In 1968, four chambers of the Tselinograd city disinfection station carried out work on disinfection of things and soft inventory from foci, medical institutions and preschool institutions [19]. See Table 6.

Table 6. Organization of chamber disinfection of things and soft inventory in 1968.

№	Name Of infectious diseases	Subject to Chamber disinfection	Applications received	Conducted chamber disinfection	sets	Of these in Organized teams	
						children's	therapeutic
1	Typhoid fever	41	41	41	44	1	7
2	Paratyphoid fever	32	32	32	37	–	6
3	Acute dysentery	929	929	2	91	–	2
4	Hepatitis	735	735	665	889	134	81
5	Pharyngeal diphtheria	22	22	22	37	4	–
6	Bacteriocarrier of diphtheria	125	125	125	284	30	5
7	Salmonellosis	51	51	22	50	5	1
8	Anthrax	2	2	2	5	–	1
9	Typhus fever	1	1	1	5	–	–
10	Scabies	1895	1895	1551	1856	113	4
11	Trichophytosis	139	139	106	109	18	2
12	Microsporia	266	266	227	237	43	–
13	Scab	2	2	2	2	–	2
14	Pediculosis	15	15	15	145	–	1
15	Tuberculosis	217	217	204	326	–	6
16	Prevention	–	–	16	9320	5	10
	Total:	4395	4395	3009	13437	353	76

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Thus, during 1968, disinfection of things and soft inventory was carried out for 16 infections, including dysentery. The quality of the treatment was checked by the laboratory of the disinfection station and was found satisfactory.

In 1968, chamber processing was not carried out in 482 cases. Despite the sufficient number of disinfecting chambers and their incomplete loading, there were reasons why it was not possible to disinfect the chamber method. The reasons for not conducting chamber disinfection of things were:

1. not living at this address – 300 cases, including scabies – 257;
2. refusals – 90 cases;
3. expired – 35 cases;
4. passing through – 21 cases;
5. changes in diagnosis – 19 cases;
6. apartments are closed – 11 cases.

4 Conclusion

In conclusion, we note that in Tselinograd, the city health services in the 1960s were permanently faced with the issue of creating a disinfection station. The arrival of a large number of labor force to Kazakhstan for the development of virgin lands generated an increase in the number of incidences of various infections. Unstable work of municipal utilities generated a lot of organizational epidemiological tasks, the solution of which was complicated by a whole complex of problems: violation of the disinfection regime, lack of disinfection equipment, understaffing of medical personnel, etc. The sanitary and epidemiological measures carried out by the health authorities for individual diseases lowered the level of morbidity of the population, but they were not enough for a comprehensive solution to the problem.

References

1. A. Nove, *An Economic History of the USSR* (Harmondsworth, UK, 1982)
2. I. Kreindler, *Soviet language planning since 1953 Language planning in the Soviet Union* (London, 1990). DOI: 10.1007/978-1-349-20301-7_3
3. M. B. Olcott. The Kazakhs **427,** 355 (1995)
4. T. Gomart, W. Taubman, Politique étrangère **69(1)**, 205–206 (2004)
5. I. Zelenin, Russian Studies in History **50(3)**, 44–70 (2012) DOI: 10.2753/RSH1061-1983500303
6. M. Elie, Global Environment **8.2**, 259–292 (2015) DOI: 10.3197/ge.2015.080202
7. R. Kraemer et al., Environ. Res. Lett. **10**, 054012 (2015) DOI: 10.1088/1748-9326/10/5/054012
8. T. Artamonova et al, IOP Conf. Ser.: Earth Env. Sci. **395,** 012118 (2019) DOI: 10.1088/1755-1315/395/1/012118
9. A. A. Chibilev, *The development of virgin lands turned into an ecological disaster for the steppes* (2010) http://ecologylib.ru/news/item/f00/s00/n0000042/index.shtml
10. E.V. Pakhomova, RUDN J. of Russian Hist. **19(3),** (2020) DOI: 10.22363/2312-8674-2020-19-3-625-640
11. G. Breslauer, *Khrushchev reconsidered The Soviet Union since Stalin* (Bloomington, London, Indiana Univer. Press, 1980)
12. A. Mussagaliyeva, Russkii Arkhiv **6(2)**, 175–191 (2018) DOI: 10.13187/ra.2018.2.175
13. Zh. Mazhitova et al, Europ. Jour. of Sci. and Theol. **18(5)**, 105–122 (2022)
14. T. Zhumasultanov, Statistics, Accounting and Audit **4**, 109–119 (2013)
15. A. Orazbayeva et al, E3S Web Conf. **371,** 06018 (2023) https://doi.org/10.1051/e3sconf/202337106018
16. Zh. Mazhitova et al, E3S Web of Conf. **258**, 05036 (2021) DOI: 10.1051/e3sconf/202125805036
17. Z. Saktaganova et al, E3S Web Conf. **284**, 07020 (2021) DOI: 10.1051/e3sconf/202128407020
18. V. Kozina et al, E3S Web Conf. **371,** 06019 (2023) https://doi.org/10.1051/e3sconf/202337106019
19. C. Beksultanova et al, E3S Web Conf. **284**, 10001 (2021) DOI: 10.1051/e3sconf/202128410001

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