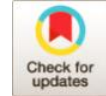


# Investigating the Pattern of Direct Medical Costs of Covid-19 Patients in Hospitals of Ilam Province

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## ABSTRACT

Direct medical costs are the most well-known category of disease costs. This study aimed to investigate and analyze the direct medical costs of patients with Covid19 by services provided in the centers and hospitals affiliated to Ilam University of Medical Sciences. This study was a descriptive-analytical cross-sectional study using hospital costs information in Ilam province from March 2019 to September 2021. Financial information related to all patients diagnosed with Covid-19 disease was collected in all hospitals of the province and classified and reviewed using Excel 2016 software. In general, 1713711 services were provided in medical centers affiliated to Ilam University of Medical Sciences. Most of these services were provided in Shahid Mostafa Khomeini Educational and Medical Center as the main medical center for patients with Covid-19 in Ilam. The results of the study showed that among the direct medical costs, medication services (30%), laboratory (16%) and inpatient care (11%), were the highest costs in Ilam University of Medical Sciences. In total, out of the total direct medical costs, the share of patient's payments was 10%. The share of insurance companies in total expenditures was 83% and the share of government subsidy was 7%. Examining the pattern of drug consumption and pharmaceutical services can be considered as one of the key sectors by health policy makers in Ilam province, because the 30% share of pharmaceutical expenditures showed that the management of these services greatly control the medical expenditures of Ilam University of Medical Sciences.

**Keywords:** Direct Medical Costs, Hospital, Ilam Province, Covid-19

## Introduction

On December 31, 2019, a respiratory illness was reported in China, and the world is currently experiencing a pantomime of the disease, known as Covid-19 [1]. The spread of this disease has confronted the international community with a crisis that has been unprecedented in recent years [2]. Covid-19 is the seventh coronavirus to infect humans and the third coronavirus to cause significant mortality and disability over the past two decades [3]. In addition to causing death and disability, coronaviruses have also caused high economic costs. The results of a study in 2004 showed that if the SARS continued from 2003 to 2004,

its global costs would reach more than 40 \$ billion [4]. An examination of MERS costs in Saudi Arabia also showed that the direct medical cost per person varied from 1248.41\$ to 75987.95 \$ [3].

Disease costs are generally categorized in different ways. The most well-known category of these costs is the direct medical costs. These costs are directly related to the provision of medical services to patients and include costs incurred by health centers (hospitals, outpatient clinics), staff (physicians, nurses and other specialists), medical services, alternative care, supplements and any medication [5-6]. In other words, direct medical costs are the resources that are consumed in the health sector during the evaluation of



treatment and follow-up services for patients [7-8]. it allows managers and policymakers to make accurate comparisons between different uses of financial resources and use these analyzes as tools to track treatment patterns, cost forecasts, and issues related to measuring the efficiency and effectiveness of health services [9]. Ilam province was one of the last provinces where the first case was reported on March 31, 2017, 11 days after the official announcement of the release of Corona in the country [10]. This province is one of the most important provinces in the country,

Examining disease cost information as well as analyzing which has always faced health problems and lack of infrastructure and resources [11]. According to the latest information of the Statistics Center of Iran in 2015, Ilam province with 998 fixed beds, 602 active hospital beds and nine hospitals has approximately 0.7% of active hospital beds and 1% of the country's hospitals [12]. Spatial analysis of health indices in different cities of Iran shows that Ilam province is developing in terms of health indices [8].



**Map 1.** Spatial analysis of health indices in the cities of Ilam province

As mentioned, Covid-19 has imposed a lot of costs on the health sector in the country, then it is necessary to study and analyze these costs due to the limited resources. Therefore, the aim of the present study was to investigate and analyze the direct medical costs of patients with Covid-19 by services provided in the centers and hospitals affiliated to Ilam University of Medical Sciences.

### Method

The present study is a descriptive-analytical study that was conducted cross-sectionally using hospital expenditure information in Ilam province from March 2019 to September 2021. This province has nine hospitals and medical centers affiliated to Ilam University of Medical Sciences. For the present study, all financial information related to patients with Covid-19 was collected in all hospitals of the province. Therefore, sampling was not performed in this study. Financial information of patients was collected in Shahid Mostafa Khomeini Hospital in Ilam, Imam Khomeini Hospital in Ilam, Ayatollah Taleghani Hospital in Ilam, Imam Reza Hospital in Ivan, Imam Hossein Hospital in Mehran, Rasoul Akram Hospital in

Abdanan, Shohada Hospital in Dehloran, and Imam Ali Hospital in Sarabeleh and Valiasr hospital in Darreh Shahr. Relevant information on the segregation of services performed for each hospital was classified and then classified using Excel 2016 software and reviewed and compared for different hospitals. Relevant information divided by services performed for each hospital was classified and then classified using Excel 2016 software and reviewed and compared for different hospitals.

### Findings

A total of 1713711 services were performed in hospitals of Ilam until September 2020. The frequency of services provided by hospitals is presented in Table 1.

The total expenses related to these services amounted to 249992510843 billion Rials, of which the amount of 201484799368 billion Rials was related to the insurance, the amount of 4852104416 billion Rials to supplementary insurance, the amount of 25824251109 billion Rials to the patient share and the amount of 17831355950 billion Rials was related to subsidy. The

insurance share, subsidy share and patient share by hospital are presented in Table 2.

**Table 1**  
The frequency of services provided by hospitals.

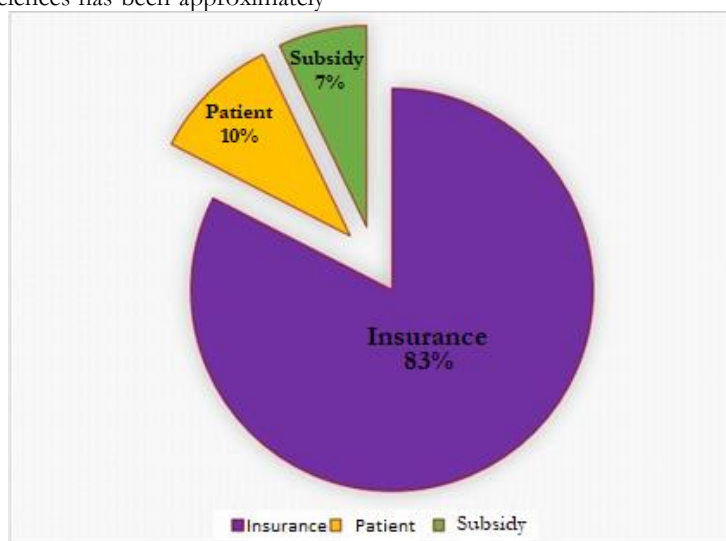
Hospital name	Number of services
1303517	Shahid Mostafa Khomeini
179548	Imam Khomeini
16335	Ayatollah Taleghani
12429	Imam Reza
15002	Imam Hossein
4420	Imam Ali
15626	Rasool Akram
72960	Valiasr
93874	Shohada
1,713,711	Total

**Table 2**  
Insurance share, patient share and subsidy share of total expenditures in hospitals of Ilam University of Medical Sciences

Hospital	Total amount	Insurance	Supplementary insurance share	Patient share	Subsidy share
Shahid Mostafa Khomeini	192537683465	155253894467	4347694750	18566341824	14369752424
Imam Khomeini	25658903323	21405011486	247709609	2848953828	1157228400
Ayatollah Taleghani	2458358894	1967747341	0	191373183	299238370
Imam Hossein	2065791391	1718040118	98633501	173891505	75226267
Imam Reza	1586042771	1295126376	31857405	174416069	84642921
Rasool Akram	2856340726	1940695235	12563571	647047270	256034650
Valiasr	7967631921	5973956751	24332223	1130274616	839068331
Imam Ali	403841152	327773354	611838	29295270	46160690
Shohada	14457917200	11602554240	88701519	2062657544	704003897
Total	249992510843	201484799368	4852104416	25824251109	17831355950
Percentage	100	80/6	1/94	10/33	7/13

Percentage of patient share, subsidy and insurance is presented in Figure 1. In general, the share insurance in the services provided in hospitals affiliated to Ilam University of Medical Sciences has been approximately

equal to 81%. Also, the share of out-of-pocket payments for services provided in these centers was 10.33 (Figure 1).



**Figure 1.** Frequency distribution of services provided in hospitals affiliated to Ilam University of Medical Sciences by insurance share and patient share.

Of the total insurance expenses, 77,1% was related to the insurance expenses of Shahid Mostafa Khomeini Hospital of Ilam, 10.6% to Imam Khomeini Hospital of Ilam and 3% to Valiasr Hospital of Darehshar. Also, the largest share of subsidy in the province with 8.6% was related to Shahid Mostafa Khomeini Hospital in

Ilam and 6.5% was related to Imam Khomeini Hospital. Out-of-pocket payments in the centers were respectively equivalent to 71.9 percent of the total expenses in Shahid Mostafa Khomeini Hospital in Ilam, 11% in Imam Khomeini Hospital in Ilam and 8% in Dehloran Shohada Hospital (Table 3).

**Table 3**

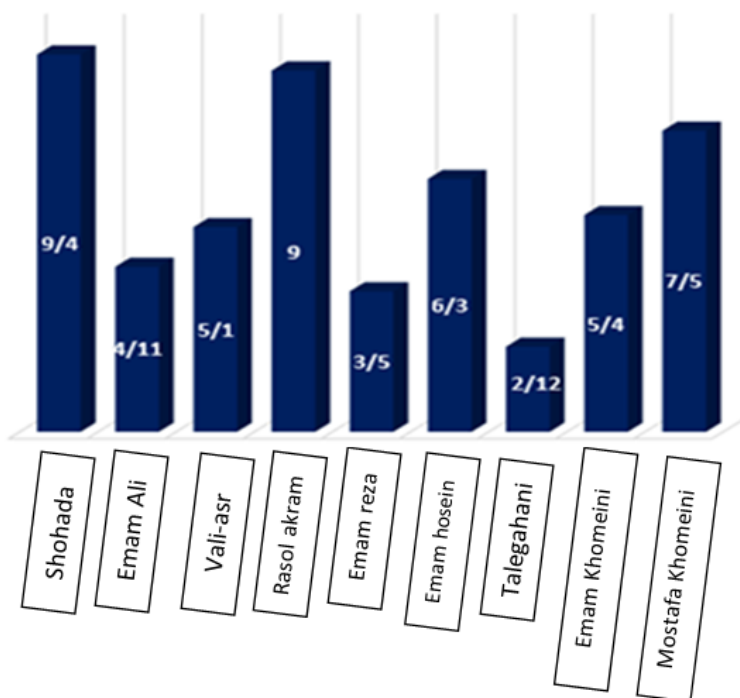
The share of hospital centers of Ilam University of Medical Sciences from expenditure

Hospital	Percentage of basic insurance	Supplementary insurance percentage	Percentage of patient share	Percentage of subsidy share
Shahid Mostafa Khomeini	77/1	89/6	71/9	80/6
Imam Khomeini	10/6	5/1	11	6/5
Ayatollah Taleghani	1	0	0/7	1/7
Imam Hossein	0/9	2	0/7	0/4
Imam Reza	0/6	0/7	0/7	0/5
Rasool Akram	1	0/3	2/5	1/4
Valiasr	3	0/5	4/4	4/7
Imam Ali	0/2	0	0/1	0/3
Shohada	5/8	1/8	8	3/9
Percentage	100	100	100	100

Table 4 shows the share of each hospital by the basic and supplementary insurance, patient's share and government subsidy share. In Rasoul Akram Hospital of Abdanan city and Valiasr Hospital of Darreh Shahr hospital, the insurance share has been less than 80%. In Imam Hossein Hospital of Mehran, Imam Khomeini Hospital of Ilam and Imam Reza Hospital of Ivan, the

largest share of expenses was related to insurance expenses.

In the hospitals of the province, the highest share of subsidy expenses was 12.2% for Ayatollah Taleghani Center, 11.4% for Imam Ali Hospital of Sarableh and 10.5% for Valiasr Hospital of Darreh Shahr (Figure 2).



**Figure2.** The share of government subsidies in total expenditures in each hospital affiliated to Ilam University of Medical Sciences.

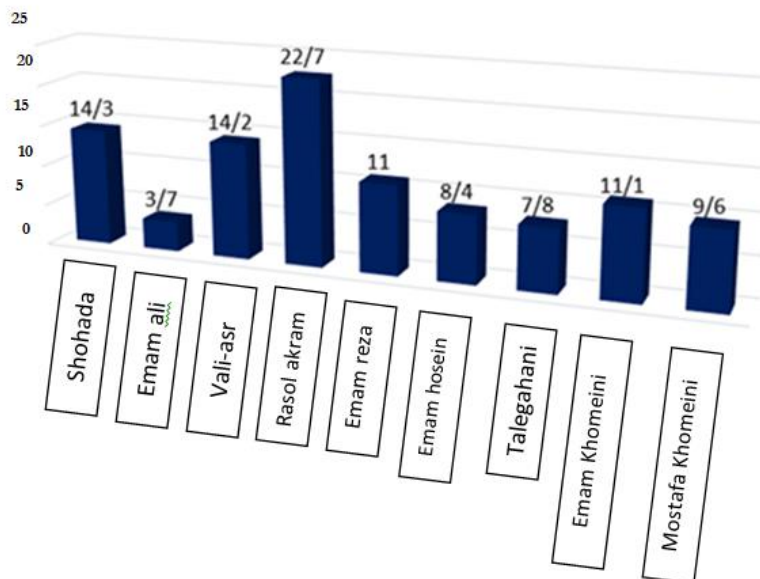
**Table 4**

The share of hospital centers of Ilam University of Medical Sciences from the expenditures by hospital.

Hospital	Percentage of basic insurance	Supplementary insurance percentage	Percentage of patient share	Percentage of subsidy share	Percentage
Shahid Mostafa Khomeini	80/6	2/3	9/6	7/5	100
Imam Khomeini	83/4	1	11/1	4/5	100
Ayatollah Taleghani	80	0	7/8	12/2	100
Imam Hossein	83/2	4/8	8/4	3/6	100
Imam Reza	81/7	2	11	5/3	100
Rasool Akram	67/9	0/4	22/7	9	100
Valiasr	75	0/3	14/2	10/5	100
Imam Ali	81/2	0/2	7/3	11/4	100
Shohada	80/3	0/6	14/3	4/9	100

In these centers, the share of highest out-of-pocket payment of the total expenses of each hospital was 22.7% for Rasoul Akram Hospital, 14.3% for Shohada

Hospital and 14.2% for Valiasr Hospital in the (Figure 2).



**Figure3.** The share of out-of-pocket payment of the total expenses in hospitals affiliated to Ilam University of Medical Sciences

The share of basic insurance of total expenditures in hospitals affiliated to Ilam University of Medical Sciences is presented in Table 5. The largest share of

basic insurance expenses in each hospital was related to Imam Khomeini Hospital in Ilam, Imam Hossein Hospital in Ilam and Imam Ali Hospital in Hospital.

**Table 5**

Share of basic insurance of total expenses in each hospital affiliated to Ilam University of Medical Sciences

Hospital	Percentage of basic insurance share
Shahid Mostafa Khomeini	80/6
Imam Khomeini	83/4
Ayatollah Taleghani	80
Imam Hossein	83/2
Imam Reza	81/7
Rasool Akram	67/9
Valiasr	75
Imam Ali	81/2
Shohada	80/3

In hospitals affiliated to Ilam University of Medical Sciences, services such as medication, laboratory and visits had the most expenses. Table 6 lists the 20

services with the highest frequency of provision and related costs in each hospital.

**Table 6**  
Share of hospital centers from the expenses of 20 patients presented in hospitals affiliated to Ilam University of Medical Sciences

Hospital	Shahid								
	Mostafa Khomeini	Imam Khomeini	Ayatollah Taleghani	Imam Hossein	Imam Reza	Rasool Akram	Valiasr	Imam Ali	Shohada
Medication	64425057786	5022109799	190840644	457093760	355594798	361543754	2330479031	106963558	0722068
ICU bed	30673245200	9069819000	577408000	214480000	321678000	0	0	0	6750000
Regular bed	27205852000	1474244000	219960000	343408000	288925000	95758000	2277810000	118492000	5296000
Inpatient care	21949332796	1050045756	88347580	401486280	318503100	202001620	1679829200	66936560	1585020
Laboratory	15168522043	1583821332	100558721	255039206	96626582	560045368	786458424	36370534	8484166
Consumables	8456825268	1721784407	177431924	56877853	32603331	109347164	350413056	13541200	1612957
Nursing services	3363086676	484669002	43945230	21983280	38854800	19606956	127922844	7109520	6746812
CT Scan	3048007081	647298122	31817163	166247563	0	480212502	315079046	0	0
Consulting	2523364280	685591200	88302200	45829960	12439020	95758000	40012940	11763840	9833080
Surgery	2265636928	1491854444	496658768	2562200	1871520	12989240	35604560	3077872	2673940
Psychiatric bed	1868046000	0	0	0	0	0	31281120	0	0
CCU bed	1024890000	0	0	0	36977000	229800000	126112000	0	4563000
Ambulance	922732500	0	16250000	66425500	44000000	275110000	119444000	0	7319000
Anesthesia	793281492	386523960	146532792	0	0	4286672	3530016	0	1624332
ECG	726694808	33265660	5614260	50738234	10834128	68467600	72847438	3183892	2942140
Physiotherapy	670626850	623679800	0	0	0	3995750	0	0	2951300
Ecocardiography	656763080	101756930	29866680	0	8715060	58841970	4682250	7176920	1372260
Pharmaceutical services management	632665789	35029724	1584812	9046392	5390414	3408218	37879399	2053980	4538866
Radiology	620402165	115691432	15741111	1271798	14435524	5670786	10584146	12738104	0903295
Surgery room	606874285	403278641	101321984	0	362600	4195800	5112240	0	2411220

Surgery, CT scans, and nursing services accounted for approximately 2% of total hospital expenditures

The percentage of each hospital expenses of the above services is reported in Table 7. 84.7% of the total expenses was related to the medication of all hospitals

affiliated to the University of Medical Sciences of the province, 72.9% to ICS beds, 77.2% to regular beds, 77.9% to inpatient care, 72.8% to laboratories, etc. (Table 7).

**Table 7**  
Ilam University of Medical Sciences by hospital.

Hospital service	Shahid Mostafa Khomeini	Imam Khomeini	Ayatollah Taleghani	Imam Hossein	Imam Reza	Rasool Akram	Valiasr	Imam Ali	Shohada
Medication	84/7	6/6	0/3	0/6	0/5	0/5	3/1	0/1	3/7
ICU bed	72/9	21/6	1/4	0/5	0/8	0	0	0	2/8
Regular bed	77/2	4/2	0/6	1/0	0/8	0/3	6/5	0/3	9/1
Inpatient care	77/9	3/7	0/3	1/4	1/1	0/7	6/0	0/2	8/6
Laboratory	72/8	7/6	0/5	1/2	0/5	2/7	3/8	0/2	10/7
Consumables	73/9	15/0	1/6	0/5	0/3	1	3/1	0/1	4/6
Nursing services	78/5	11/3	1/0	0/5	0/9	0/5	3	0/2	4/1
CT Scan	65/0	13/8	0/7	3/5	0	10/2	6/7	0	0
Consulting	66/9	18/2	2/3	1/2	0/3	2/5	1/1	0/3	7/2
Surgery	47/0	30/9	10/3	0/1	0	0/3	0/7	0/1	10/6
Psychiatric bed	98/4	0	0	0	0	0	1/6	0	0
CCU bed	62/0	0	0	0	2/2	13/9	7/6	0	14/2
Ambulance	50/7	0	0/9	3/6	2/4	15/1	6/6	0	20/7
Anesthesia	52/3	25/5	9/7	0	0	0/3	0/2	0	12
ECG	69/6	3/2	0/5	4/9	1/0	6/6	7/0	0/3	7
Physiotherapy	5	46/5	0	0	0	0/3	0	0	3/2
Eco cardiography	67/8	10/5	3/1	0	0/9	6/1	0/5	0/7	10/5
Pharmaceutical services	80/9	4/5	0/2	1/2	0/7	0/4	4/8	0/3	7/0
Radiology	62/8	11/7	1/6	0/1	1/5	0/6	1/1	1/3	19/3
Surgery room	50/8	33/8	8/5	0	0/0	0/4	0/4	0	6/1

**Table 8**

Percentage of each hospital from 20 common services in the hospital centers affiliated to Ilam University of Medical Sciences.

Hospital services	Shahid Mostafa Khomeini	Imam Khomeini	Ayatollah Taleghani	Imam Hossein	Imam Reza	Rasool Akram	Valiasr	Imam Ali	Shohada
Medication	84/7	6/6	0/3	0/6	0/5	0/5	3/1	0/1	3/7
ICU bed	72/9	21/6	1/4	0/5	0/8	0	0	0	2/8
Regular bed	77/2	4/2	0/6	1	0/8	0/3	6/5	0/3	9/1
Inpatient care	77/9	3/7	0/3	1/4	1/1	0/7	6	0/2	8/6
Laboratory	72/8	7/6	0/5	1/2	0/5	2/7	3/8	0/2	10/7
Consumables	73/9	15	1/6	0/5	0/3	1	3/1	0/1	4/6
Nursing services	78/5	11/3	1	0/5	0/9	0/5	3	0/2	4/1
CT Scan	65	13/8	0/7	3/5	0	10/2	6/7	0	0
Consulting	66/9	18/2	2/3	1/2	0/3	2/5	1/1	0/3	7/2
Surgery	47	30/9	10/3	0/1	0	0/3	0/7	0/1	10/6
Psychiatric bed	98/4	0	0	0	0	0	1/6	0	0
CCU bed	62	0	0	0	2/2	13/9	7/6	0	14/2
Ambulance	50/7	0	0/9	3/6	2/4	15/1	6/6	0	20/7
Anesthesia	52/3	25/5	9/7	0	0	0/3	0/2	0	12
ECG	69/6	3/2	0/5	4/9	1	6/6	7/0	0/3	7
Physiotherapy	5	46/5	0	0	0	0/3	0	0	3/2
Eco cardiography	67/8	10/5	3/1	0	0/9	6/1	0/5	0/7	10/5
Pharmaceutical services management	80/9	4/5	0/2	1/2	0/7	0/4	4/8	0/3	7
Radiology	62/8	11/7	1/6	0/1	1/5	0/6	1/1	1/3	19/3
Surgery room	50/8	33/8	8/5	0	0	0/4	0/4	0	6/1

The table above shows each hospital's share of these 20 services in the form of a percentage. To the medication service, the share of Shahid Mostafa Khomeini Hospital in Ilam accounted for 84.74%, the share of Imam Khomeini Hospital in Ilam 6.6%, the share of Ayatollah Taleghani Hospital 0.3%, Imam Hossein Hospital 0.6%, Imam Reza and Rasoul Akram Hospital 0.5%, Valiasr Hospital 3.1%, Hospital Imam Ali accounted for 0.1%, and Shohada Hospital 3% of total expenditures.

**Conclusion**

In hospitals of Ilam University of Medical Sciences, the highest expenses were related to medicine, laboratory services and visits. The main expenses were related to medical services and hospitalization. The highest expenses were related to the pharmaceutical services in most centers. The share of out-of-pocket payments in university hospitals was equal to 10.33% of total expenditures. Some of the services provided in these centers may be outside the insurance obligations and were not subject to government subsidies. Consumption pattern and consumer services in these centers should be examined to identify these services and sectors that have high out-of-pocket payments. The important point is that some of the higher paying centers were in low-income and poor cities in terms of health indices. Abdanan (22%), Hospital and Dehloran (14%) have more than 10% out-of-pocket payments.

Since the share of basic insurance in Corona inpatient services should be at least 90%, it seems that the share of basic insurance is less than 90% in these centers and the rest is paid by patients. This is probably due to the consumption pattern as well as the type of service. For example, in Abdanan, which has the largest share of out-of-pocket payments, services such as laboratory, CT scan, medicine and ambulance have the highest costs. In Darashahr, pharmaceutical services, regular beds, laboratories and consumables had the most expenses. The details of these services in the above centers should be examined. These centers will affect the general indices of the province and will cause a change in the results of financial and cost information of the university. The sharp decline in hospital revenues and, consequently, the limited financial resources of the university, science and medicine, show the need to pay attention to these issues. As it was said, in Abdanan Hospital, which had the most out-of-pocket payments, most of the expenses were related to diagnostic services, while in Mostafa Khomeini Hospital, as the main medical center for patients with Corona, the most expenses were related to medicine, bed, ICU, regular bed and hospitalization; The share of patients in this center has been less than 10%.

The high share of diagnostic services in some city centers of the province showed a lack of attention to the principles of health economics. Health resources in these centers were spent on diagnostic services, while the managers of these centers have to allocate the

limited financial resources, equipment and facilities to the most cost-effective services in the current critical situation.

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