Section 2. Preventive medicine

Asatryan A.,

Mardiyani M.,

Kurghinyan R.,

Mnatsakanyan A.,

“Natali Pharm” LTD “Astghik” Medical Centre, Yerevan, RA

YSMU, Public Health and Healthcare Organization Department

E-mail: arminchopikyan@gmail.com

ANALYSIS OF HOSPITAL MORBIDITY AND EVALUATION OF ACTIVITY OF A MULTI-PROFILE MEDICAL CENTER

Abstract: Under the influence of external economic factors, the medical institution should change its tactics, management system and structure. On the other hand, there is no technology to improve the quality of the management of medical care. Managing the quality of health care will make it become a monitoring function, ignoring issues of planning, organization and motivation.

The performance indicators of “Astghik” Hospital (2011–2016) have been analyzed. Indicators have been calculated according to official statistical reporting forms. The structure of patients has been analyzed according to the main disease classes. It was found that reasons of hospitalization of patients were pregnancy, childbirth and postpartum - 47,0%, blood diseases 17.2% – (I00-I99), and on third place-diseases of digestive organs – 13.1% (K00-K93). According to research data, the mean duration of treatment of acute myocardial infarction has been 7 days, and in case of brain vascular disease - 8 days. So the research confirms, that the latest technologies introduced at the Multi-profile Medical Center aimed at improving the quality of care, diagnostics, improved treatment, reduced the average duration of treatment of patients, and reduced the level of hospital mortality.

To improving the quality and effectiveness of further medical care, it is required to invest more effective models of hospital care, and make refinement of inter-hospital ambulant care, day care and advisory-diagnostic centers.

Keywords: Morbidity; average duration of treatment; Multi-Profile Medical Center; hospital care.

Introduction. Formation of the market of medical services, the formation of a private sector in the health care system, introduction of a mandatory and voluntary medical insurance system are the main reasons that substantiate the quality of health care quality control and introduction of mechanisms.

In conditions of socio-economic development and market relations, the introduction of modern innovative processes into the health care system is an important driving force. Under the influence of external economic factors, the medical institution should change its tactics, management system and

structure. On the other hand, there is no technology to improve the quality of the management of medical care. Managing the quality of health care will make it become a monitoring function, ignoring issues of planning, organization and motivation. In practical health care, modern methods of medical care quality management, which should be based on ISO 9000 international standards, are absent [1; 2].

Today, the most important problem is to use expensive hospital beds only for the most severe case, which require such diagnostic activities, that can not be carried out in an out-of-hospital environment [3; 4]. Numerous researchers have found that the investment of new hospital technologies have the potential to increase not only the ambulatory-polyclinic ring but also the overall healthcare system's effectiveness. The results of the researches justify, that one of the realistic ways to organize hospital care is the investment of forms and methods that can replace hospital care. The alternative forms of patient care have powerful resources: home, day care center, and day care hospital. The

ambulatory model includes ambulatory and hospital care elements and can provide diagnostic, preventive, therapeutic and rehabilitation measures. Most researchers have found that the work of these modeling associations is 20–28% more effective. This model provides access to a cheaper hospital care. For having more effectiveness, the investment of ambulatory surgical service in the structure of the combined hospital is most applicable.

The research material and methods

The performance indicators of “Astghik” Hospital (2011–2016) have been analyzed. Indicators have been calculated according to official statistical reporting forms.

Research results and discussion.

44796 – is the number of hospital patients, which, declined to 15.1% in 2011, while it became 29.2% in 2016 (*diagr.1*). The structure of patients has been analyzed according to the main disease classes. It was found that reasons of hospitalization of patients were pregnancy, childbirth and postpartum – 47.0%, blood diseases 17.2% – (I00-I99), and on third place – diseases of digestive organs – 13.1% (K00-K93).

Diagram 1. Patient Dynamics of Multiprofile Medical Center

Diagram 2. Distribution of hospitalized patients according to main classes of diseases (2011)

According to the research data, in 2011 (*diagr. 2*), the average duration of treatment was 4.7 days. Moreover, the duration of treatment was longer for patients

with blood circulatory system diseases (6.4 days), skin and subcutaneous diseases (7.2 days), injuries, intoxications and external causes (8.2 days) (*table 1*).

Table 1. – The average duration of stationary treatment according to the basic disease classes

	Name of the disease	Code by ICD	Patients that were discharged	Bed days	Average duration of treatment
1	2	3	4	5	6
1.	Infectious and parasitic diseases	A00-B99	11	100	9.1
2.	Tumors	C00-D48	139	1091	7.8
3.	Diseases of blood and blood-forming organs	D50-D89	1	12	12
4.	Endocrine system diseases	T00-T90	33	160	4.8
5.	Mental disorders	F00-F99	22	52	2.4
6.	Nervous system diseases	G00-G99	119	599	5
7.	Diseases of the eye and its appendix	H00-H59	1	1	1
8.	Ear and mastoid diseases	H60-H95	0	0	0
9.	Diseases of blood circulatory system	I00-I99	821	5235	6.4
10.	Diseases of respiratory organs	J00-J99	76	374	4.9
11.	Diseases of digestive organs	K00-K93	624	3868	6.2
12.	Diseases of the skin and subcellular cells	L00-L99	34	244	7.2

1	2	3	4	5	6
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	165	1042	6.3
14.	Diseases of the urogenital system	N00-N99	186	552	3
15.	Pregnancy, childbirth and postpartum period	C00-C99	2248	6907	3.1
16.	Congenital anomalies	Q00-Q99	2	8	4
17.	R00-R99	R00-R99	29	71	2.4
18.	Traumas, poisons and external causes	S00-T98	272	2233	8.2
19.	Total	A00-T98	4783	22549	4.7

In 2011, the rate of hospital mortality was 2.5%, because of the diseases of the blood circulatory system – 10.0%, and the diseases of endocrine system – 15.0% (table 2).

Table 2. – Hospital mortality indicator according to the main classes of diseases

	Name of the disease	Code by ICD	Patients that were discharged	Died	Hospital mortality rate
1.	Infectious and parasitic diseases	A00-B99	11	1	9.1
2.	Tumors	C00-D48	139	8	5.8
3.	Diseases of blood and blood-forming organs	D50-D89	1	0	0
4.	Endocrine system diseases	T00-T90	33	5	15
5.	Mental disorders	F00-F99	22	1	4.5
6.	Nervous system diseases	G00-G99	119	1	0.8
7.	Diseases of the eye and its appendix	H00-H59	1	0	0
8.	Ear and mastoid diseases	H60-H95	0	0	0
9.	Diseases of blood circulatory system	I00-I99	821	82	10
10.	Diseases of respiratory organs	J00-J99	76	4	5.3
11.	Diseases of digestive organs	K00-K93	624	9	1.4
12.	Diseases of the skin and subcellular cells	L00-L99	34	0	0
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	165	0	0
14.	Diseases of the urogenital system	N00-N99	186	2	1.1
15.	Pregnancy, childbirth and postpartum period	C00-C99	2248	0	0
16.	Congenital anomalies	Q00-Q99	2	0	0
17.	R00-R99	R00-R99	29	1	3.4
18.	Traumas, poisons and external causes	S00-T98	272	7	2.6
19.	Total	A00-T98	4783	121	2.5

Since hospitalization and hospital mortality rates have been high especially because of blood circulatory system diseases, we have analyzed this class of diseases

according to basic nosological forms. It was found out that 30.2% had been hospitalized because cardiovascular disease, 18.1% of stenocardia (diag. 3).

Diagram 3. Distribution of hospitalized patients with blood circulation diseases according to basic nosologic forms

According to research data, the mean duration of treatment of acute myocardial infarction has been 7 days, and in case of brain vascular disease – 8 days (table 3).

Table 3. – The average duration of treatment of major nosologic forms of diseases of the blood circulatory system (2011)

	Diseases of blood circulatory system	Patients that were discharged	Bed days	Average duration of treatment
1.	Diseases caused by increased blood pressure	101	400	3.96
2.	Stenocardia	149	651	4.369
3.	Acute heart attack	164	1175	7.165
4.	Acute ischemic heart attack	1	1	1
5.	Chronic ischemic heart disease	24	111	4.625
6.	Vascular diseases of the brain	248	2141	8.633
7.	Other diseases of this class	134	756	5.642
8.	Total	821	5235	6.376

In 2011, the hospital mortality rate was 10.0%, the rate of cardiovascular disease was 19.2%, and in the case of cardiac acute infarction – 14.6% (table 4).

Table 4. – Features of hospital mortality rate, caused by blood circulatory system diseases (2011)

	Diseases of blood circulatory system	Patients, that have been discharged	Died	Hospital mortality rate
1.	Diseases caused by increased blood pressure	101	1	1,0
2.	Stenocardia	149	0	0
3.	Acute heart attack	164	24	14.6
4.	Acute ischemic heart attack	1	0	0
5.	Chronic ischemic heart disease	24	1	4.2
6.	Vascular diseases of the brain	248	48	19.2
7.	Other diseases of this class	134	8	6,0
8.	Total	821	82	10.0

An important indicator of the evaluation of surgical activity is the evaluation of the multi-profile clinical activity. In 2011, 56.9% of surgeries fell on obstetric surgery, and 19.8% on surgeries of abdominal organs (*diagr. 4*).

41.7% of emergency surgeries have been performed because of the acute inflammation of the

gallbladder, 38.0% for acute appendicitis, 7.8% for congenital hernia disease (*diagr. 5*).

As a result of the 2012 annual report, it was found that the average duration of treatment was 5–6 days, including 7 days for diseases of the blood circulatory system and 9 days for the skin and subcutaneous diseases (*table 5*).

Diagram 4. Surgical Activity Structure of Multi-profile Hospital according to Names of Surgical Operations (2011)

Diagram 5. Special Nosological Needs for Emergency Surgery (2011)

Table 5. – The average duration of treatment according to the specifications of major disease classes (2012)

Name of the disease		Code by ICD	Patients that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1		2	3	4	5	6
1.	Infectious and parasitic diseases	A00-B99	7	116	16.6	0
2.	Tumors	C00-D48	111	829	7.47	3.6
3.	Diseases of blood and blood-forming organs	D50-D89	0		0	26.7
4.	Endocrine system diseases	T00-T90	15	119	7.93	0
5.	Mental disorders	F00-F99	8	19	2.38	4.1
6.	Nervous system diseases	G00-G99	49	292	5.96	0
7.	Diseases of the eye and its appendix	H00-H59	0		0	0
8.	Ear and mastoid diseases	H60-H95	1	2	2	0
9.	Diseases of blood circulatory system	I00-I99	871	6050	6.95	12.5
10.	Diseases of respiratory organs	J00-J99	80	439	5.49	1.2
11.	Diseases of digestive organs	K00-K93	665	4743	7.13	2
12.	Diseases of the skin and subcellular cells	L00-L99	22	205	9.32	0
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	29	338	11.7	0

	1	2	3	4	5	6
14.	Diseases of the urogenital system	N00-N99	154	542	3.52	1.3
15.	Pregnancy, childbirth and postpartum period	C00-C99	0	6433	3.92	0
16.	Congenital anomalies	Q00-Q99	1	4	4	0
17.	R00-R99	R00-R99	76	98	1.29	0
18.	Traumas, poisons and external causes	S00-T98	234	1958	8.37	2.6
19.	Total	A00-T98	0	22207	5.6	3.5

The hospital morbidity rate was 3.5%. It was higher, especially, in the cases of diseases of the blood circulatory system (13.0%) and diseases of the endocrine system (27.0%). According to the 2012 report, the average duration of treatment for the diseases of the blood circulatory system was 7.0

days, for acute myocardial infarction- 7 days and 9 days for cardiovascular diseases. According to the research data, in 2012, diseases, that caused patients death were diseases of the blood circulation system 12.2%, and acute myocardial infarction, which made 18.0% (*table 6*).

Table 6. – The average duration of treatment of major nosological forms of diseases of the blood circulatory system (2012)

	Blood circulatory system diseases	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1.	Diseases caused by increased blood pressure	79	378	4.8	0
2.	Stenocardia	168	720	4.3	0
3.	Acute heart attack	205	1403	7	18
4.	Other types of acute ischemic heart attack	8	16	2	0
5.	Chronic ischemic heart disease	32	162	5.1	3.1
6.	Vascular diseases of the brain	278	2586	9.3	2.2
7.	Brain Infarction	237	2179	9.2	18
8.	Other diseases of this class	95	730	7.7	7.4
9.	Total	871	6050	7.0	12

For 2012, the number of surgeries, performed, especially, on heart with implantable cardiostimulator and surgeries on abdomen, have increased (*diagr. 6*).

Diagram 6. Surgical Activity in 2012 by Type of Surgery

In 2013, the average duration of treatment was 4 days, and hospital mortality was 2.1% (table 7).

Table 7. – Average duration of hospital treatment and hospital mortality, according to main classes of diseases (2013)

	Name of the disease	Code by ICD	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1	2	3	4	5	6	7
1.	Infectious and parasitic diseases	A00-B99	6	124	21	16.7
2.	Tumors	C00-D48	232	1338	5.8	2.6
3.	Diseases of blood and blood-forming organs	D50-D89	0		0	0
4.	Endocrine system diseases	T00-T90	38	201	5.3	18.4
5.	Mental disorders	F00-F99	13	74	5.7	0
6.	Nervous system diseases	G00-G99	132	962	7.3	3.0
7.	Diseases of the eye and its appendix	H00-H59	0	0	0	0
8.	Ear and mastoid diseases	H60-H95	0		0	0
9.	Diseases of blood circulatory system	I00-I99	2309	9274	4	4.0
10.	Diseases of respiratory organs	J00-J99	33	143	4.3	9.1
11.	Diseases of digestive organs	K00-K93	911	4031	4.4	1.8
12.	Diseases of the skin and subcellular cells	L00-L99	58	278	4.8	0

1	2	3	4	5	6	7
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	48	301	6.3	0
14.	Diseases of the urogenital system	N00-N99	263	883	3.4	1.9
15.	Pregnancy, childbirth and post-partum period	C00-C99	2454	7439	3	0
16.	Congenital anomalies	Q00-Q99	3	7	2.3	33.3
17.	R00-R99	R00-R99	23	64	2.8	0
18.	Traumas, poisons and external causes	S00-T98	306	2426	7.9	3.3
19.	Total	A00-T98	6829	27545	4	2.1

The average duration of treatment for patients receiving hospital treatment for diseases of the circulatory system has been 4 days. It should be noted, that in the case of acute myocardial infarction, the average duration of treatment was 5 days, for stenocardia – 2 days,

but the length of treatment for cerebrospinal cases is still high. Hospital morbidity rate of blood circulatory system diseases made 4.0. At the same time, the rate of acute myocardial infarction and cerebral hemorrhage has dropped dramatically (*table 8*).

Table 8. – Features of the rate of hospital mortality and average duration of treatment in cases of blood circulatory system diseases (2013)

	Blood circulatory system diseases	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality
1.	Diseases caused by increased blood pressure	323	722	2.24	0.6
2.	Stenocardia	261	674	2.58	0
3.	Acute heart attack	318	1598	5.03	8.2
4.	Other types of acute ischemic heart attack	60	147	2.45	0
5.	Chronic ischemic heart disease	260	891	3.43	4.6
6.	Vascular diseases of the brain	263	2629	10	17.9
7.	Brain Infarction	212	2069	9.76	11.3
8.	Other diseases of this class	822	2608	3.17	0.6
9.	Total	2309	9274	4.02	4.0

In 2013, the surgical activity was especially higher for surgeries performed on vessels (30.0%) and on heart, with implantable cardiostimulator (4.1%).

The average duration of the medical treatment in 2014 was 4 days, but the hospital morbidity dropped dramatically (*table 9*).

Table 9. – Average duration of hospital treatment and hospital mortality, according to main classes of diseases (2014)

	Name of the disease	Code by ICD	Patients that have been discharged	Bed days	Average duration of treatment	Hospital mortality
1.	Infectious and parasitic diseases	A00-B99	7	67	9.57	0
2.	Tumors	C00-D48	253	1391	5.5	2
3.	Diseases of blood and blood-forming organs	D50-D89	0		0	0
4.	Endocrine system diseases	T00-T90	42	205	4.88	11.9
5.	Mental disorders	F00-F99	14	63	4.5	0
6.	Nervous system diseases	G00-G99	167	1274	7.63	3
7.	Diseases of the eye and its appendix	H00-H59	0		0	0
8.	Ear and mastoid diseases	H60-H95	0		0	0
9.	Diseases of blood circulatory system	I00-I99	2734	10640	3.89	3.4
10.	Diseases of respiratory organs	J00-J99	48	1969	41	8.3
11.	Diseases of digestive organs	K00-K93	928	4381	4.72	1.7
12.	Diseases of the skin and subcellular cells	L00-L99	61	350	5.74	0
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	80	605	7.56	0
14.	Diseases of the urogenital system	N00-N99	416	14140	34	1.2
15.	Pregnancy, childbirth and postpartum period	C00-C99	2548	8150	3.2	0
16.	Congenital anomalies	Q00-Q99	2	4	2	0
17.	R00-R99	R00-R99	21	71	3.38	0
18..	Traumas, poisons and external causes	S00-T98	362	2488	6.87	1.4
19	Total	A00-T98	7683	31299	4.07	1.8

Table 10. – The average duration of hospital treatment for patients with diseases of the blood circulation system and features of rates of hospital mortality (2014)

	Name of the disease	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1.	Diseases caused by increased blood pressure	353	796	2.25	0
2.	Stenocardia	377	956	2.54	0
3.	Acute heart attack	309	1620	5.24	7.1
4.	Other types of acute ischemic heart attack	151	328	2.17	0
5.	Chronic ischemic heart disease	338	1234	3.65	1.5
6.	Vascular diseases of the brain	275	2742	9.97	19.2
7.	Brain Infarction	231	2331	10.1	13
8.	Other diseases of this class	930	2962	3.18	1.3
9.	Total	2964	12969	4.38	4.1

As it is clear from (Table 10), the average duration of hospital treatment for the patients with blood circulatory system disease was 4 days. The rate of morbidity, cause by heart and brain infarction has dramatically decreased. A huge surgical activity was recorded for the operations of the vessels and, urgent surgical treatments, in case of gallbladder acute inflammation.

As it is clear from table 11, the average duration of hospital treatment was 3.8 days, and hospital mortality was 1.4%. The average duration of treatment for the patients with diseases of the blood circulation system was 3.8 days, and the hospital mortality rate was 2.7% (table 12).

Table 11. – Average duration of hospital treatment and hospital mortality, according to main classes of diseases (2015)

	Name of the disease	Code by ICD	Patients that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1	2	3	4	5	6	7
1.	Infectious and parasitic diseases	A00-B99	14	115	8.21	7.1
2.	Tumors	C00-D48	271	1243	4.59	1.5
3.	Diseases of blood and blood-forming organs	D50-D89	0		0	0
4.	Endocrine system diseases	T00-T90	90	441	4.9	7.8
5.	Mental disorders	F00-F99	5	18	3.6	0

1	2	3	4	5	6	7
6.	Nervous system diseases	G00-G99	192	1584	8.25	1
7.	Diseases of the eye and its appendix	H00-H59	2	3	1.5	0
8.	Ear and mastoid diseases	H60-H95	3	7	2.33	0
9.	Diseases of blood circulatory system	I00-I99	2846	11087	3.9	2.7
10.	Diseases of respiratory organs	J00-J99	353	980	2.78	0.6
11.	Diseases of digestive organs	K00-K93	1071	4165	3.89	1
12.	Diseases of the skin and subcellular cells	L00-L99	69	321	4.65	1.4
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	65	362	5.57	0
14.	Diseases of the urogenital system	N00-N99	463	1278	2.76	1.7
15.	Pregnancy, childbirth and postpartum period	C00-C99	2593	8223	3.17	0
16.	Congenital anomalies	Q00-Q99	4	27	6.75	0
17.	R00-R99	R00-R99	45	146	3.24	0
18.	Traumas, poisons and external causes	S00-T98	393	2268	5.77	0.3
19.	Total	A00-T98	8479	32268	3.81	1.4

Table 12. – The average duration of hospital treatment for patients with diseases of the blood circulation system and features of rates of hospital mortality (2015)

	Blood circulatory system diseases	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality
1.	Diseases caused by increased blood pressure	413	892	2.2	0
2.	Stenocardia	355	842	2.3	0
3.	Acute heart attack	361	1738	4.8	5.5
4.	Other types of acute ischemic heart attack	122	252	2.0	0
5.	Chronic ischemic heart disease	419	1422	3.3	3.1
6.	Vascular diseases of the brain	301	3103	10.3	10.6
7.	Brain Infarction	259	2566	9.9	7.7
8.	Other diseases of this class	916	2900	3.1	1.3
9.	Total	2846	11087	3.8	2.7

Analyzing results of the annual data of 2016, it has been found, that the average duration of treatment compared to the previous year has not had sig-

nificant changes, but the level of hospital mortality has dropped dramatically (*table 13*).

Table 13. – Average duration of hospital treatment and hospital mortality, according to main classes of diseases (2016)

	Names of the diseases	Code by ICD	Patients, that have been discharged	Bed days	Average duration of treatment	Hospital mortality rate
1.	Infectious and parasitic diseases	A00-B99	15	138	9.2	20
2.	Tumors	C00-D48	596	3953	6.6	2.7
3.	Diseases of blood and blood-forming organs	D50-D89	7	14	2	14.3
4.	Endocrine system diseases	T00-T90	245	835	3.4	0.4
5.	Mental disorders	F00-F99	20	105	5.3	0
6.	Nervous system diseases	G00-G99	308	2025	6.6	0
7.	Diseases of the eye and its appendix	H00-H59	20	36	1.8	0
8.	Ear and mastoid diseases	H60-H95	30	101	3.4	0
9.	Diseases of blood circulatory system	I00-I99	4200	20886	5	0
10.	Diseases of respiratory organs	J00-J99	530	1646	3.1	0
11.	Diseases of digestive organs	K00-K93	1404	6092	4.3	0
12.	Diseases of the skin and sub-cellular cells	L00-L99	105	488	4.6	0
13.	Diseases of musculoskeletal system and connective tissue	V00-V9*9	797	3946	5	0
14.	Diseases of the urogenital system	N00-N99	875	2220	2.5	0
15.	Pregnancy, childbirth and postpartum period	C00-C99	3214	10680	3.3	0
16..	Congenital anomalies	Q00-Q99	29	79	2.7	0
17.	R00-R99	R00-R99	65	220	3.4	0
18.	Traumas, poisons and external causes	S00-T98	600	3839	6.4	0
19.	Total	A00-T98	13060	57303	4.4	1.7

Diagram 7. The structure of surgical interventions by basic causes

In 2016, 24,0% of surgical interventions, performed in Medical Center, were performed on the blood vessels, and 3,4% of them on heart (*diagr.7*).

We have analyzed the surgical activity of the medical center from 2011 to 2016. It turned out that

in 2016, that total percent of all performed surgeries make 31.0%, and percent of endoscopic surgeries is 26.6% (table 14).

Table 14. – Surgical activity of Multi-profile Medical center from 2011–2016

Period	Surgeries		Endoscopic surgeries		Surgeries, performed on abdomen	
	n	%	n	%	n	%
2011	2487	8.8	161	8.7	492	10.8
2012	1609	5.7	142	7.7	476	10.4
2013	4527	16.0	332	18.0	771	16.9
2014	4998	17.7	346	18.8	804	17.6
2015	5875	20.8	372	20.2	921	20.2
2016	8779	31.0	490	26.6	1105	24.2

So the research confirms, that the latest technologies introduced at the Multi-profile Medical Center aimed at improving the quality of care, diagnostics,

improved treatment, reduced the average duration of treatment of patients, and reduced the level of hospital mortality.

To improving the quality and effectiveness of further medical care, it is required to invest more effective models of hospital care, and make refine-

ment of inter-hospital ambulant care, day care and advisory-diagnostic centers.

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