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Analytical system of physiological condition of the organism (PHAUS) and a clinical example its application in practice

Abstract

Based on parameters of the previously developed by the author universal analytical system of physiological condition of the body (PHUAS) a new algorithm for assessing of the patient's severity was proposed. Algorithm of computer program allows identify risk groups among patients in severity general condition automatically quickly and objectively. Also, it permits to determine optimal and efficient options of prevention and treatment, avoid in-depth examinations that can save both time and money. The data that were obtained could be used for the subsequent correlation with various factors that influenced on organism. These factors were such as ecology, nutrition, medications, vaccine, methods of intensive therapy, pharmacotherapy, etc. In general, the proposed algorithm allows estimating the severity of the patient's health, improving welfare of the population in terms of underfunding by means objective and rapid examination of a large number of people. The clinical example shows that the use of data analytical PHUAS system allows not only early in development identify multi-organ failure, to diagnose acute surgical pathology of abdominal cavity organs, but also to identify the root cause of its occurrence which is associated with venous thrombosis of mesenteric vessels, bowel infarction.

Keywords: algorithm, PHUAS, assess, severity, efficiency of treatment, correlation, multi-organ failure, bowel infarction

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Abbrevations: APACHE, acute physiology and chronic health evaluation; SAPS II, simplified acute physiology score; TISS, therapeutic intervention scoring system; ICU, intensive care unit

At present, the doctor's arsenal has few tens of rating scales, most of which have been used in the practice of intensive care units. Some of them have received global popularity and have been used in virtually all countries of the world (such as APACHE, SAPS, TISS), others (MPM, TOSS) have been applied more rarely.[1,2] Objective assessment of the severity of the patient's condition is a necessary tool for decision-making on management of patients, solving the problems of transporting them and the optimum placement of patient care (emergency department, specialized department, ICU, etc.), comparison the outcomes of patients depending on the therapies and quality of care. The latest versions of rating scales (APACHE III, SAPS II) were build on new principles of construction - selection and weighting of variables, which based on statistical modeling techniques and the risk of death was estimated by means multiple logistic regression model.[3]

Today most of hospitals district and city centers have the significant deficiency of technical equipment, so using of these evaluation systems are objectively impossible. Many scoring systems are very time-consuming and cumbersome themselves, and, therefore, they need to be updated and improved constantly. Besides, each of these systems scoring has its own specific variables for assessing of the severity of the disease. It determines not only their specifics but subjective approach in assessment of the parameters. Therefore, every physician who has used a particular evaluation system in practice often finds out inconsistency between of clinical severity of patient and result of assessment. Due this fact, the forecast of mortality is not always veridical. Another important disadvantage of the above evaluation systems is the inability to conduct a complex analysis of clinical and laboratory data. In 1990, in Leningrad, on the basis of LMT the software-Research Module for analysis of clinical and laboratory data (GEMA) was first developed. The first version of intellectual medical system was created on this basis in 1993. This software package was named OMIS.[4] However, intelligent computer OMIS system couldn't be objective in general cases. The computer system wasn't able to take into account all nuances of individual clinical and laboratory data. New universal analytical evaluative system of the physiological state of the organism (PHUAS) that was created by the author was an attempt of combining the positive aspects of the above evaluative systems (Figure 1).[5]

Analytical PHUAS system contains different formulas that are used in medicine (for example, Astrup, Starr, De-Rittis, Algover-Bruber, Sydore, Sheych-Zade, Moore, Sumin and others). The PHUAS system allows to receive 74 integral parameters from 54 obtained analytical parameters by using of software Excel. The data obtained from 128 indicators allow the practitioner to assess objectively the overall picture of the reaction of compensatory mechanisms of physiological and pathophysiological processes and also reliably identify the basic syndrome disease; observe of the pathological process and effectiveness of the therapy. The data of evaluative system that have been obtained in dynamics after four measurements transfer automatically to the table for calculating of the coefficient of correlation, with reliability $p<0.05$. It allows to reveal the basic pathogenic links of the disease, key clinical and biochemical parameters (Figure 2). The PHUAS system calculates automatically for individual patient correction of water-electrolyte and acid-base balance, creatinine clearance, and in case of the predicted blood loss - volume of infusion solutions for hypervolemic hemodilution

(Figure 3). Effectiveness of the program requires of basic clinical and biochemical parameters of the body that includes common clinical and biochemical analysis of venous and capillary blood, urine. Also it needs information about the water exchange in day, weight, arterial pressure, respiratory rate, heart rate and body temperature. When the patient is on artificial ventilation, it requires the mode of ventilation of lungs. Based on assessment of the PHUAS program the physician could determine objectively and reliably the main syndrome of disease, the most important biochemical parameters in individual patients and also apply these data for estimation of algorithm of the patient's severity (Figure 4).

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UNIVERSAL EVALUATION SYSTEM PHUAS

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No human investigation can not be called a true science, if it is not passed through mathematical proofs. Leonardo da Vinci

Surname	A. Pavlova							
№	1567							
Diagnosis	Chronic Urticaria							**Norm**
Stages	**01.12.2005**	**06.12.2005**	**15.12.2005**	**29.12.2005**	**25.03.2006**			**Techniques**
Age	36	36	36	36	36			
Height	166	166	166	166	166			
Weight	60	62	62	62	63			
t body	37	37,4	37,8	36,6	36,6			
t coefficients	1	1	1	0	0			
Diuresis	2000	2100	2000	2000	1200			
V1	2600	2680	2680	2180	2220	-300	-300	S.A.Sumin,1997
V2	3170	3299	3199	2699	1913,5	-200	-200	
ΔV	-570	-619	-519	-519	306,5	-100	-100	
Infusion	1200	2200	2000	2000	1700			
Na+	136	132	137	140	146			135-145 mmol/l
Urea	3,3	3,9	2,5	3	4,4			2.5-8.3 mmol/l
Blood glucose	5,2	4	5	5	5,3			3.5-5.5 mmol/l
Osm. of blood	270,46	262,42	271,32	277,4	290,26	9	9	280-293 mosm/kg
Imp. WEB	hypot.deg.	hypot.deg.	hypot.deg.	hypot.deg.	isot.deg.			
Total protein	71	67	70	63	69			65-85 g/l
COP	23,43	22,11	23,1	20,79	22,77	0	0	21-25 mmHg
Prop.Pul.Rate	**67,3845269**							Sheych-Zade,1999
Hb cap			124	118	138			
Hb ven	160	120	123,5	116	128			
ΔHb	160	120	-0,5	-2	-10	0	0	0
Erythrocytes	5,2	3,8	4	3,8	4,1			
Leukocytes	6,8	9,5	10,8	8,3	13			
Platelets	300	220	240	311	244			250-300 thousand/mm3
S boody	1,66332999	1,69082491	1,69082491	1,69082491	1,70440605	0	0	
Albumin	46,5696	38,7996	39,9	38,7996	40,4514	18,5	18,5	46-65 g/l
Total protein	76,9068	65,9224	67,284	65,9224	67,99075	53,2	53,2	65-85 g/l
α-Amylase	30	13,7	12	12	10,5			12-32 g/(h*l), Karavey
PR	66	80	80	70	80			
APs	105	100	95	85	100			
APd	75	60	60	55	75			
Pul.preasure	30	40	35	30	25	0	0	40-60 mm Hg
CVP								
Vblood loss(м)	-969,23077	333,846154	217	467,384615	67,8461538	0	0	
Vblood loss(f)	-830,76923	286,153846	186	400,615385	58,1538462	0	0	Moore
Shock Index	0,62857143	0,8	0,84210526	0,82352941	0,8	#ДЕЛ/0!	#ДЕЛ/0!	0.54, Alg.-Brubera
pBlood Vol(м)	4,2	4,34	4,34	4,34	4,41	0	0	
pBlood Vol(f)	3,6	3,72	3,72	3,72	3,78	0	0	
Blood Vol - 1	3,5	3,2	3,1	3,4	3,3			
W.P. of Ht	13,2	14,3	14	14,7	13,8			
Blood Vol-2	4,54545455	4,33566434	4,42857143	4,21768707	4,56521739	#ДЕЛ/0!	#ДЕЛ/0!	Sydora
ΔBlood Vol	-1,0454545	-1,1356643	-1,3285714	-0,8176871	-1,2652174	#ДЕЛ/0!	#ДЕЛ/0!	0
Heart Vol	48,4	62,4	59,9	60,4	45,9	100	100	55-90 ml, J.Starr
MVBC	3,1944	4,992	4,792	4,228	3,672	0	0	4-6 l
Heart Index	1,92048482	2,95240504	2,83411958	2,50055459	2,15441619	#ДЕЛ/0!	#ДЕЛ/0!	2.8-4.2 l/min*m2
SAP	85	73,3333333	71,6666667	65	83,3333333	0	0	70-150 mmHg
TPVR	2128,19309	1174,91987	1196,1394	1229,58846	1815,08715	#ДЕЛ/0!	#ДЕЛ/0!	900-1400 din/s*sm-5
CHD	0,56941176	0,85090909	0,83581395	0,92923077	0,5508	#ДЕЛ/0!	#ДЕЛ/0!	0.5-1.2 ml/contr. min.
pSTO	664,4352	778,752	769,3556	637,5824	611,0208	0	0	640-1400 ml/min
cSTO	582,165498	591,78872	591,78872	591,78872	596,542119	0	0	eSTO2=420 ml/min*m2
Inequality	82,2697023	186,96328	177,56688	45,7936802	14,4786808	0	0	
ESR	20	30	10	10	18			2-15 mm/h
Ca++								2.1-2.65 mmol/l
Cl-	100	100	101	102	104			99-106 mmol/l
BE	-6	-10	-6	-4	0	-42	-42	
SB	18,9122	15,327	18,9122	20,7048	24,29	-13,3546	-13,3546	25-28 mmol/l
AST	0,75	0,28	0,18	0,28	0,22			
ALT	0,9	0,56	0,32	0,41	0,46			
Total Bilirubin	11,5	11	11	11	12			

Figure 1 Analytical PHUAS system (fragment).

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Creatinine	Amylase	BV	BR	MVB	MVL	CaO2	PaO2	Cons. O2	PaO2/FiO2	Ca-v
-0,774597	-0,2404	0,258199	#ДЕЛ/0!	0,258199	0,258199	-0,111206	-0,111206	0,914015	-0,111206	-0,111206
-0,333333	-0,245618	0,333333	#ДЕЛ/0!	0,333333	0,333333	-0,324051	-0,324051	0,613298	-0,324051	-0,324051
0,524733	-0,273389	0,184178	#ДЕЛ/0!	0,184178	0,184178	-0,187773	-0,187773	-0,40254	-0,187773	-0,187773
-0,387928	0,982943	-0,992651	#ДЕЛ/0!	-0,992651	-0,992651	0,996739	0,996739	-0,393675	0,996739	0,996739
0,225494	-0,953573	0,97714	#ДЕЛ/0!	0,97714	0,97714	-0,964728	-0,964728	0,540069	-0,964728	-0,964728
0,75665	-0,135135	0,050443	#ДЕЛ/0!	0,050443	0,050443	-0,111113	-0,111113	-0,711773	-0,111113	-0,111113
-0,19935	0,226601	-0,142393	#ДЕЛ/0!	-0,142393	-0,142393	0,09357	0,09357	0,132596	0,09357	0,09357
0,246183	0,410613	-0,492366	#ДЕЛ/0!	-0,492366	-0,492366	0,481684	0,481684	-0,648432	0,481684	0,481684
0,758597	-0,077291	-0,006502	#ДЕЛ/0!	-0,006502	-0,006502	-0,059691	-0,059691	-0,75553	-0,059691	-0,059691
-0,39553	0,979811	-0,990323	#ДЕЛ/0!	-0,990323	-0,990323	0,996706	0,996706	-0,385516	0,996706	0,996706
-0,881104	0,606333	-0,602861	#ДЕЛ/0!	-0,602861	-0,602861	0,716184	0,716184	0,358044	0,716184	0,716184
-0,455312	0,98494	-0,98856	#ДЕЛ/0!	-0,98856	-0,98856	1	1	-0,324847	1	1
-0,396059	0,979579	-0,990148	#ДЕЛ/0!	-0,990148	-0,990148	0,996691	0,996691	-0,384939	0,996691	0,996691
-0,214944	-0,799055	0,801154	#ДЕЛ/0!	0,801154	0,801154	-0,701898	-0,701898	0,797187	-0,701898	-0,701898
-0,374634	-0,715806	0,749269	#ДЕЛ/0!	0,749269	0,749269	-0,652336	-0,652336	0,925637	-0,652336	-0,652336
-0,522233	-0,452425	0,522233	#ДЕЛ/0!	0,522233	0,522233	-0,44771	-0,44771	0,915406	-0,44771	-0,44771
0,339373	-0,994773	0,984481	#ДЕЛ/0!	0,984481	0,984481	-0,962492	-0,962492	0,418566	-0,962492	-0,962492
0,830554	0,101206	-0,114415	#ДЕЛ/0!	-0,114415	-0,114415	-0,03595	-0,03595	-0,854638	-0,03595	-0,03595
0,27591	-0,965945	0,985393	#ДЕЛ/0!	0,985393	0,985393	-0,978001	-0,978001	0,497325	-0,978001	-0,978001
-0,060884	-0,886247	0,915905	#ДЕЛ/0!	0,915905	0,915905	-0,860732	-0,860732	0,7605	-0,860732	-0,860732
-0,074018	-0,879949	0,91038	#ДЕЛ/0!	0,91038	0,91038	-0,853892	-0,853892	0,76891	-0,853892	-0,853892
-0,70117	0,923656	-0,901504	#ДЕЛ/0!	-0,901504	-0,901504	0,94214	0,94214	-0,017396	0,94214	0,94214
-0,290789	0,991106	-0,998826	#ДЕЛ/0!	-0,998826	-0,998826	0,982746	0,982746	-0,485868	0,982746	0,982746
0,56526	-0,969923	0,965271	#ДЕЛ/0!	0,965271	0,965271	-0,991454	-0,991454	0,201238	-0,991454	-0,991454
-0,694133	-0,398431	0,445438	#ДЕЛ/0!	0,445438	0,445438	-0,324847	-0,324847	1	-0,324847	-0,324847
-0,522233	0,2635	-0,174078	#ДЕЛ/0!	-0,174078	-0,174078	0,177799	0,177799	0,407946	0,177799	0,177799
#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!
0,870388	-0,587655	0,522233	#ДЕЛ/0!	0,522233	0,522233	-0,584808	-0,584808	-0,450161	-0,584808	-0,584808
0,662266	0,046151	-0,132453	#ДЕЛ/0!	-0,132453	-0,132453	0,076607	0,076607	-0,76322	0,076607	0,076607
0,173528	0,816461	-0,856108	#ДЕЛ/0!	-0,856108	-0,856108	0,79359	0,79359	-0,825606	0,79359	0,79359
#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!
0,798447	-0,850923	0,832424	#ДЕЛ/0!	0,832424	0,832424	-0,899554	-0,899554	-0,120839	-0,899554	-0,899554
-0,455312	0,98494	-0,98856	#ДЕЛ/0!	-0,98856	-0,98856	1	1	-0,324847	1	1
-0,320726	0,953351	-0,926941	#ДЕЛ/0!	-0,926941	-0,926941	0,891624	0,891624	-0,381777	0,891624	0,891624
#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!
-0,683207	-0,315797	0,320479	#ДЕЛ/0!	0,320479	0,320479	-0,173942	-0,173942	0,868117	-0,173942	-0,173942
0,713746	-0,695347	0,713746	#ДЕЛ/0!	0,713746	0,713746	-0,807076	-0,807076	-0,107248	-0,807076	-0,807076
-0,302314	0,261082	-0,174643	#ДЕЛ/0!	-0,174643	-0,174643	0,140374	0,140374	0,204224	0,140374	0,140374
1	-0,375091	0,333333	#ДЕЛ/0!	0,333333	0,333333	-0,455312	-0,455312	-0,694133	-0,455312	-0,455312
Amylase	1	-0,9958	#ДЕЛ/0!	-0,9958	-0,9958	0,98494	0,98494	-0,398431	0,98494	0,98494
	BV	1	#ДЕЛ/0!	1	1	-0,98856	-0,98856	0,445438	-0,98856	-0,98856
		BR	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!	#ДЕЛ/0!
			MVB	1	1	-0,98856	-0,98856	0,445438	-0,98856	-0,98856
				MVL	1	-0,98856	-0,98856	0,445438	-0,98856	-0,98856
					CaO2	1	1	-0,324847	1	1
						PaO2	1	-0,324847	1	1
							Cons. O2	1	-0,324847	-0,324847
								PaO2/FiO2	1	1
									Ca-v	1

Figure 2 Calculation of the coefficient of correlation by using PHUAS (fragment).

The developed algorithm scoring allows determining the risk of danger of the disease, identifying the degree of clinical severity of the general condition of the patient, finding out the best financially and clinically effective way of prevention and treatment, complex assessing of the quality of the therapeutic and preventive measures. The main components of the program are systemic approach, real access to health care and social rehabilitation, regardless of gender, age and social status. Also, PHUAS provides independence, the constancy of the diagnostic and therapeutic processes, allows control the volume, quality and timeliness of delivery of health services and their compliance with medical standards. Also, the advantage of the program is not only fast and objective examination of large number of people, early identification of risk groups with severe condition, determining optimum and effective options for prevention and treatment of disease, retention of time and money for the survey, but also an ability for using the data for their correlation with external factors the environment (ecology, nutrition, addictions, vaccinations, pharmacotherapy, etc.).

As a clinical example, the difficult to diagnose in case, which was submitted to the medical consultation, was presented. The 16-years old patient was delivered to the clinic of the Kharkov Region Hospital with a diagnosis of closed head injury severe degrees of severity. From the anamnesis of the disease: head injury was hurted on the patient as a result of physical beatings. Diabetes mellitus type I was accompanying disease.

On the second day of stay in the intensive care unit against the background of massive infusion and transfusion therapies the patient's condition deteriorated dramatically due to the increasing of intoxication syndrome. Disease severity and progressing negative dynamics of clinical and laboratory parameters did not correspond to the diagnosis that was management. The clinical signs of the

surgical diseases of the abdominal cavity was absent. In ultrasound examination of abdominal cavity organs no pathological changes were detected. Analytical PHUAS system was used for the purpose of complex assessment of clinical and biochemical parameters, objective analysis and interpretation of data. The objective data of the analytical PHUAS system that were obtained allowed to conclude that the leading syndrome of the disease was multi-organ failure, systemic inflammatory response syndrome.

Corrective Therapy								
K+	16,8	1,24	2,48	-12,4	-11,844	0	0	3%KCl (ml)
Ca++	20-30	mmol/l					10 ml 10% CaCl2 =9 mmol Ca++	
Trisamin	-360	-620	-372	-248	0	0	0	3.6% ml
Na+	43,2	74,4	37,2	14,88		0	0	10%NaCl (ml)
NaHCO3	-120	-206,66667	-124	-82,666667	0	0	0	8.4%NaHCO3 (ml)
4%HCl	-64,8	-111,6	-66,96	-44,64	0	0	0	Met.alkalosis (ml)!
Creat.Clearan	445,545455	460,39697	460,39697	440,37971	467,822727	#ДЕЛ/0!	#ДЕЛ/0!	80-160 ml/min
Am. of plas.	-48	148,8	0	347,2	50,4	0	0	(ml)
Am. of alb.	-189,20448	35,723904	2,976	35,723904	-13,650336	0	0	10% Albumin (ml)
Corr. Infusion	1970	1099	1199	699	213,5	-200	-200	ml
Vgl for K	-192	124	99,2	396,8	388,08	0	0	ml 10% Gluc.
Hyp. deg.	-1,5882353	-2,8181818	-1,3576642	-0,5314286	1,03561644	#ДЕЛ/0!	#ДЕЛ/0!	(l)
Hyper.deg	-0,5070423	-0,8732394	-0,4366197	-0,1746479	0,35492958	0	0	5% Glucose (l)
Isot.deg.	3	0	0,351417	-0,4275862	0,7875	#ДЕЛ/0!	#ДЕЛ/0!	(l)
Vinf.(olig)	2950	3050	2950	2950	2150	950	950	
Pol.solution	90							ml/h!!!
Calculations for hypervolemic hemodilution								
TVG	1575	ml	Safely until reduced hemoglobin and increases the MVB!!!					
10% Alb	630	ml						
Ringer	945	ml						

Figure 3 Calculation of corrective therapy (fragment of PHUAS).

№	Parameters PHUAS	Estimated-point algorithm									Date 12.01.2014	Scores	Date 26.03.2010	Scores	Date 21.02.2005	Scores	Date 26.11.2014	Scores
		0,75	0,3	0,2	0,1	0	0,1	0,2	0,3	0,75								
1	ΔV	<-800	-600-800	-600-400	-400-200	0±200	200-400	400-600	600-800	>800	204	0	494,9	0,2	1740,5	0,75	1181,5	0,75
2	IWB	<15	15	16	17-19	20-25	26-28	29-30	>30		38	0,3	35	0,3	46	0,3	40	0,3
3	Blood gluc	<2,3	2,4-2,7	2,8-3,1	3,2-3,4	3,5-5,5	5,6-7,5	6,6-9,0	9-14	>14	6,6	0,1	4,1	0	3,3	0,1	5,7	0,1
4	Osm. blood	<240	240-265	266-269	270-279	280-293	294-300	301-315	316-400	>400	296,62	0,1	283,48	0	287,36	0	291,54	0
5	COP	<15	15-16	17-18,9	19-20,9	21-25,9	26-27,9	28-30	30-32	>32	28,248	0,2	28,38	0,2	27,06	0,1	27,192	0,1
6	ΔHb	<-18	-18-16	-15-8	-7-3	-2-+2	3-7	8-15	16-18	>18	-4	0,1	-5	0,1	3	0,1	-10	0,2
7	Platelets	<140	140-159	160-179	180-249	250-300	301-320	321-350	351-400	>400	188	0,1	196	0,1	400	0,3	132	0,75
8	TPVR	<900				900-1400	1401-1800	1801-2400	2401-2800	>2800	2154,60	0,2	1781,88	0,1	1321,98	0	1708,84	0,1
9	Total Bil.					8,5-20,5	20,6-22,9	23-28	28-39	>40	11,5	0	26,3	0,2	10,5	0	11,4	0
10	Kdkittis		<0,5	0,5-0,54	0,55-0,59	0,6-0,8	0,81-0,9	0,91-1,2	>1,2		1,44	0,3	1,56	0,3	0,46	0,3	0,92	0,2
11	K+	<3,0	3,0-3,2	3,3-3,5	3,6-4,1	4,2-5,5	5,6	5,7-5,8	5,9-6,0	>6,0	4,65	0	4,7	0	4,7	0	3,45	0,2
12	Heart Vol	<38	38-42	42-49	50-54	55-90					86,614815	0	89,770541	0	110,91679	0	95,667965	0
13	tcoagul.	<3	3-4	4,1-4,4	4,5-4,9	5-10	11-12	13-14	15-16	>16	7	0	6	0	7	0	8	0
14	NII					до 0,1	0,11-0,29	0,30,6	0,7-0,9	>1,0	0,18	0,1	0,13	0,1	0,06	0	0,10	0
15	Shok Index		<0,48	0,48-0,5	0,51-0,53	0,54	0,55-0,7	0,71-0,9	0,91-1,0	>1,0	0,31	0,3	0,38	0,3	0,46	0,3	0,38	0,3
16	Norspec/sp					до 2	2,1-2,9	3,0-3,5	3,6-3,8	>3,8	1,37	0	2,44	0,1	1,07	0	2,92	0,1
17	Den.urine		<1008	1009-1010	1011-1013	1014-1028	1029-1031	1032-1034	>1034		1015	0	1015	0	1005	0,3	1015	0
18	U/C	<6	6-7	8-9	10-11	12-20					11,43	0,1	7,90	0,3	14,00	0	16,85	0
19	Consum. O2	<110	110-119	120-139	140-179	180-280					161,94	0,1	212,86	0	259,55	0	195,11	0
20	PaO2/FiO2	<330	330-399	400-429	430-445	446-455	456-460	461-465	>465		456,87	0,1	488,24	0,3	482,53	0,3	476,83	0,3
									Dynamics:		Total:	2,1	Total:	2,6	Total:	2,85	Total:	3,4
											I Phase		II Phase		II Phase		IY Phase	
	The severity of the general condition of the patient and the risk of acute disorders of the vital functions of the body by the sum of points:																	
	0-2-low risk (preventive action), satisfactory condition																	
	3-4 - medium risk (recommended medical therapy), a state of moderate severity																	
	> 5 high risk (drug therapy is required), a serious condition																	

Figure 4 Algorithm of scores of patient's severity.

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Comprehensively about it evidenced by the following calculation indicators: increase of minute volume of blood circulation (MVC=9l), cardiac index (CI=5,76 l/min*m^2), oxygen consumption (274ml/min), index of intoxication (nuclear index=0,7; lymphocytes index=3.5), the decrease in total peripheral resistance (TPR=646 dyn/sec*cm^{-5}), arteriovenous oxygen difference (Ca-v=3ml/100ml), the presence of kidney and liver failure.

The deficiency of circulating blood volume (CBV) in 1 liter on the background of clinical and laboratory signs of isotonic hyperhydration (blood osmolality =298 mOsm/kg; ΔV= +900 ml) was revealed. Systemic analysis of indicators of the analytical PHUAS system in this case allowed not only to determine the leading syndrome of the disease, but also, based on objective data, to establish a preliminary diagnosis of the underlying pathology.

I will not limit myself to the formulation of the preliminary diagnosis, but to present a logical chain of pathophysiological arguments that led to the diagnosis: Rapid loss of a large volume of fluid in conditions of increased vascular permeability is possible only in a profusely vascularized zone. The only such area is a vascular network of the intestine. The gut is "motor" of multiple organ failure (MOF).The middle degree of intoxication does not fully explain the cause of high vascular permeability. Consequently, the only reason for the rapidly increased vascular permeability can only be venous hyperemia syndrome that cause by venous thrombosis of mesenteric vessels.The exponential increase of clinical and laboratory signs of intoxication due to a massive infusion-transfusion therapy indicate the development of acute surgical pathology of abdominal cavity organs, infarction of the bowel.Thus, the clinical example shows that the use of data analytical PHUAS system allows not only early in development identify multi-organ failure, to diagnose acute surgical pathology of abdominal cavity organs, but also to identify the root cause of its occurrence which is associated with venous thrombosis of mesenteric vessels, bowel infarction. The patient underwent emergency laparotomy. As a result of laparotomy, a final diagnosis was establishment: peritonitis, venous thrombosis of mesenteric vessels, intestinal infarction. The patient underwent surgery.

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Conflict of interest

There is no conflict of interest.

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