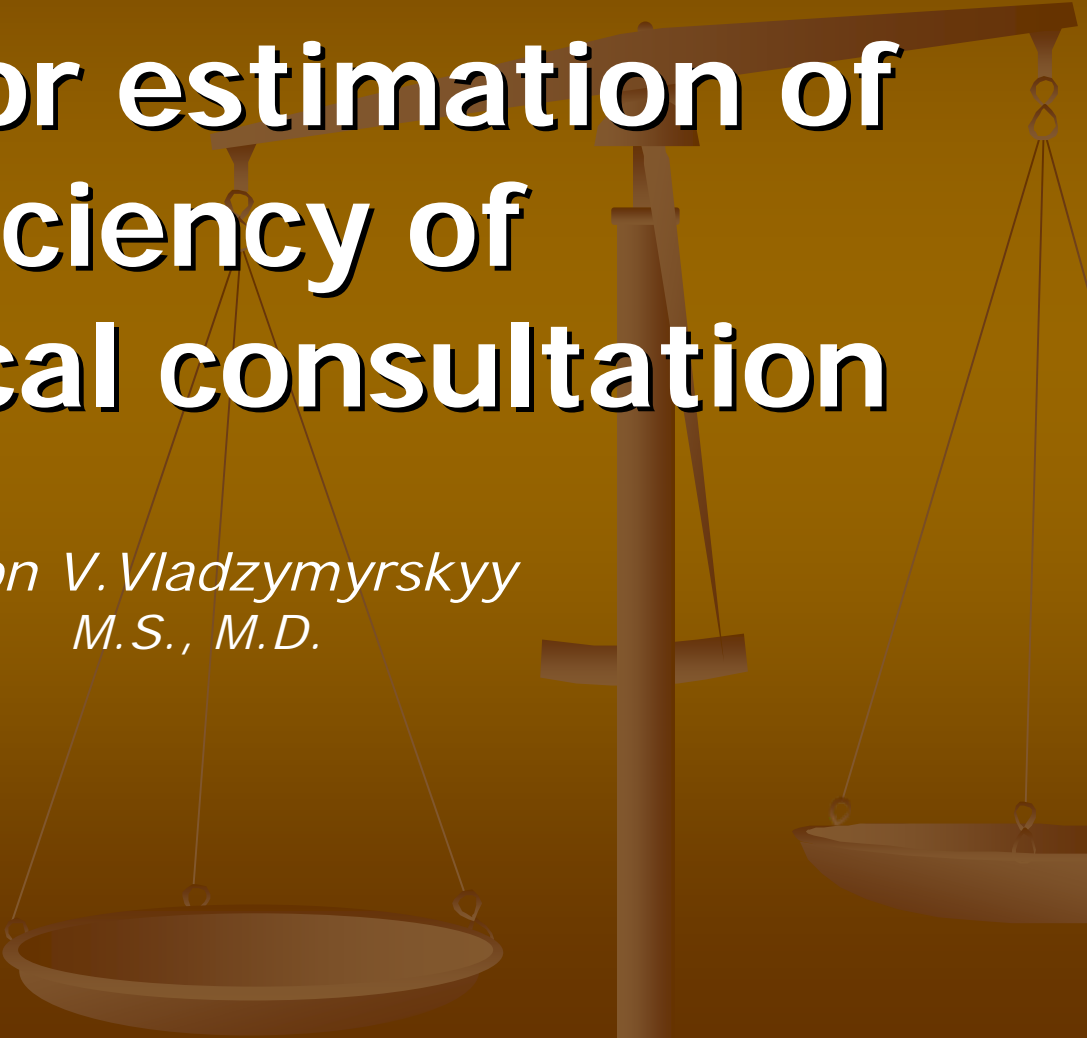


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Method for estimation of efficiency of telemedical consultation



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TABLE 2. OUTCOMES USED FOR
TELEMEDICINE EVALUATION

<i>Components</i>	<i>Number of evaluations</i>
Clinical outcomes	
Clinical effectiveness	3 (2.7%)
Patient satisfaction	26 (23.2%)
Diagnostic accuracy	49 (43.8%)
Cost	9 (8.0%)
Nonclinical outcomes	
Technical evaluation	15 (13.4%)
Management evaluation	10 (8.9%)
Total	112

*By N.Aoki et al. Outcomes and Methods in
Telemedicine Evaluation. TELEMEDICINE JOURNAL
AND e-HEALTH. Volume 9, Number 4, 2003*

For example...

Financial benefits

Bergmo TS; PalaninathaRaja M et al.

Moral aspects

Siden HB ; Chan FY et al.

Changes of clinical parameters

Lambrecht CJ; Rendina MC

Management improvements

Rollert MK et al; Rosser JC et al



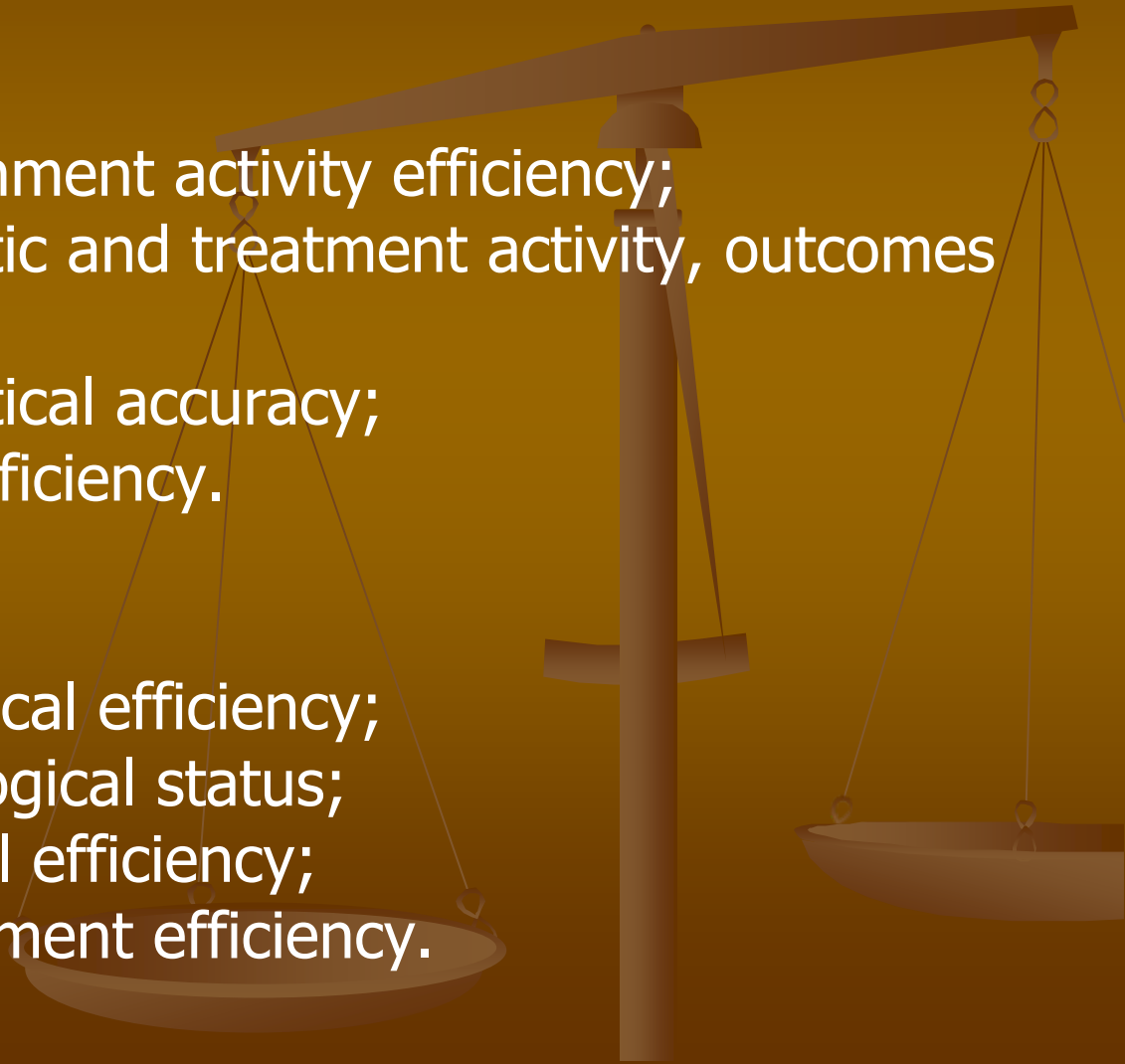
Own classification for methods of telemedicine efficiency investigations (MTEI) (presented at Med-e-Tel 2006)

1. Clinical MTEI:

investigation of establishment activity efficiency;
investigation of diagnostic and treatment activity, outcomes
efficiency;
investigation of diagnostical accuracy;
investigation of moral efficiency.

2. Non-clinical MTEI:

investigation of economical efficiency;
investigation of psychological status;
investigation of technical efficiency;
investigation of management efficiency.



Complex method for estimation of efficiency of telemedicine consultations



Relevance

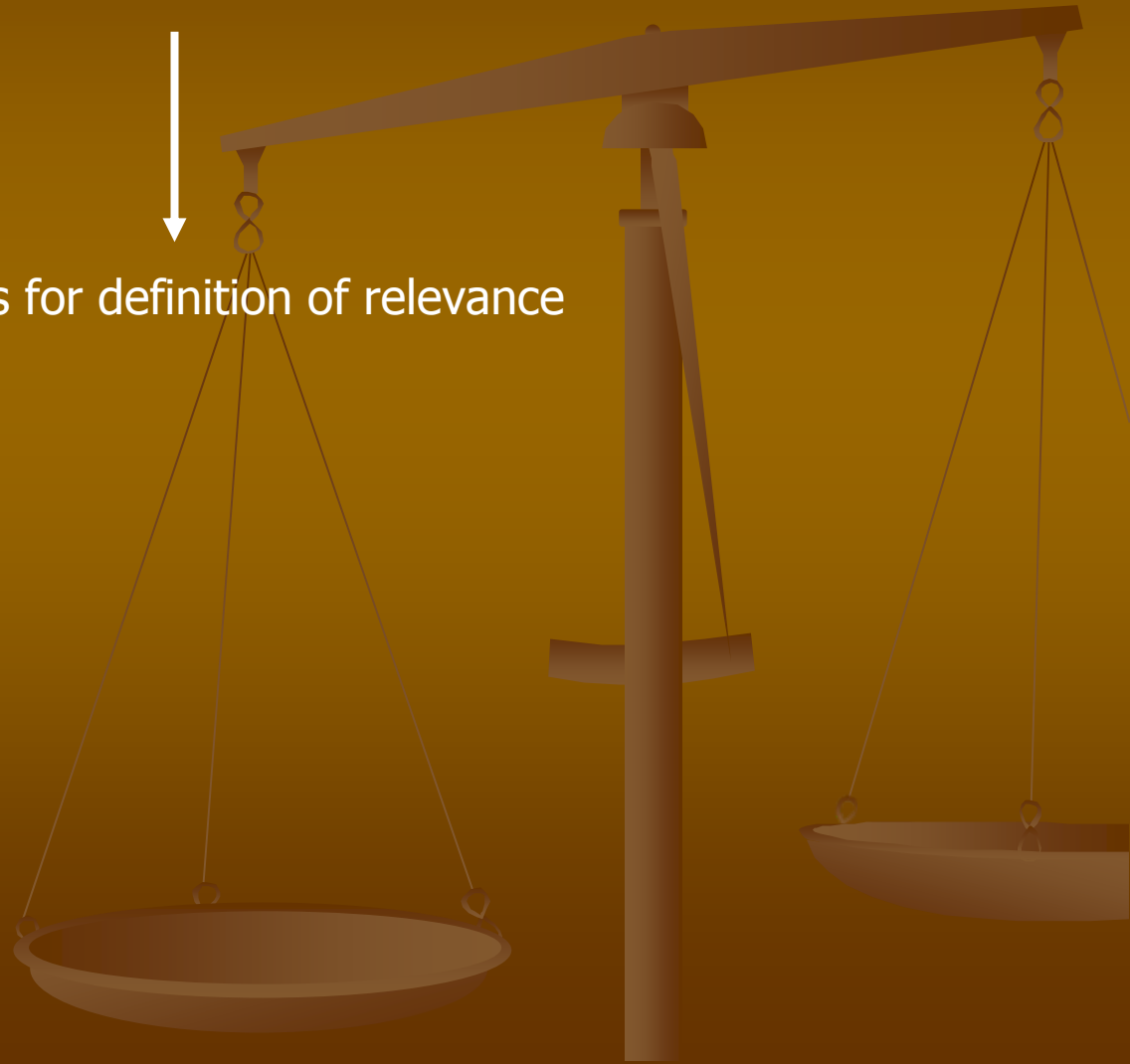
Economic feasibility

Quality indicators

It should be the set of objective criteria which it would be possible to use for statistical processing with the purpose of comparison, studying of different kinds of telemedical consultations etc...

Relevance of teleconsultation - conformity of the distant adviser's answer to information and medical needs of the attending physician (subscriber)

Questionnaires for definition of relevance



Subjective questionnaire (3 mark scale)

Discrepancy of answers to questions

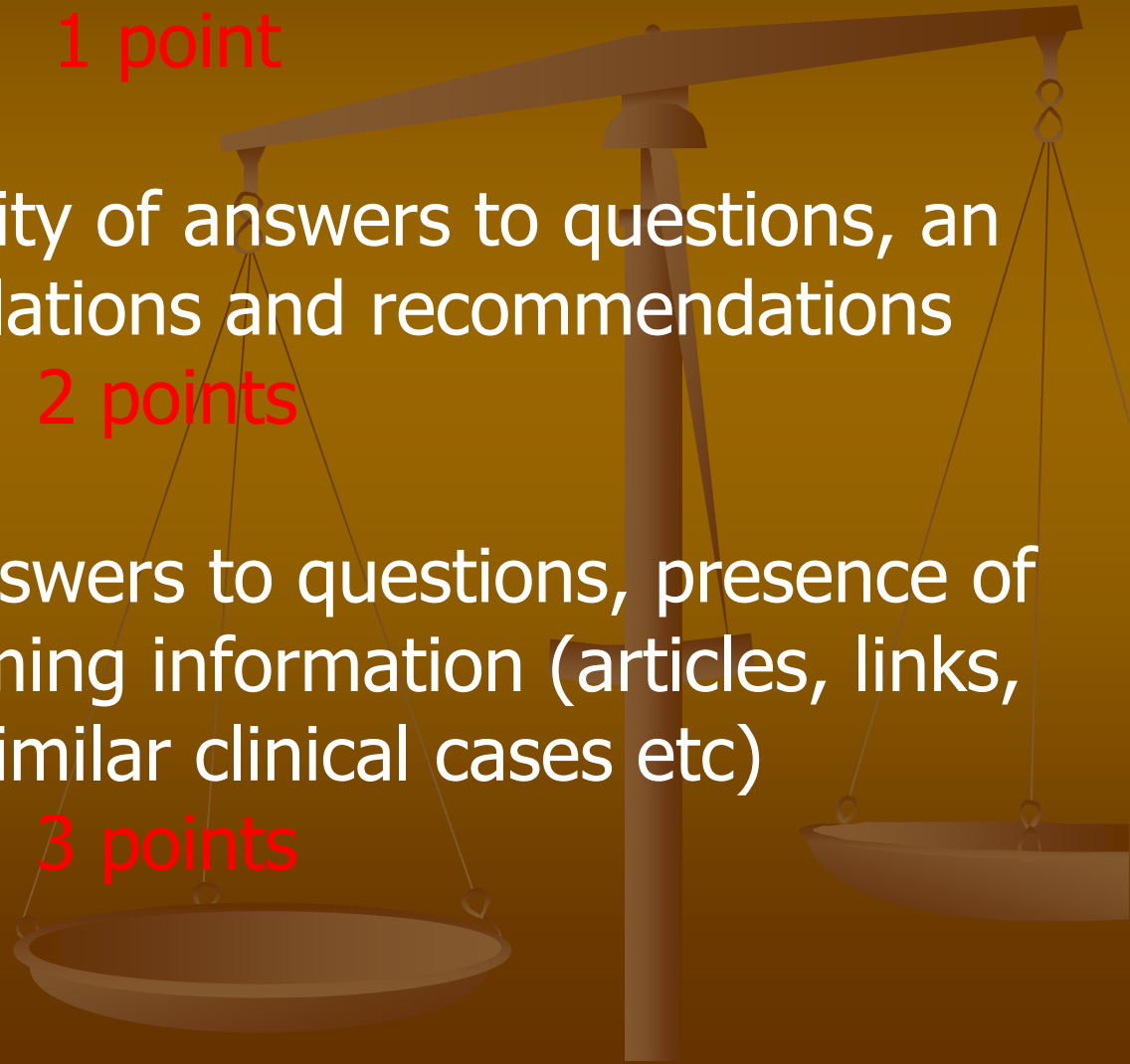
1 point

Incomplete conformity of answers to questions, an illegibility of formulations and recommendations

2 points

Full conformity of answers to questions, presence of the additional confirming information (articles, links, references, similar clinical cases etc)

3 points



Objective questionnaire

(terms, conformity of answers, additional confirming information, influence on the clinical decisions, inquiry for additional diagnostic tests, expert propositions, consilium, transportation)

1. Terms. Teleconsultation is lead:		
	Before the necessary terms	3
	In the necessary terms	3
	After necessary terms	2
	In terms of full loss of the urgency	1
2. Conformity of answers:		
	Full conformity	3
	Incomplete conformity of answers to questions, an illegibility of formulations and recommendations	2
	Discrepancy of answers to questions	1

3. Presence of the additional confirming information (articles, links, references, similar clinical cases etc), evidence-based recommendations:		
	Yes	3
	No	1
4. Influence on the clinical tactics:		
	Tactics of the adviser is completely accepted	3
	Essential change of own tactics	2
	Acknowledgement of own tactics	2
	Refusal of adviser's recommendations	1
5. Inquiry for additional diagnostic tests:		
	No/ Accessible tests	3
	Accessible tests with an investment of significant expenses (work, money)	2
	Inaccessible tests	1

6. Expert has propose:		
	One clinical program	3
	A few clinical programs	2
	Preconditions for formation of the program	1
7. A few distant experts take a part:		
	Yes	3
	No	1
8. Transportation after teleconsultation		
	Yes	1
	No	3

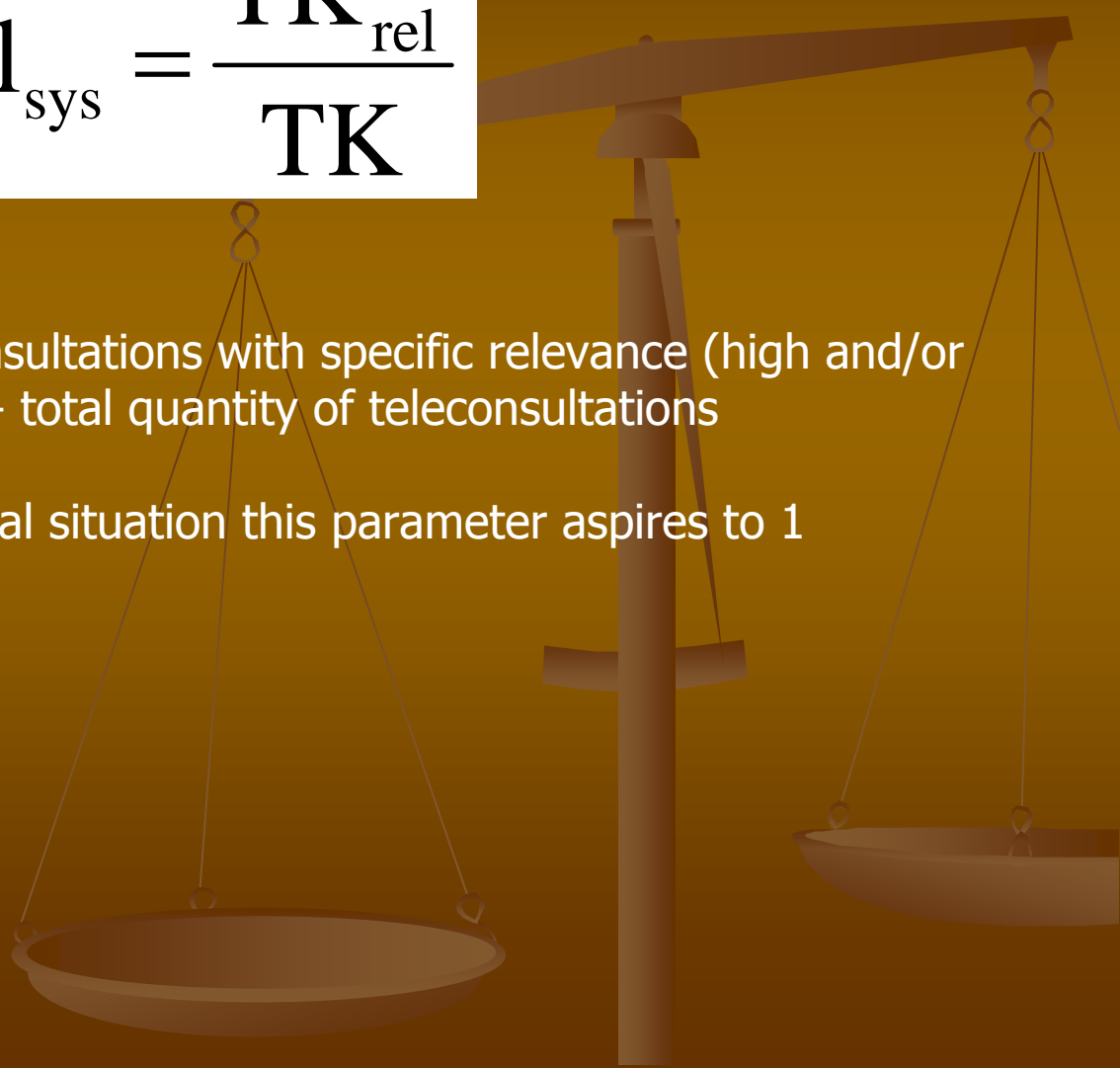
18-24 points – high relevance
13-17 points – average relevance
8-12 points – low relevance

Criterion relevance for telemedical system Relsys

$$\text{Rel}_{\text{sys}} = \frac{\text{TK}_{\text{rel}}}{\text{TK}}$$

TKrel - quantity of teleconsultations with specific relevance (high and/or average), TK - total quantity of teleconsultations

Accordingly, in ideal situation this parameter aspires to 1



Economic feasibility

Cost of
teleconsultation
(Stk)

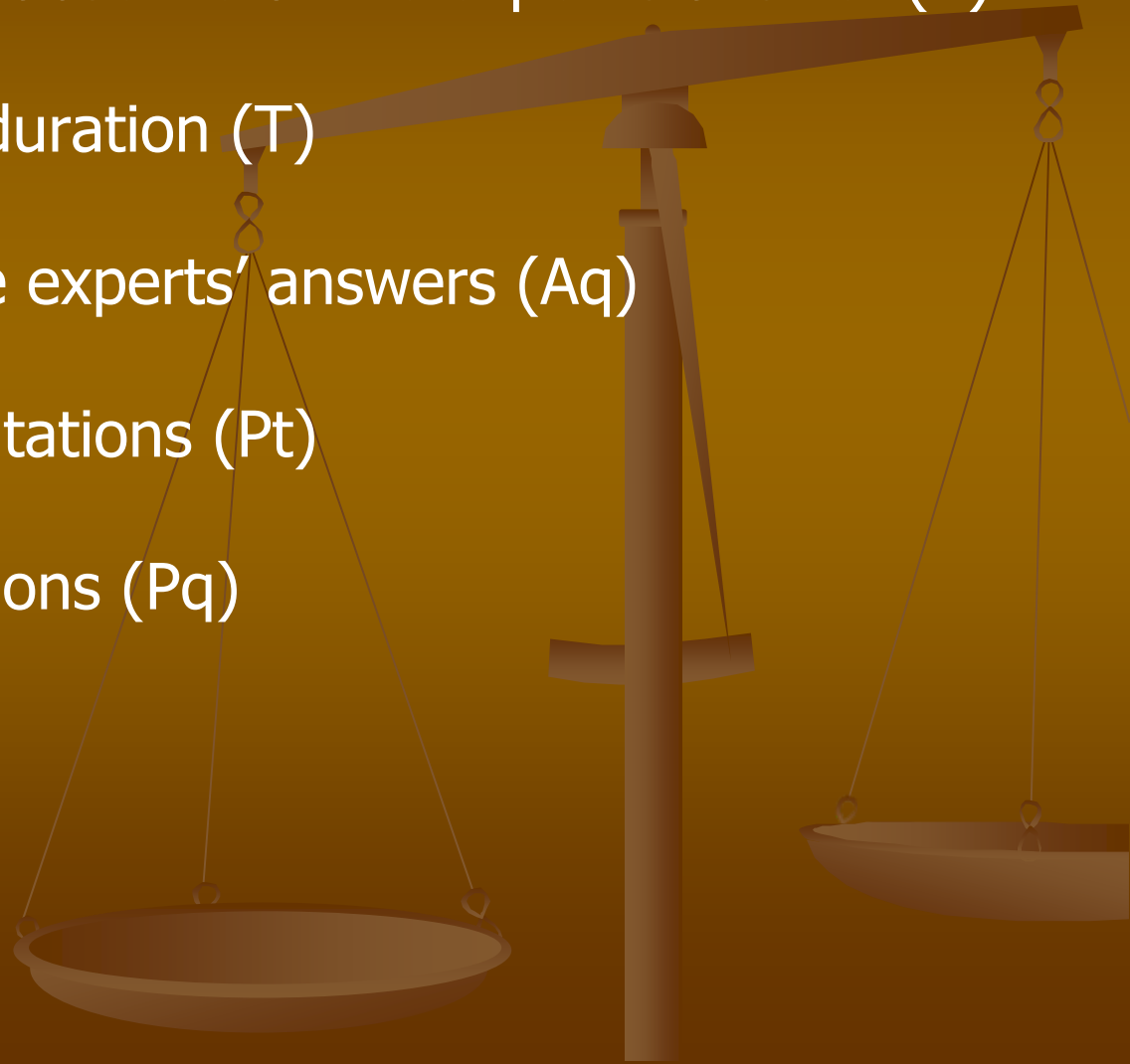
Profitability of
teleconsultation
(Rtk)

After calculation of Stk and Rtk researcher can compare results with other servivies...



Quality indicators

- parameter of presence/absence of the expert's answer (A)
- parameter of average duration (T)
- average quantity of the experts' answers (Aq)
- timeliness of teleconsultations (Pt)
- quality of teleconsultations (Pq)



A - parameter of presence/absence of the expert's answer

0 – absence of answer

1 – presence of answer

To define a parity of taken and not taken place teleconsultations...

T - parameter of average duration

$$\bar{T} = \frac{\sum_{i=1}^n T_i}{n}$$

*in numerator - the sum of durations of all teleconsultations
in denominator - quantity of teleconsultations*

Aq - average quantity of the experts' answers

$$\overline{Aq} = \frac{\sum_{i=1}^n Aq_i}{n}$$

*in numerator - quantity of answers (experts)
in denominator - quantity of teleconsultations*

Pt - timeliness of teleconsultations

$$Pt = \frac{m(t \leq t_{don})}{n_t}$$

*in numerator - quantity of duly received teleconsultations during certain time,
in denominator - total quantity of teleconsultations for the same period of
time*

Pq- quality of teleconsultations

$$P_q = \frac{m}{n}$$

m - quantity of teleconsultations of admissible quality
n - total quantity of teleconsultations

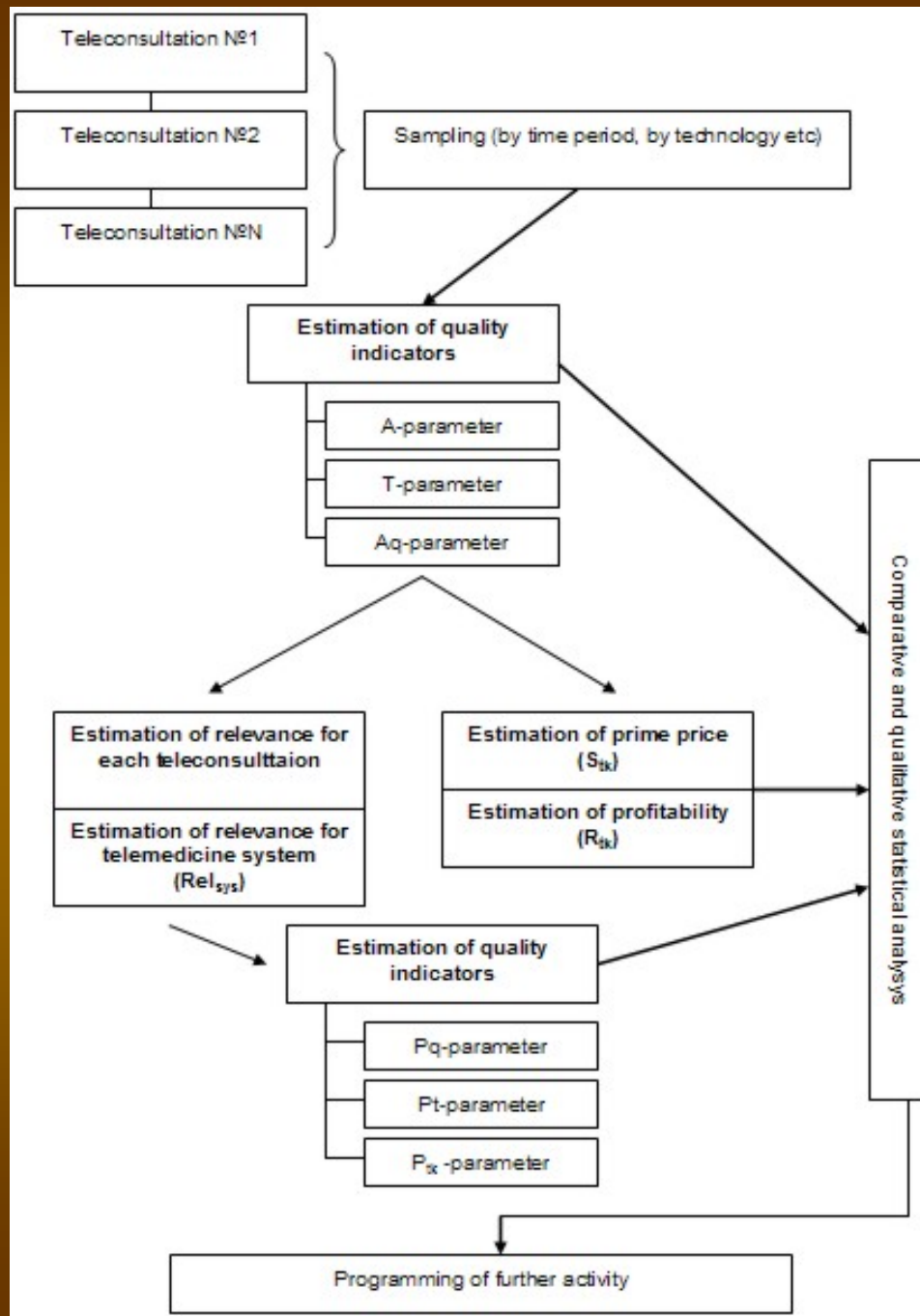
P_t

P_q

P_{tk} -probability of effective teleconsultation

$$P_{tk} = P_t * P_q$$

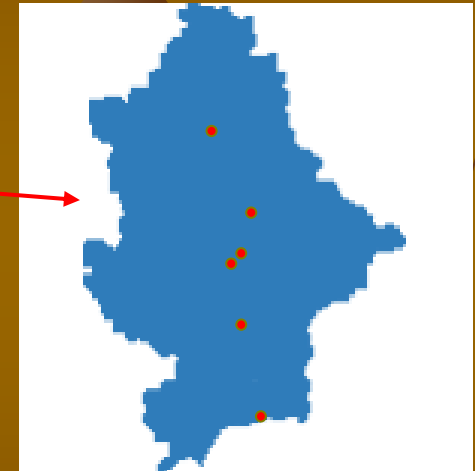
In ideal situation this parameter aspires to 1



Regional Telemedicine Network

27 teleconsultation (in traumatology and orthopedics) during 2006 year

Quality Indicators, Relevance, also Clinical Outcomes Comparison



3 rural hospitals, 2 town hospitals
From Donetsk region



A-parameter (of presence/absence of the expert's answer):

All teleconsultation were successful. A-parameter - 1.

Excellent!

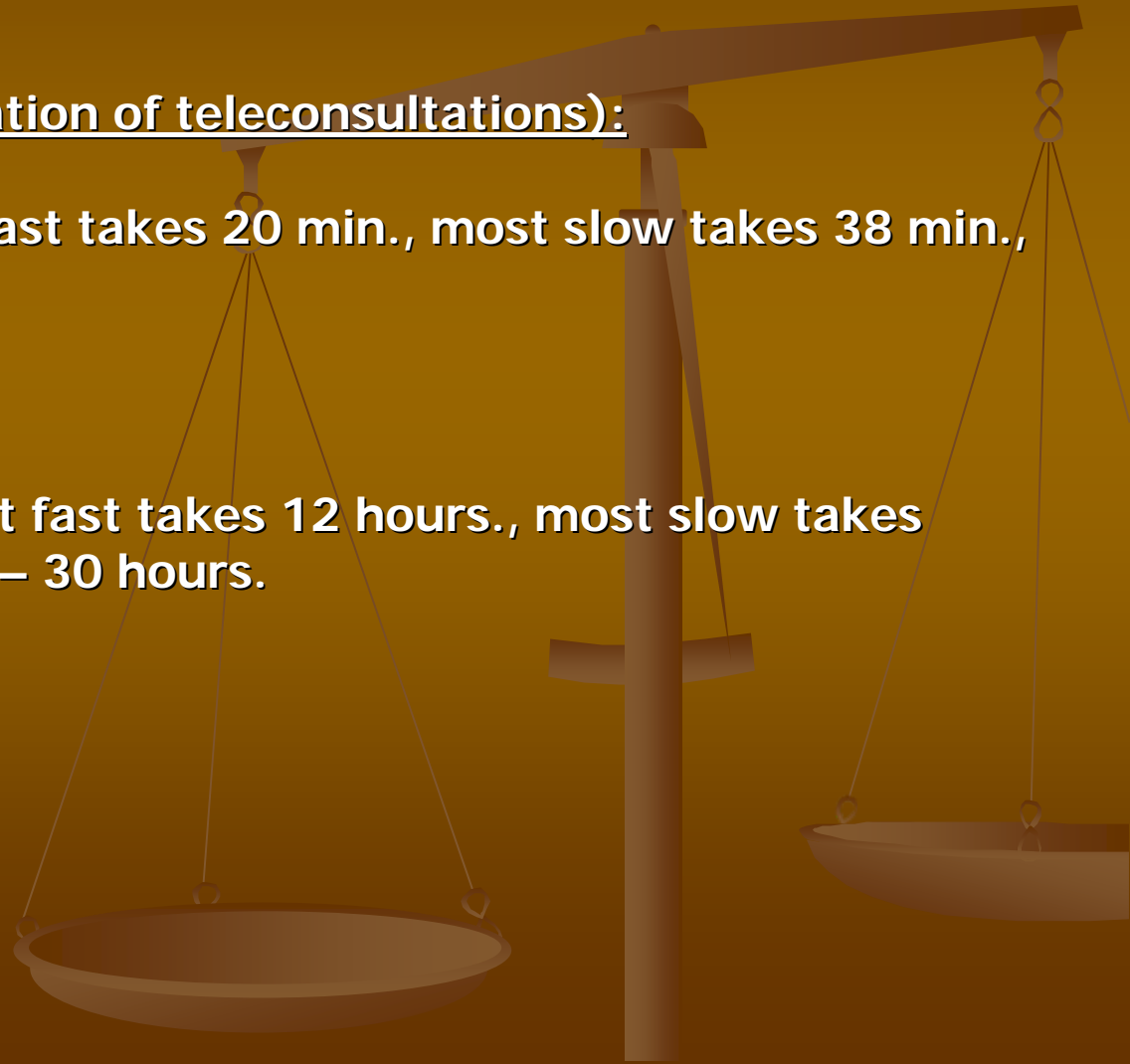
T-parameter (of average duration of teleconsultations):

synchronous – total 8, most fast takes 20 min., most slow takes 38 min.,
T-parameter – 28,5 min.

Nothing to compare!

asynchronous – total 19, most fast takes 12 hours., most slow takes
about 70 hours, T-parameter – 30 hours.

Excellent!



Aq (average quantity of the experts' answers):

total – 27, from 1 to 6 opinions for each case.

Aq – 1,85

Bad!

Pt - timeliness of teleconsultations:

Total 27, 24 – in the actual terms, 3 – after necessary terms

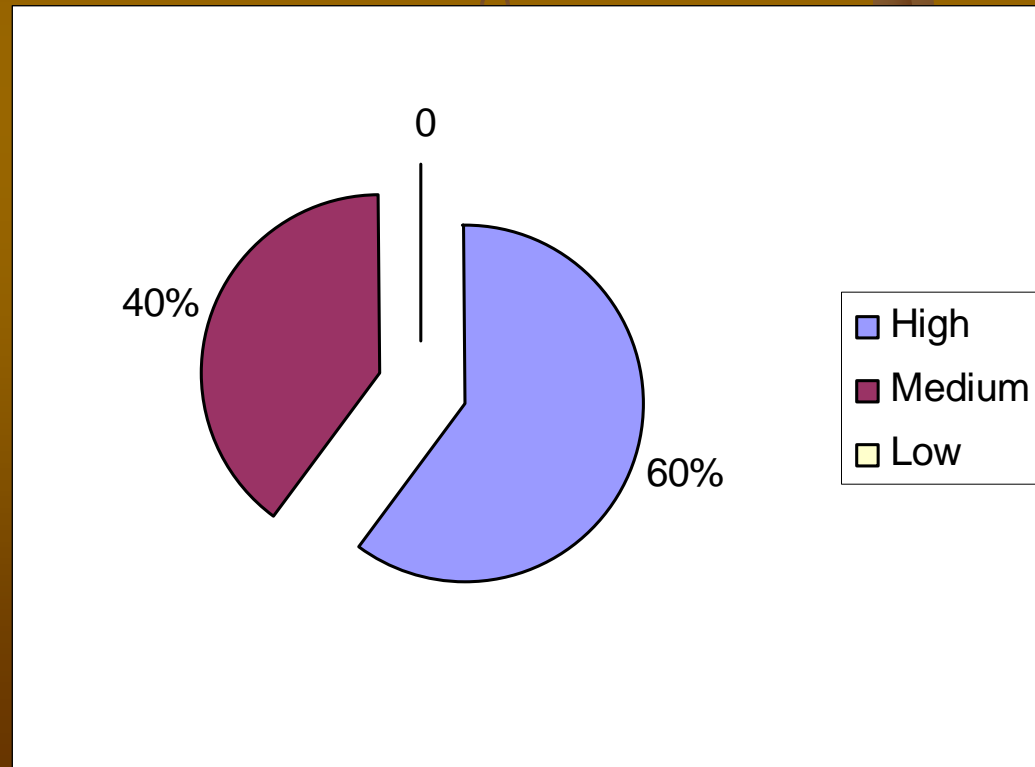
Pt – 0,9

Good!

Relevance

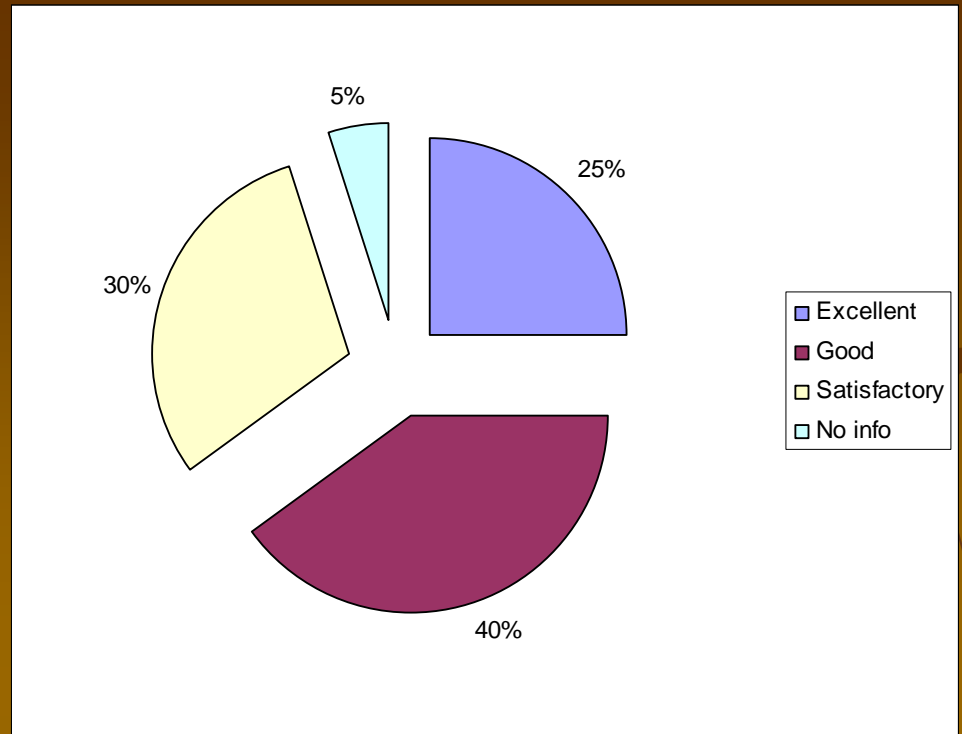
RELSys – 1.

Excellent!



Clinical outcomes - anatomical and functional results of treatment (tactics proposed by experts)

Good!



Pq - quality of teleconsultations

by Relevance

by Outcomes

$$Pq = \frac{\text{High} + \text{Medium}}{\text{Total}}$$
$$Pq = 1$$

Excellent!

$$Pq = \frac{\text{Excellent} + \text{Good}}{\text{Total}}$$
$$Pq = 0,6$$

Good!

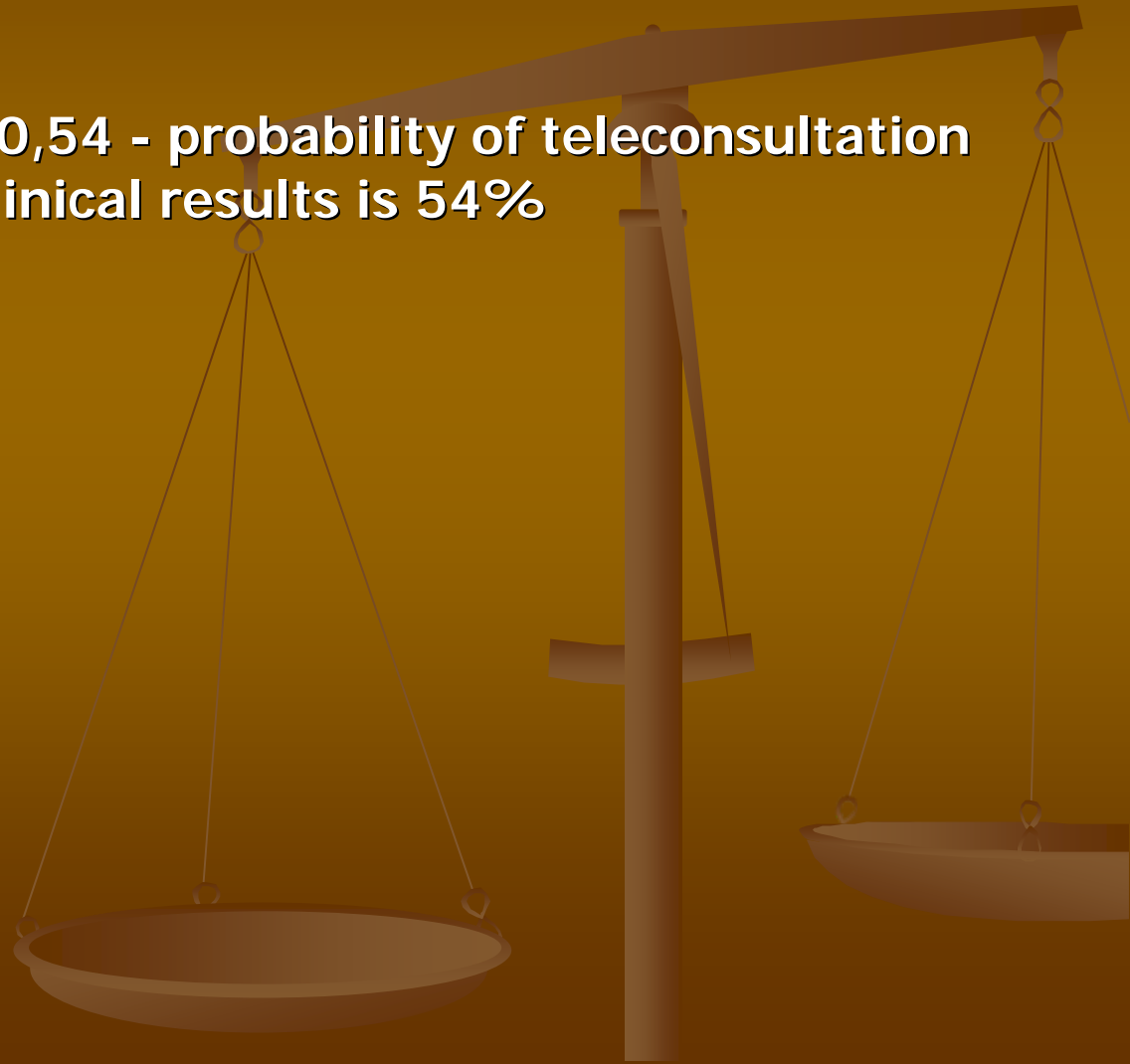
Ptk - probability of effective teleconsultation

Ttk1 = $P_t * P_q = 0,9 * 1 = 0,9$ - probability of enough relevant teleconsultation is 90%

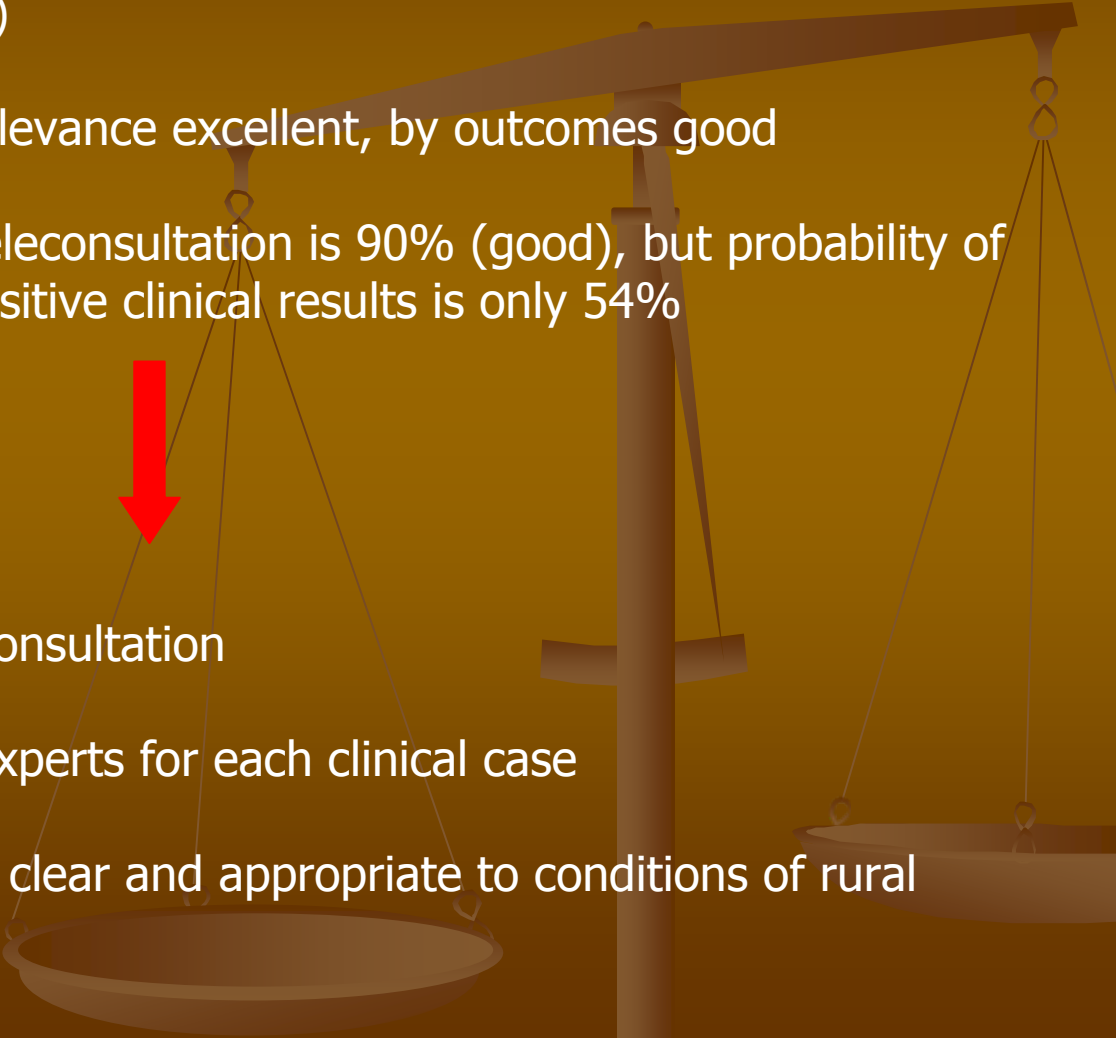
Good!

Ttk2 = $P_t * P_q = 0,9 * 0,6 = 0,54$ - probability of teleconsultation which will give positive clinical results is 54%

Bad!



CONCLUSION

- all teleconsultation was delivered in pretty good terms (average duration - excellent, timeliness – good)
 - quantity of the experts' answers was low (1,85), but with good quality (high relevance – 60%, medium – 40%)
 - quality of teleconsultations by relevance excellent, by outcomes good
 - probability of enough relevant teleconsultation is 90% (good), but probability of teleconsultation which will give positive clinical results is only 54%
- 
- to increase total quantity of teleconsultation
 - to attract at least 2-3 independent experts for each clinical case
 - experts' opinions should be more clear and appropriate to conditions of rural hospitals

THANK YOU VERY MUCH!



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