Human risk factors and Criteria-Risk Adjuster

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Abstract: Criteria and Risk Adjusters are strongly needed not only a machine centered safety but also the concepts of human centered safety. A risk has commonly given by relative and comparative expressions, whose styles are various survival or death ratio. The choice of risk are judged from the weight -ratio of benefit and disbenefit for group members or each person, and the death ratio for the risk is almost reduced to below $10^{-6}$, and final judgments of accept or rejects for the criteria (level acceptable) depend on consciousness of social members. The ISS3 of TRISS mentions that the injured persons, being in death ratio 0.0035, are estimated as lifelong death ratio 5.8%, an average loss of life expectancy 2.7 years and an annual death rate 0.0007, if our life span is about 90 years and an operating time of those equipments reaches 4 hours every day. Those values are much smaller than ratio of automobiles or that of accidental death, and are same levels of the death rates of natural calamity. However, an estimation of TRISS becomes similar to that of ASCOT in the case of slight or severe injury, and accompanied with single trauma in the same region.

Keywords human centered safety, relative risk, level acceptable, TRISS, ASCOT, multiple trauma, death rate, a loss of average duration time

1. Introduction.
We sometimes hear words of “Risk”, which is defined as a probability of an occurring possibility of harmful evidence. The types of the risk are almost divided into three groups: risk for each person (individual risk), risk for group, and problem of dose of exposures. Important points are that we need sufficiently know contents of the risk and consider whether a benefit of choice of the risk exceeds disbenefit or not. For example, unfortunately, the JCO accident being exposed to the Uranium radiation is said that laborers hardly know how to treat radiation emitted by Uranium nucleus.

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and nuclear reactions, and their organization gives preference to give preference to an economical efficiency over concepts of safety. We should accurately appreciate both regions of the benefit and the magnitude of risk. Radioactive contaminations by accidents of an atomic reactor cause the radioactive pollution of large area and an exposure to radiation of many people if a few professional make mistakes in their judgments. The criteria and risk adjustor of human injury are based on the database of automobile accidents and statistical researches of medical institutions in U.S.A. And to determine the way of treatment policy of trauma, medical adjusters, what is called, TRISS (Trauma and Injury Severity Scale) or ASCOT(A Severity Characterization of Trauma) is proved to be much useful tools in department of emergency medical care. In
this paper, we would like to refer to concept of various risk managements, and we intend to show the differences and characteristics between those two comprehensive risk adjusters[1].

2. Risk and Its Studies

It is important to describe the relationship between the dose and effects for the risk. The risk of human injury commonly is represented by survival ratio or death ratio, whose values are functions of dependent variables, i.e., age, RTS, ISS, Nij, AIS, acceleration, duration time in the department of human injury branch. The criteria are described as

\[ P_D = f(x_1, \ldots, x_n) \]

To estimate an effect on our health using relationship between quantities of factors and an occurrence of probability of events, we should always bear in mind of following contents:

Every small damage gives an effect on our bodies. The occurring probability and injury levels should be always estimated by scientific method. And everything useful has something harmful in our body, and the choice of risk should be practiced when the benefit of availability is always larger than the risk. Moreover, all occupations, sports and human activities are accompanied with various risks. Everything in the world has a kind of risk more or less. You know what they say in Japan, a good medicine becomes a poison, and sometimes a poison becomes a good medicine. Every medicine has a side effect.

We cannot recognize absolute risk values and can only know the relative risk by comparing the risk-A with risk-B since everything contains something dangerous more or less. What we should do is to decide the acceptable level of risk, level acceptable, and to reduce the risk to acceptable level of social members. The recognition of social members has some characteristics. The risk level or death rate is related to response of social members:

1. \( P_D \sim 10^{-2} \) (/person/year), Not acceptable if the risk level continue to be held.
2. \( P_D \sim 10^{-3} \), Acceptable with difficulty, they make effort to reduce that risk level.
3. \( P_D \sim 10^{-4} \), Social member do not so much have respect for the risk.4. \( P_D \sim 10^{-5} \), They commonly accept that risk without reservation.

Commonly safety occupations are thought that the death rate \( P_D \) almost takes the value \( P_D \sim 10^{-4} \), and the level acceptable for social members is said to be from \( P_D \sim 10^{-5} \) to \( 10^{-6} \). Notice that \( P_D \) is paid attentions to the death rate of social groups, which is not considered individual variation of biological features. Life support & care instrument should be took account of individual anatomical and physiological features. It is important to take into account that a ratio mythogenesis of canard and hearsay is about ten times easier than the above death rate \( P_D \sim 10^{-3} \). When the ratio of mythogenesis reaches the level from 15% to 20%, many social members have a tendency that safety myth without a doubt. They do not consider whether the myth is true or not, and suppose the myth to be true because the myth is given citizenship by force of numbers. Its atmosphere is much dangerous, and the critical level is about 8%, being called as the wall of 8%, which we should prevent the ratio of myth from exceeding the level 8%. And we think to have two different concepts of safety system, which stand in complementary situation each other, and we need take a balance both safety systems. One thing means mechanical safety’s concept taken from general engineering.

References
