A Rough Multi-Criteria Decision-Making Framework With Complex Linguistic Information for the Drug Selection Process in Medical Institutions

MSR206

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- With the implementation of China's National Centralized Drug Procurement policy, the scientific and rational selection of generic drugs has gained significant attention from health decision-makers (DMs).
- The current guidelines for drug selection do not meet the scientific and rational requirements for procuring drugs in medical institutions.
- Multi-Criteria Decision Making (MCDM) is a systematic approach to assess diverse aspects of complex problems under uncertain conditions according to the preferences of DMs.
- To improve the selection process for centralized procurement varieties, our objectives were to :
- To conduct a modified multi-criteria decision-making (MCDM) framework.
- To develop a selection criteria system for the centralized procurement of pharmaceuticals.
- To aggregate decision information under different preferences.
- Embodies the nonlinear correlation between attributes

- Using the probabilistic linguistic term set (PLTS) to uniformly model various types of linguistic information.
- A multi-dimensional evaluation criteria system containing health technology assessment (HTA) indicators and procurement factors is put forward to make the decision results more comprehensive and applicable.
- Developing an integrated weighting mechanism that synergistically combines the CRITIC (criteria importance through intercriteria correlation) with non-linear correlation coefficients and the MAHP (multiplicative analytic hierarchy process) method.
- The DNMA method is integrated to analyze the performance of centralized procurement of medicines.

RESULTS

A modified MCDM decision mechanism for centralized procurement of drug selection is established.

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					θ=0.3	θ=0.5	θ=0.7			



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	U(α _i)	r(a _i)	RC(α _i)	r(α _i)	RC(α _i)	r(a _i)	Q(α _i)	r(α _i)	Q(α _i)	r(α _i)	Q(α _i)	r(α _i)	BS(α _i)	r(α _i)
a ₁	0.32	2	0.64	2	0.96	4	0.18	7	0.19	7	0.20	7	0.55	4
a ₂	0.20	6	0.48	5	0.94	7	0.60	4	0.61	3	0.62	3	0.15	8
a ₃	0.07	8	0.32	8	0.94	7	0.97	1	0.98	1	0.99	1	0.36	7
a ₄	0.25	5	0.55	4	0.95	5	0.39	6	0.39	6	0.39	5	0.40	6
a ₅	0.19	7	0.39	7	0.97	1	0.89	2	0.81	2	0.74	2	0.63	2
a ₆	0.26	4	0.46	6	0.96	2	0.61	3	0.57	4	0.53	4	0.60	3
a ₇	0.42	1	0.75	1	0.96	2	0.00	8	0.00	8	0.00	8	0.65	1
a ₈	0.31	3	0.56	3	0.95	6	0.43	5	0.40	5	0.38	6	0.48	5

A real case study was implemented to examine the drug selection procedure. Comparing with other three value-based MCDM methods, this improved approach processes qualitative and quantitative data at the same time with bi-normalization technique, which reflect the actual size of the original data and ascertain the trust level of the amalgamated ranking and the consensus level among the three subordinate values.

CONCLUSIONS

Drug selection in medical institutions is complex and variable. The traditional health decision-making process typically converts qualitative information into scores, which results in the loss of some original information. Additionally, traditional weighting models assume independence between criteria, whereas, in reality, there is often correlation between indicators. Therefore, this study introduces the PLTS to retain the original decisionmaking information as much as possible. It employs a bi-normalization technique and combined weighting method to normalize qualitative and quantitative information simultaneously while reflecting the non-linear correlation between criteria. Moreover, different risk types are considered and integrated into the model to provide a more scientific, reasonable, and efficient decision-making process for improving drug selection.

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