

# Analysis of mortality due to multiple causes in rheumatoid arthritis in the Tula region in Russian Federation for 2000-2017 yy

## Abstract

The death certificates (DC) of the patients with rheumatoid arthritis (RA) which had died in the period 2000 to 2017 were analyzed in the study. The method for the analysis of multiple causes of death (MCD) based on the databases with the automated system was used. The importance of obtaining a reliable mortality statistics and its rates and the relevance of investigation of competing causes of death for the strategy of medical care to RA patients was stated.

**Keywords:** rheumatoid arthritis, mortality statistics, multiple causes of death, automated coding system.

## Research Article

Volume 10 Issue 1 - 2018

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**Received:** February 11, 2018 | **Published:** February 22, 2018

## Introduction

Rheumatoid arthritis (RA) – a systemic disease of the connective tissue with predominant involvement of fine joints by the type of erosive-destructive polyarthritis of unspecified etiology with a complex autoimmune pathogenesis. The investigation of mortality rates due to the pathology is relevant for rendering medical care to RA patients and correct organization of rheumatic care to the population.

RA refers to the avoidable causes of death therefore the investigation of modes of dying is important for the decrease of morbidity and mortality rates.

Death, as a rule, is induced by the complex of various multiple reasons. MCD – these are all the causes recorded in a death certificate. They are divided to underlying and competing causes.

The analysis of multiple causes allows understanding the pathogenesis of modes of dying due to RA which is important for determination of management strategy for severe patients and death prevention.

The purpose of the present study is to analyze MCD due to RA and determine shares of various causes contributing to death for development of methods for pathogenetic therapy and decrease of mortality rates due to RA.

## Materials and methods

The database (DB) of the patients deceased due to RA in the Tula Region in 2000-2017 was used for the statistic analysis.

The automated system was used for collection and statistical processing which provided automatic coding and automatic selection of the underlying cause of death with ACME decision tables. The

system allows to code all conditions recorded in the DC and select the underlying cause of death (UCD) in strict accordance with ICD-10 rules.

## Results and discussion

The mortality statistics in the Russian Federation has its particularities. The coding system is absent, and responsibilities to code statistic information and select UCD are imposed on physicians.

In the Tula Region, physicians were trained to provide reliability of statistic information, and automated coding system was implemented.

In the period 2000 to 2017, 365 subjects died in the Tula Region, and RA was specified as the cause of death in DC. Among 356 deaths – RA was chosen as UCD in 250 certificates. In additional 86 cases, RA was recorded as a contributory condition, though as part of the expect evaluation, chronic ischemic and cerebrovascular diseases were chosen as UCD in 65 of 86 cases, in other 4 cases, renal complications in RA were assessed as an individual renal pathology.

It was related with unclear ICD-10 rules for selection of the underlying cause of death. If RA were recorded in part II of DC, then the automated system does not select it as a UCD, even if a milder disease were recorded in part I.

Meanwhile, in accordance with ICD-10 rule MB1, in the last episode of health care among two conditions – chronic ischemic heart disease and RA with systemic involvement, the latter condition should be selected as a UCD.

Such selection errors lead to underestimation of deaths and decrease of RA mortality rates. 356 people died in Tula region during 2000-2017, the DC of which was indicated RA.

Among 356 DC 25 (7%) contain only one record, in 356 DCs, 920 conditions were recorded. In part II of DC, 125 conditions (15%) were recorded, with optimum value 20-25%. In part I, 695 conditions were recorded in three lines which averaged to 1.95 records per 1 DC.

The DB was verified: heart and respiratory failure were ruled out as 100 conditions; hereby the total number of conditions in DB was reduced to 820.

The conditions were used for the analysis. The sufficiency degree of death information was first determined to analysis mortality via determination of a divisible factor of multiple causes of death (DFMCD). DFMCD was 2.3 with the standard (>2.6) which shows insufficient DB for the analysis per MCD.

Per UCD due to RA – 250 DC which shows that only 30.5% of the recorded death information is used for the MCD analysis. The MCD allows using 100% of the recorded causes of death.<sup>1-9</sup>

## Final analysis stage

The stage includes determination of % contribution of competing causes of death (464 conditions). On the first position – diseases of the genitourinary system – 139 conditions (17%); on the second – diseases of the circulatory system – 122 conditions (15%); on the third – diseases of the respiratory system – 57 conditions (7%), on the fourth – endocrine diseases – 40 conditions (4.9%); on the fifth – diseases of the digestive system – 39 (4.8%).

As one nosology entity with complication is recorded in part I of DC, then the structure of complications does differ from the structure of all competing causes of death: on the first position – diseases of the genitourinary system – 138 conditions (19.9%); on the second – diseases of the circulatory system – 103 conditions (14.8%); on the third – diseases of the respiratory system – 53 conditions (7.6%), on the fourth – endocrine diseases – 37 conditions (5.3%); on the fifth – diseases of the digestive system – 34 (4.9%) (Table 1).

**Table 1** The contribution of competing causes on the final stage of multiple causes of death analysis

Causes of death	Rank	Structure	
		abs.	Percentage of all causes
All death causes, among them competing causes:	-	695	100
Diseases of the genitourinary system	1	138	19,9
Diseases of the circulatory system	2	103	14,8
Diseases of the respiratory system	3	53	7,6
Endocrine diseases	4	37	5,3
Diseases of the digestive system	5	34	4,9

## Conclusion

1. In some cases, DC is completed not in accordance with the established requirements: 100 conditions (heart and respiratory failure) should not be included to certificates as they are an element of modes of dying.
2. 125 conditions (15%) are recorded in part II of DC which is insufficient (optimum rate 20-25%) and reduces possibility of MCD analysis.
3. A correct logical sequence is stated not in all cases which does not give possibility to develop methods for pathogenetic RA therapy.
4. Diseases of the genitourinary system (17%), diseases of the circulatory system (15%), and diseases of the respiratory system (7%) and endocrine diseases (4.9%) are of primary importance in the structure of competing causes of death.
5. The most common RA complication – renal failure – 115 conditions, amyloidosis – 34 conditions, and pneumonia – 26 conditions which shows the necessity to pay a special attention to the conditions while rendering medical care.
6. RA is underestimated as UCD: in 65 of 356 cases which decreased mortality rate due to RA.
7. Conditions recorded in DC should be accounted while determining management strategy for severe patients.

8. Training of physicians and medical statisticians on correct filling of DC and selection of PDR should be continued.

## Acknowledgments

None.

## Conflict of Interest

Authors declare there is no conflict of interest in publishing the article.

## References

1. Avouac J, Amrouche F, Rey G, et al. SAT0116 Mortality Profile of Patients with Rheumatoid Arthritis in France and Its Change in 10 Years. Poster Presentations. Rheumatoid arthritis - comorbidity and clinical aspects. BMJ Publishing Group Limited. 2016.
2. Frederico AG Pinheiro, Deborah CC Souza, Emilia I Sato. A Study of Multiple Causes of Death in Rheumatoid Arthritis. *The Journal of Rheumatology*. 2015;42(12):2221-2228.
3. Kiadaliri AA, Turkiewicz A, Englund M. Mortality from Musculoskeletal Disorders Including Rheumatoid Arthritis in Southern Sweden: A Multiple-cause-of-death Analysis, 1998-2014. *J Rheumatol*. 2017;44(5):571-579.
4. Sorotskaya VN, Vaisman DSh. Principles of coding rheumatological diseases and the rules for filling in the «Medical certificate of death»: A methodical guide. Tula; 2005. 96 p.

5. Sorotskaya VN, Vaisman DSh, Cherkasov SN. Principles of coding of rheumatoid arthritis and the rules of registration of the «Medical certificate of death». FGBICU «National Research Institute of Public Health. ON. Semashko». The WHO Collaborating Center in Russia for the Family of International Classifications. Moscow; 2016. 37 p.
6. Vaisman DSh. Guidelines for the use of the International Classification of Diseases in Practice of a Physician. Moscow: RIO FRI HOI MH RF; 2013. Vol. 1. 168 p.
7. Vaisman DSh. A method of the analysis of mortality by multiple causes. Innovations and investments. 2014; № 6, p. 26-28.
8. Vaysman DS, Sorotskaya VN, Nikitina ES. Analysis of mortality from musculoskeletal diseases as underlying and multiple causes in the residents of the Tula region. *Rheumatology Science and Practice*. 2017; 55(6):616-620.
9. Vaisman DSh, Sorotskaya VN, Balabanova RM. Reliability of the data on morbidity and mortality from musculoskeletal system diseases in residents of the Tula region. *Rheumatology Science and Practice*. 2014; 52(1):44-48.