MULTICENTER OSTEOARTHRITIS STUDY

OUTCOMES DATASET DESCRIPTION
JANUARY 2020

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Overview

Dataset: OUTCOMES
Observations: 3026 (1 record per study participant)
Variable Guide: VariableGuide_OUTCOMES.pdf
Distributions: Distributions_OUTCOMES.pdf
Formats: FORMATS.SAS7BDAT (contains all the formats used for the dataset)

Introduction

This dataset contains data on outcomes or endpoints for knee replacements, hip replacements, deaths, and x-ray outcomes. All 3026 MOST participants have a record in the dataset. At present, data on hip and knee replacements that occurred up to the 84 month follow-up visit are included in this dataset. Additional and revised outcome/endpoints data will be included in this dataset, and analysts are encouraged to ensure they are using the most up-to-date version of the dataset. Analyses ran using an older version of this dataset should be re-run using the most recent version of this dataset.

Variables

The Variable Guide (VariableGuide_OUTCOMES.pdf) is a complete list of all variables in the dataset, their SAS variable names, descriptive variable labels, and attributes. Variables in this dataset are related to endpoints or outcomes and as such, may not be associated with a specific visit and have the visit prefix "V99." Endpoint-related variables in this dataset all have names which begin V99E ("E" for endpoint).

There are 3 sets of variables, one for knee replacements, one for hip replacements, and one for x-ray (radiographic) outcomes, for which there are both right knee and left knee versions of the variables. There is also a set of variables related to death/loss to follow-up which have names prefixed "V99ED…", and a variable "V99EXCLUSION" indicating potential reasons for which a participant may need to be excluded from particular types of analyses. The following table summarizes how the prefix of the variable name describes which set of variables it belongs to:

Table 1. Variable name prefixes and associated endpoint/outcome

Variable Name Prefix	Endpoint	Variables include data on
V99ERK….	Right Knee Replacement	Visit by which replacement had occurred, and whether adjudicated or seen on x-ray, months from enrollment to replacement, etc.
V99ELK….	Left Knee Replacement	
V99ERH….	Right Hip Replacement	
V99ELH….	Left Hip Replacement	
V99ERX….	Right Knee X-ray	Prevalence/incidence of radiographic OA, medial and/or lateral progression of joint space narrowing
V99ELX….	Left Knee X-ray	
V99ED….	Death/loss to follow-up	Months from study enrollment by which death or loss to follow-up had occurred, etc.
V99EXCLUSION	Reason to exclude from 84-month analysis	Reason that participant might be excluded from analyses, including presence of inflammatory arthritis, withdrawal of consent, death, etc.

The remaining characters in the variable name relate to the meaning of the variable, as described in the following sections.

Hip and knee replacements:

Participants have information about hip or knee replacements in the Outcomes dataset if one of the following three criteria were met:

(1) The replacement was centrally adjudicated: knee and hip replacements that occur after a participant enrolled in the MOST study are centrally adjudicated by the MOST Coordinating Center at the University of California, San Francisco. A physician adjudicator reviews the medical records forwarded by MOST clinical centers that document the event.

(2) The replacement was seen on a MOST study x-ray: all knee x-rays were read for the presence of a knee replacement. This is the only source of data for knee replacements that occurred prior to enrollment into the study. All MOST study participants had bilateral knee x-rays taken when enrolled into the study.

(3) The replacement was self-reported: participants that self-reported a replacement that has not gone through the adjudication process due to a lack of medical records and/or x-rays are also included in the Outcomes dataset.

Description of knee/hip replacement variables:

Knee and hip replacement status:
Variables V99ExxRINDEX are the key variables for identifying knee and/or hip replacements that occurred either prior to the start of the MOST Study or after a participant was enrolled into the study. A value "V0:Baseline" indicates that the replacement happened prior to enrollment into the study. Other values indicate by which visit replacements had happened.

For participants who have reported a knee or hip replacement during their follow-up interviews, variables V99ExxRSRC give information on the source of the data and these variables take 4 possible values:

- '0:None': no medical records or x-rays were available and the replacement is identified by self report from the study participant only
- '1:xray': no medical records were available for adjudication, but the replacement was seen on a MOST x-ray
- '2:med doc': medical records were used for adjudicating the occurrence of the replacement
- '3:x-ray,med doc': both medical records and a MOST x-ray were used for identifying the occurrence of the replacement

In general, when the only information about a knee or hip replacement is self-reported and not adjudicated (V99ExxRSRC=0), these joints should be treated as having had a replacement in analyses, since in general participants are very reliable at reporting the presence of knee and hip replacements. Similarly, if analyses require participants who have not had a replacement, self-reported replacements should be removed.

Reason for follow-up replacement:
Data on the reason for knee and/or hip replacements are provided in the variables V99ExxRDX, but only when known from medical records. The reason for replacements which occurred prior

to study enrollment is unknown as is the reason for follow-up replacements which were seen only on x-rays or only from participant self-report.

Date of follow-up replacement:
Although the actual date of the replacement is not released, when the actual date is known from medical records, the number of months between the date that the participant was enrolled into the study and the date on which the replacement occurred is provided in variables V99ExxRMONTHS. For participants where the actual date was not obtained from medical records, the date reported by the participant is used for the calculation. The variables V99ExxRDTSRC define whether the date of replacement is from documentation of participant's self-report.

Description of variables for death/loss to follow-up and exclusion:

The variable V99EDINDEX indicates by which visit a participant's death had been adjudicated or by which the participant had withdrawn from the study, and the variable V99EDDVSPR indicates the closest MOST Study visit prior to death or withdrawal from the study.

All deaths of MOST Study Participants were adjudicated from documentation (e.g.: death certificates or obituaries) and the number of months between study enrollment and death is given in the variable V99EDMONTHS. There is also a variable V99EXCLUSION which lists reasons that a participant may need to be excluded from certain analysis. It indicates those who have died, those who withdrew consent, and also information such as those who were found to have inflammatory arthritis at baseline.

Description of variables for radiographic status and outcomes:

This dataset contains x-ray outcome variables which are based on semi-quantitative x-ray readings of Kellgren and Lawrence[1] grades (KLG) and OARSI joint space narrowing (JSN) grades[2] and other radiographic features of knee OA.

The dataset MOSTV01235XRAY contains the individual KLG scores and JSN grades and other IRFs and variables for longitudinal changes, and there is information about the reading protocols and methods used in the documentation for that dataset.

Variables for left knee radiographic outcomes/status are prefixed with V99ELX… and variables for right knee with V99ERX… and variables split into those for incidence/prevalence of radiographic OA, and those for progression/worsening of joint space.

Prevalence and Incidence of radiographic OA:
For each participant, there are data on prevalence of radiographic knee OA, or incidence of radiographic knee OA (including at which visit) over the 84-month follow-up period in both right and left knees. Typically incident radiographic OA at a specific visit is the development of structural changes scored as KLG >=2 at a follow-up visit, where the earlier visits were scored KLG 0 or 1[3,4].

Following this standard, incident radiographic knee OA occurred when a knee with a KLG of 0-1 became a grade 2 or higher at a subsequent visit.

In addition, the readers classified the incident KLG 2 radiographic OA as resulting from either:
   a) new or enlarging definite osteophyte with normal joint space (described as KLG of 2N), or

b) the new combination of a definite osteophyte and joint space narrowing in a knee that did not have this combination at previous visits (denoted by a new KLG of 2).

The reason for doing this is related to the different definitions of each KLG that have been used over the years, where KLG=2 in particular was sometimes defined as an unimpaired joint space, and other times defined having joint space narrowing[5].

Definition (a) is a weaker definition of incident ROA and definition (b) is a stronger definition. In this dataset, knees which are KLG 0-1 at early visits, but which become KLG=2 at a later visit represent knees which meet either of these two definitions.

For analyses which might want to separate out knees which meet each of these two separate definitions the OUTCOMES dataset which contains separate variables (V99ELXKL2N for left knee, V99ERXKL2N for right knee) that can used to identify knees with incident ROA which meets either definition (a) or (b) and separate variable (V99ELXKL2 for left knee, V99ERXKL2 for right knee) which identifies knees which only meet the stronger definition (b) of incident ROA.

These variables indicate the following situations:
- whether there was a follow-up x-ray on which to determine incidence of ROA
- whether the knee had prevalent ROA at baseline
- whether the knee was KLG 0-1 at baseline and had no incident ROA at last follow-up visit
- whether a knee had incident ROA and at which visit it occurred

Incidence/Prevalence of ROA status for all knees went through an adjudication process which is described in detail in the documentation for the MOSTV01235XRAY dataset.

Please note that there are variables V99ELXLVSQD and V99ERXLVSQD which indicate the latest visit at which the knee had central x-ray readings performed. It is important to take the value of this variable into consideration when determining incidence of ROA. For example, for a knee with no ROA at baseline, if the latest visit with a central x-ray reading is the 15-month visit, then the radiographic OA status of that knee at the 60-month visit is unknown and depending on the type of analysis being performed, that knee might not be eligible for an analysis of incident radiographic OA.

Progression/Worsening of Joint Space Narrowing:
We define progression of ROA as a worsening of JSN score in a knee which has radiographic OA at the initial time point of the analysis. This dataset also contains variables for indicating cumulative worsening of joint space from baseline, which can be useful for determining progression of existing ROA, or loss of joint space in knees without ROA.

Both PA view and lateral view radiographs were read for joint space narrowing changes. As described in the documentation for the MOSTV01235XRAY dataset, readers could score both whole grade change in JSN score, as well as within-grade change in JSN score (where readers considered that a definite narrowing of joint space had occurred, but that its magnitude was not large enough to cause a whole grade change in OARSI JSN score).

The JSN progression/ worsening status provided in this dataset is the results of an adjudication process described in more detail in the documentation of the MOSTV01235XRAY dataset.

The following list identifies the JSN progression/worsening variables and which knee compartment is involved and which x-ray view was being used:

From bilateral PA view knee radiograph:
> V99ELXJSNM – left knee medial tibio-femoral compartment JSN progression
> V99ELXJSNL – left knee lateral tibio-femoral compartment JSN progression
> V99ERXJSNM – right knee medial tibio-femoral compartment JSN progression
> V99ERXJSNL – right knee lateral tibio-femoral compartment JSN progression

From left knee lateral view radiograph:
> V99ELXJSNM_Lat – left knee medial tibio-femoral compartment JSN progression
> V99ELXJSNL_Lat – left knee lateral tibio-femoral compartment JSN progression

From right knee lateral view radiograph:
> V99ERXJSNM_Lat – right knee medial tibio-femoral compartment JSN progression
> V99ERXJSNL_Lat – right knee lateral tibio-femoral compartment JSN progression

The following 4 summary variables indicate whether narrowing was seen on either the PA view or the lateral view:
> V99ELXJSNM_any – left knee medial tibio-femoral compartment JSN progression
> V99ELXJSNL_any – left knee lateral tibio-femoral compartment JSN progression
> V99ERXJSNM_any – right knee medial tibio-femoral compartment JSN progression
> V99ERXJSNL_any – right knee lateral tibio-femoral compartment JSN progression

The values taken by these variables are used to indicate the following situations:
- x-ray was not read for JSN
- there were no follow-up visit x-rays or readings
- the knee was JSN=3 at baseline and could therefore not worsen at later timepoints
- the knee was JSN <3 at baseline and within-grade worsening occurred
- the knee was JSN<3 at baseline and a full grade (or more) of worsening occurred

Consult the variable (VariableGuide_OUTCOMES.pdf) and distributions document (Distributions_OUTCOMES.pdf) for this dataset for the descriptive labels and values used for each of these variables and situations. When analyzing JSN progression/worsening status, the variables V99ELXLVSQD and V99ERXLVSQD (which indicate the latest visit at which the knee had central x-ray readings performed) should be considered.

Missing Data

The dataset includes records for 3026 participants. Where expected data do not exist for a knee, special missing values are assigned to denote why the data were not acquired. The special missing values include:

.P	Not expected: data missing because the exam was not done or because the result is not expected for this participant
.N	Not applicable: variable is not applicable for this participant
.M	Missing data: not available for this variable
.E	Excluded: participant excluded
.X	X-ray not read: baseline feature other than KLG was not read because only a single time point was available to be read

References

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2. Altman RD, Gold GE. Atlas of individual radiographic features in osteoarthritis, revised. Osteoarthritis Cartilage. 2007;15 Suppl A:A1-56. PMID: 17320422.

3. Felson DT, Nevitt MC, Yang M, Clancy M, Niu J, Torner JC, Lewis CE, Aliabadi P, Sack B, McCulloch C, Zhang Y. A new approach yields high rates of radiographic progression in knee osteoarthritis. J Rheumatol. 2008 Oct;35(10):2047-54. PMID: 18793000. PMCID: PMC2758234.

4. Felson DT, McAlindon TE, Anderson JJ, Naimark A, Weissman BW, Aliabadi P, Evans S, Levy D, LaValley MP. Defining radiographic osteoarthritis for the whole knee. Osteoarthritis Cartilage. 1997 Jul;5(4):241-50. PMID: 9404469.

5. Croft P. An introduction to the atlas of standard radiographs of arthritis.Rheumatology 2005; 44(Suppl 4) iv42. PMID: 16306482.

Additional imaging background literature is available on MOST Online under
Data and Documentation (http://most.ucsf.edu/datadocs.asp).