Assumptions

- Artificial key created in the ER model:
    - "fatherid" in the entity set "father"
    - "parentid" in the entity set "registered_prnt"
    - "instid" in the entity set "institution"
    - "apptid" in the entity set "appointment"
    - "pregid" in the entity set "pregnancy"
    - "babyid" in the entity set "baby"

- We assume that each appointment, the midwife prescribe one type of med_actions (either sample test or referral) to one patient (either mother or baby). There can be cases where during one appointment, one individual receives two med_actions, but the two med_actions need to have different types.

- Both types of med_actions (test sample & referral) need to be sent to lab to be examined/ conducted by one technician.

- There may be a situation where different infosessions are hosted at the same date&time (by different midwives).

- If an infosession has no attended_parents, it will still be held.

- If a mother comes again with a new individual in the future, we will count the pregnancy time of the couple to be 1.

Restrictions

- In the ER model, "Father" will be assigned an artificial key. But if the same "father" registers again in the future, he will get another different artificial id. We cannot prevent that.

- It is required that a med_action prescribed is either a sample test or a referral. But we cannot ensure that in the ER model, because there is an ISA hierachy where Covering Constraints exist. It is possible to prescribe a med_action other than sample test or referral.

- It is required that a midwife either works in a clinic or a birthing center. But in the ER model, we cannot ensure that. A midwife is possible to work in an institution other than a clinic or a birthing center.

- Back-up midwife should be assigned midway through the pregnancy. But in the ER model, it is possible that primary midwife and backup midwife are assigned to parents simultaneously.

- In the ER model, we are unable to show whether or not the primary midwife is replaced by a backup midwife at some point of time.

- We are unable to show the exact point of time at which the parents make decision on the location of birth.

Relational Translation

midwife (<u>practitionerid</u>, mwfname, mwfemail, mwfphonenum, instid,
      foreign key (instid) references institution (instid))

institution (<u>instid</u>, instname, addr, instphonenum, instemail, website,
      foreign key (instname) references institution (name),
      foreign key (instphonenum) references institution (phonenum),
      foreign key (instemail) references institution (email))

backup (<u>primary_pracid</u>, backup_pracid,
      foreign key (primary_pracid) references midwife (practitionerid),
      foreign key (backup_pracid) references midwife (practitionerid))

infosession (<u>practitionerid, datetime</u>, lang,
      foreign key (practitionerid) references midwife (practitionerid))

mother (<u>mcardid,</u> expbirthframe, mname, mbirth, maddr, mphonenum, memail, mprof)

father (<u>fatherid</u>, fname, fbirth, fphonenum, fprof, fother)

registered_prnt (<u>parentid, mcardid, fatherid,</u>
      foreign key (mcardid) references mother (mcardid),
      foreign key (fatherid) references father (fatherid))

attended_prnt (<u>parentid,</u>
      foreign key (parentid) references registered_prnt (parentid))

attend (<u>parentid, practitionerid, datetime,</u>
      foreign key (parentid) references attended_prnt (parentid),
      foreign key (practitionerid) references midwife (practitionerid),

foreign key (datetime) references infosession (datetime))

interested_prnt (parentid,
    foreign key (parentid) references attended_prnt (parentid))

selected_prnt (parentid,
    foreign key (parentid) references interested_prnt (parentid))

assign (instid, practitionerid, parentid,
    foreign key (instid) references institution (instid),
    foreign key (practitionerid) references midwife (practitionerid),
    foreign key (parentid) references selected_prnt (parentid))

appointment (apptid, datetime)

schedule (apptid, practitionerid, parentid,
    foreign key (apptid) references appointment (apptid),
    foreign key (practitionerid) references midwife (practitionerid),
    foreign key (parentid) references selected_prnt (parentid))

technician (techid, techname, techphonenum)

med_actions (apptid, patient, type, techid, prescrdate, result, donedate,
    foreign key (apptid) references appointment (apptid),
    foreign key (techid) references technician (techid))

sample (apptid, patient, type, takendate,
    foreign key (apptid) references med_actions (apptid),
    foreign key (patient) references med_actions (patient),
    foreign key (type) references med_actions (type))

referral (apptid, patient, type,
    foreign key (apptid) references med_actions (apptid),
    foreign key (patient) references med_actions (patient),
    foreign key (type) references med_actions (type))

notes (apptid, timestmp, content,
    foreign key (apptid) references appointment (apptid))

pregnancy (pregid, fir_duedate, sec_duedate, final_duedate, babynum, mblood, fblood,
birthlocation, pregnumtime, parentid,
    foreign key (parentid) references selected_prnt (parentid))

baby (babyid, babygender, babybirth, babyname, babyblood, babyother, pregid,

foreign key (pregid) references pregnancy (pregid))

- Are there any opportunity to combine relations without introducing redundancy?

    Yes. I combined several relations because there exists key constraint.
    (1) Combine the relationship "work_in" between "midwife" and "institution" into "midwife";
    (2) Combine the relationship "host" between "midwife" and "infosession" into "infosession";
    (3) Combine the relationship "m_belong" between "mother" and "registered_prnt" into "registered_prnt";
    (4) Combine the relationship "f_belong" between "father" and "registered_prnt" into "registered_prnt";
    (5) Combine the relationship "prescribe" between "appointment" and "med_actions" into "med_actions";
    (6) Combine the relationship "attach" between "appointment" and "notes" into "notes";
    (7) Combine the relationship "conduct" between "technician" and "med_actions" into "med_actions";
    (8) Combine the relationship "have_preg" between "pregnancy" and "selected_prnt" into "pregnancy";
    (9) Combine the relationship "give_birth_to" between "baby" and "pregnancy" into "baby".

- Any ER model aspects that your relational model does not capture?

    Yes. The participation constraints without key constraints with it are not captured.
    (1) The participation constraint of "mother" in the relationship "m_belong" is not captured;
    (2) The participation constraint of "father" in the relationship "f_belong" is not captured;
    (3) The participation constraint of "attended_prnt" in the relationship "attend" is not captured;
    (4) The participation constraint of "selected_prnt" in the relationship "assign" is not captured;
    (5) The participation constraint of "appointment" in the relationship "schedule" is not captured;
    (6) The participation constraint of "selected_prnt" in the relationship "have_preg" is not captured;
    (7) The participation constraint of "pregnancy" in the relationship "give_birth_to" is not captured.