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Goal goal = game.getGoal();
if (!goal.isReached(game)) {
    // increment time
    long elapsedTime = game.getElapsedTime() + increment;
    game.setElapsedTime(elapsedTime);

    // equipment variables
    Patient patient = game.getPatient();
    Equipment equipment = game.getEquipment();
    PhysiologicMonitorComponent physiologicMonitor = (PhysiologicMonitorComponent)equipment
        .getComponent(PhysiologicMonitorComponent.class);
    CDIMonitorComponent cdiMonitor = (CDIMonitorComponent)equipment
        .getComponent(CDIMonitorComponent.class);
    PumpComponent pump = (PumpComponent)equipment
        .getComponent(PumpComponent.class);
    TubeComponent tube = (TubeComponent)equipment
        .getComponent(TubeComponent.class);
    OxygenatorComponent oxygenator = (OxygenatorComponent)equipment
        .getComponent(OxygenatorComponent.class);
    VentilatorComponent ventilator = (VentilatorComponent)equipment
        .getComponent(VentilatorComponent.class);
    HeaterComponent heater = (HeaterComponent)equipment
        .getComponent(HeaterComponent.class);
    BubbleDetectorComponent bubbleDetector = (BubbleDetectorComponent)equipment
        .getComponent(BubbleDetectorComponent.class);
    PressureMonitorComponent pressureMonitor = (PressureMonitorComponent)equipment
        .getComponent(PressureMonitorComponent.class);
    AlarmIndicatorComponent alarmIndicator = (AlarmIndicatorComponent)equipment
        .getComponent(AlarmIndicatorComponent.class);

    // update equipment (physiologic monitor)
    physiologicMonitor.setHeartRate(patient.getHeartRate());
    physiologicMonitor.setO2Saturation(patient.getO2Saturation());
    physiologicMonitor.setDiastolicBloodPressure(patient.getDiastolicBloodPressure());
    physiologicMonitor.setSystolicBloodPressure(patient.getSystolicBloodPressure());

    // update equipment (tubing)
    double cdiPo2 = cdiMonitor.getPO2();
    double tubeSaO2 = 0;
    if (cdiPo2 != 0) {
        // see (b) in "Oxyhemoglobin Dissociation Curve.xls"
        tubeSaO2 = 1 / ((23400 / ((cdiPo2 * cdiPo2 * cdiPo2) + (150 * cdiPo2))) + 1);
    }
    tube.setSaO2(tubeSaO2);
    tube.setSvO2(tube.getSaO2() * 0.75);
    tube.setPreMembranePressure((pump.getFlow() * 400) + (oxygenator.getClotting() * 50));
    tube.setPostMembranePressure(tube.getPreMembranePressure() - 40);
    if ((pump.getPumpType() == PumpType.ROLLER) && (pump.isOn()) && (!tube.isVenusAOpen())) {
        tube.setVenousPressure(-100);
    }
    else {
        tube.setVenousPressure(0);
    }
    if (!tube.isArterialAOpen()) {
        tube.setArterialBubbles(true);
    }
    if ((!tube.isArterialBOpen()) && (!tube.isBridgeOpen())) {
        tube.setArterialBubbles(true);
    }
    if ((tube.getVenousPressure() < -75) && (pump.isOn())) {
        tube.setVenusBubbles(true);
    }
    else if (pump.isOn()) {
        tube.setVenusBubbles(false);
    }
}

// update equipment (pressure monitor)
pressureMonitor.setPreMembranePressure(tube.getPreMembranePressure());
pressureMonitor.setPostMembranePressure(tube.getPostMembranePressure());
pressureMonitor.setVenousPressure(tube.getVenousPressure());

// update equipment (bubble detector)
bubbleDetector.setAlarm(tube.isArterialBubbles());

// update equipment (CDI monitor)
cdiMonitor.setSaO2(tube.getSaO2());
cdiMonitor.setSvO2(tube.getSvO2());
cdiMonitor.setTemperature(heater.getTemperature());
cdiMonitor.setHct(patient.getHct());
cdiMonitor.setHgb(patient.getHgb());
cdiMonitor.setHCO3(patient.getHCO3());

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cdiMonitor.setBE(patient.getBE());
cdiMonitor.setPH(patient.getPH());
cdiMonitor.setPO2((oxygenator.getFiO2() * 600) + (oxygenator.getO2Flow() * 10));
cdiMonitor.setPCO2(patient.getPCO2());

// update equipment (pump)
if (bubbleDetector.isAlarm() || pressureMonitor.isAlarm()) {
    // turn off the pump
    pump.setOn(false);
}
if ((pump.getFlow() < (0.02f * patient.getWeight())) || (!pump.isOn())) {
    pump.setAlarm(true);
}

// update equipment (alarm)
boolean alarm = false;
if (pressureMonitor.isAlarm()) {
    alarm = true;
}
if (bubbleDetector.isAlarm()) {
    alarm = true;
}
if (pump.isAlarm()) {
    alarm = true;
}
if (oxygenator.isAlarm()) {
    alarm = true;
}
if (heater.isAlarm()) {
    alarm = true;
}
alarmIndicator.setAlarm(alarm);

// update patient
double po2 = oxygenator.getFiO2() * oxygenator.getO2Flow() * pump.getFlow() * 100;
double patientSaturation = 0;
if (po2 != 0) {
    // see (b) in "Oxyhemoglobin Dissociation Curve.xls"
    patientSaturation = 1 / ((23400 / ((po2 * po2 * po2) + (150 * po2))) + 1);
}
patient.setO2Saturation(patientSaturation);
patient.setPCO2(40 + oxygenator.getCo2Flow() * 25);
patient.setPO2((oxygenator.getFiO2() * (760 - 47)) - (patient.getPCO2() / 0.8));
}

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