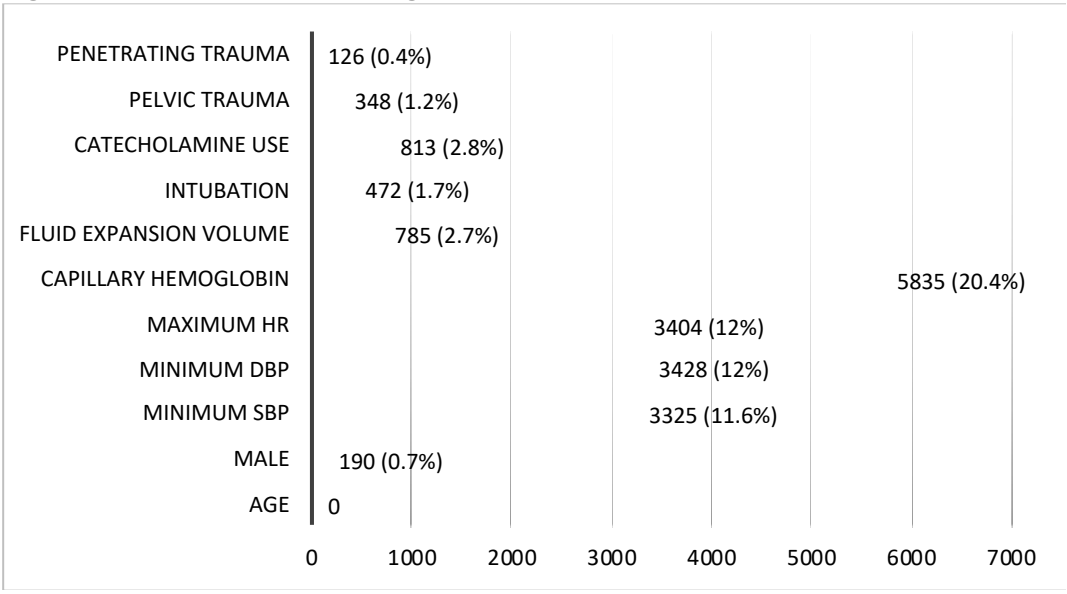
Supplementary Material

Figure 1: distribution of missing data



SBP= systolic blood pressure; DBP= diastolic blood pressure; HR=heart rate

Figure 2: Distribution in training, validation and test set before/ after undersampling

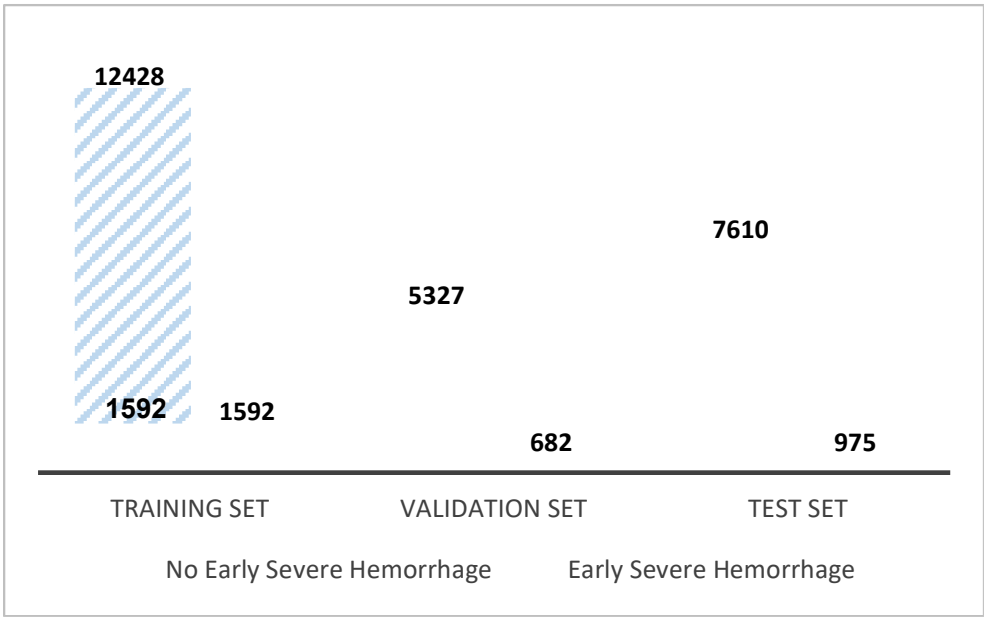


Figure 3 : Formula Bayes Risk Theory & Metrics

Formula a: Bayes Minimum Risk theory formulas for recalibration

$$p'^{calibrated} = \frac{\delta p}{(\delta - 1)p + 1}$$

$$t'^{calibrated} = \frac{\delta t}{(\delta - 1)t + 1}$$

$$with\ \delta = \frac{N\ (ESH)}{N\ (No\ ESH)}$$

$$with\ p\ the\ probability\ to\ be\ part\ of\ tthe\ HS\ group\ and\ t\ the\ threshold$$

Formula b: F-4 score

$$\boldsymbol{F4 - Score:\ \ F\beta = \left(1 + \beta^2\right)\frac{Pre\ .\ Se}{(\beta^2.Pre) + Se}}$$

$$\boldsymbol{with\ \beta = 4}$$

$$\boldsymbol{with\ Pre\ the\ precision\ and\ Se\ the\ sensitivity}$$

Formula c: Accurracy

$$Accuracy\colon\ Acc = \frac{TP\ +\ TN}{TP\ +\ TN\ +\ FP\ +\ FN}$$

$$with\ TP\colon True\ Positive, TN\colon True\ Negative, FP\colon False\ Positive, FN\colon False\ Negative$$

Formula d: Precision

$$Precision\colon\ Pre = \frac{TP}{TP\ +\ FP}$$

$$with\ TP\colon True\ Positive, TN\colon True\ Negative, FP\colon False\ Positive, FN\colon False\ Negative$$

Formula e: Sensitivity/ Recall

$$Sensitivity\colon\ Se = \frac{TP}{TP\ +\ FN}$$

$$with\ TP\colon True\ Positive, TN\colon True\ Negative, FP\colon False\ Positive, FN\colon False\ Negative$$

Formula f: Specificity

$$Specificity\colon\ Sp = \frac{TN}{TN\ +\ FP}$$

$$with\ TP\colon True\ Positive, TN\colon True\ Negative, FP\colon False\ Positive, FN\colon False\ Negative$$

Formula e: Positive Likelihood Ratio

$$Positive\ Likelihood\ Ratio\colon LR{+}= \frac{Se}{1 - Sp}$$

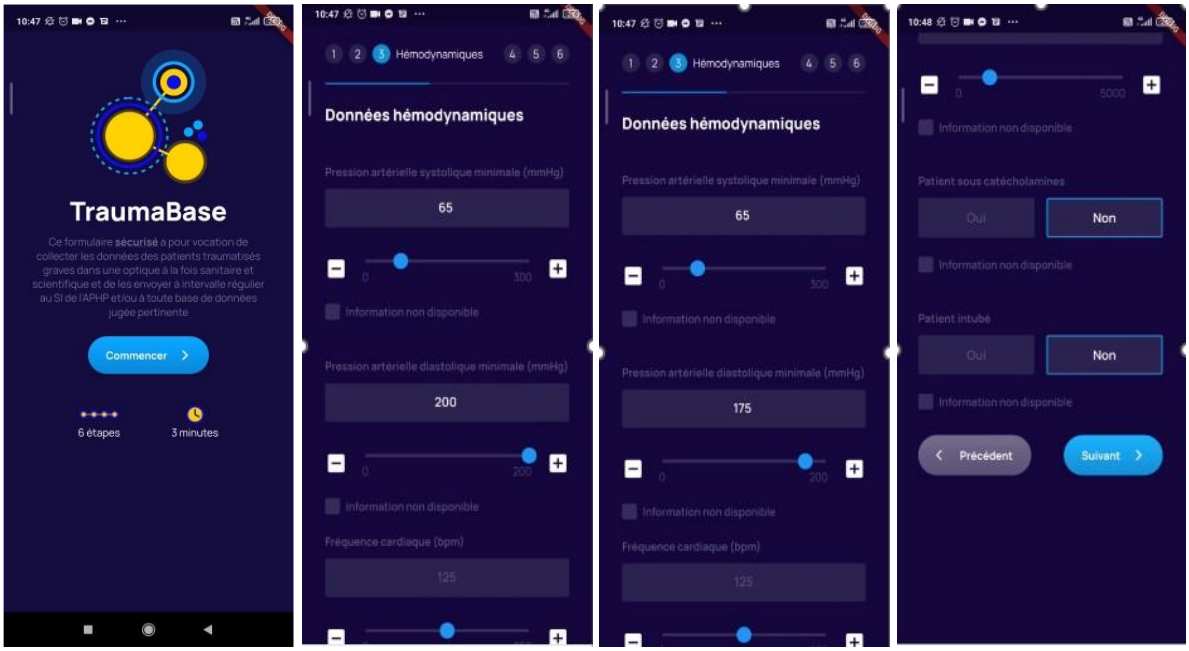
$$with\ Se\ the\ sensitivity\ and\ SP\ the\ specificity$$

Formula f: Negative Likelihood Ratio

$$Negative\ Likelihood\ Ratio\colon LR{-}= \frac{1\ - Se}{Sp}$$

$$with\ Se\ the\ sensitivity\ and\ SP\ the\ specificity$$

Figure 4: Android Screenshot smartphone application



Questionnaire Shockmatrix Pilot Study

Acceptability

1) On a scale from 1 to 10 how do you rate your global satisfaction with the smartphone tool?
2) On a scale from 1 to 10 how do you rate the clinical usefulness of the tool?
3) On a scale from 1 to 10 how do you rate your interest in the project?
4) On a scale from 1 to 10 how do you rate the clinical usefulness of the tool?
5) On a scale from 1 to 10 how likely will you use it?
6) On a scale from 1 to 10 how do you rate the acceptability by patients?

Ergonomics

1) On a scale from 1 to 10 how do you rate tactile responsiveness of the tool?
2) On a scale from 1 to 10 how well is the screen to read?
3) On a scale from 1 to 10 how do you rate the global user-friendliness?

Data quality

1) On a scale from 1 to 10 how do you rate the quality of the collected prehospital data?
2) On a scale from 1 to 10 how complete do you consider the transmitted information to be?

Recruitment

1) On a scale from 1 to 10 how do you rate the targeted rate of inclusion as realistic?
2) On a scale from 1 to 10 did your center meet the targeted rate of inclusion?

Protocol implementation

1) On a scale from 1 to 10 in your center, were you able to perform the concordance between the smartphone tool and included patients?
2) On a scale from 1 to 10 in your center, were you able to include the patients before admission?
3) On a scale from 1 to 10 to what extent your clinical activity was NOT affected by the study?
4) On a scale from 1 to 10 how often did the capture of the prehospital information NOT exceed 2 minutes?
5) On a scale from 1 to 10 how do you rate the global clinical functionality of the prediction tool?
6) On a scale from 1 to 10 how do you rate the clinical applicability of the protocol?