Table S1. Family history of DCM and overview of genetic screening performed within the Maastricht Dilated Cardiomyopathy cohort, stratified by No Inter-atrial block (IAB), IAB and AF.

|                                      | Total N=469 | No IAB N=108 | IAB N=291 | AF N=70 | p-value |
|--------------------------------------|-------------|--------------|-----------|---------|---------|
| Family History DCM, n (%)            | 61 (13%)    | 12 (11%)     | 37 (13%)  | 12 (17%)| 0.491   |
| Genetic screening, n(%)              | 245 (52%)   | 52 (48%)     | 157 (54%) | 36 (51%)| 0.581   |
| Known LPP mutation, n(%)             | 47 (10%)    | 7 (6%)       | 31 (11%)  | 9 (13%) | 0.384   |
| Known LPP TTN mutation, n(%)         | 23 (5%)     | 3 (3%)       | 17 (6%)   | 3 (4%)  | 0.541   |
| Known LPP PLN mutation, n(%)         | 1 (0.2%)    | -            | 1 (0.3%)  | -       | 0.999   |
| Known LPP LMNA mutation, n(%)        | 2 (0.4%)    | -            | 2 (0.7%)  | -       | 0.999   |
| Known LPP FLNC mutation, n(%)        | -           | -            | -         | -       | -       |

For genetic screening our previously described cardiomyopathy-associated gene panel was used (including 47 genes). Found variants were validated with Sangeq sequencing and labeled as Likely Pathogenic/Pathogenic (LPP) based on the latest criteria of the American College of Medical Genetics and the association of molecular pathology. DCM= dilated cardiomyopathy; FLNC= Filamin C; LMNA= Lamin A/C mutation ; PLN= phospholamban mutation;
Table S2. Family history of DCM and overview of genetic screening performed within the Maastricht Dilated Cardiomyopathy cohort, stratified by the occurrence of Life-Threatening Arrhythmias (LTA) and No LTA.

|                                | Total N=469 | No LTA N=420 | LTA N=49 | p-value  |
|--------------------------------|-------------|--------------|----------|----------|
| Family History DCM, n (%)     | 61 (13%)    | 46 (11%)     | 15 (31%) | < 0.001  |
| Genetic screening, n(%)       | 245 (52%)   | 218 (52%)    | 27 (55%) | 0.784    |
| Known LPP mutation, n(%)      | 47 (10%)    | 41 (10%)     | 6 (12%)  | 0.868    |
| Known LPP TTN mutation, n(%)  | 23 (5%)     | 20 (5%)      | 3 (6%)   | 0.946    |
| Known LPP PLN mutation, n(%)  | 1 (0.2%)    | 1 (0.2%)     | -        | 0.999    |
| Known LPP LMNA mutation, n(%) | 2 (0.4%)    | 2 (0.4%)     | -        | 0.999    |
| Known LPP FLNC mutation, n(%) | -           | -            | -        | -        |

For genetic screening our previously described cardiomyopathy-associated gene panel was used (including 47 genes)\textsuperscript{16}. Found variants were validated with Sangeq sequencing and labeled as Likely Pathogenic/Pathogenic (LPP) based on the latest criteria of the American College of Medical Genetics and the association of molecular pathology\textsuperscript{25}. DCM= dilated cardiomyopathy; FLNC= Filamin C; LMNA= Lamin A/C mutation; PLN= phospholamban mutation.
The digital calipers were used across all leads of the ECGs to define the limits of the P-wave interval. All intervals were then measured in ms: Partial IAB was defined as P-wave duration > 120 ms, and advanced IAB as P-wave duration > 120 ms and biphasic morphology (firstly positive and negative afterwards) of P-wave in leads II, III and aVF. In-between cases where a biphasic morphology was observed in leads III and aVF but not in lead II were interpreted as advanced IAB.
Figure S2. Univariable overview of Hazard Ratios (HR) for the study endpoint (life-threatening arrhythmias), all dichotomized variables variable in the main article are here shown as continuous variables.

| univariable unadjusted | HR [95%-CI]     | P-value |
|------------------------|------------------|---------|
| Age, years             | 0.99 [0.97 - 1.01] | 0.252   |
| Female                 | 0.92 [0.50 - 1.68] | 0.781   |
| NYHA≥3                 | 1.67 [0.77 - 3.63] | 0.192   |
| FH CMP                 | 3.10 [1.66 - 5.79] | <0.001  |
| NTproBNP, pmolL⁻¹      | 1.00 [1.00 - 1.00] | 0.704   |

**Medical history**

|                     | HR [95%-CI]     | P-value |
|---------------------|------------------|---------|
| HFH                 | 0.91 [0.43 - 1.92] | 0.807   |
| DM                  | 0.48 [0.14 - 1.59] | 0.224   |
| (near) Syncope      | 0.96 [0.48 - 1.92] | 0.913   |
| Cardiac arrest      | 2.63 [0.61 - 11.31] | 0.188   |

**Medication**

|                     | HR [95%-CI]     | P-value |
|---------------------|------------------|---------|
| BB                  | 1.67 [0.84 - 3.34] | 0.139   |
| ≥50%OMT             | 1.79 [0.99 - 3.23] | 0.054   |
| ARB/ACEi            | 0.86 [0.45 - 1.65] | 0.648   |
| ≥50%OMT             | 0.95 [0.51 - 1.77] | 0.862   |
| MRA                 | 1.89 [1.03 - 3.44] | 0.039   |
| ≥50%OMT             | 1.74 [0.93 - 3.25] | 0.083   |

**Physical examination**

|                     | HR [95%-CI]     | P-value |
|---------------------|------------------|---------|
| BMI, kgm⁻²          | 1.04 [0.99 - 1.10] | 0.096   |
| HR, bpm             | 0.98 [0.96 - 1.00] | 0.056   |
| SBP, mmHg           | 1.00 [0.98 - 1.01] | 0.610   |
| DBP, mmHg           | 1.00 [0.97 - 1.02] | 0.832   |

**Echocardiography**

|                     | HR [95%-CI]     | P-value |
|---------------------|------------------|---------|
| LVEF, %             | 0.98 [0.95 - 1.00] | 0.085   |
| LVEDDI, mm³         | 1.05 [0.99 - 1.10] | 0.104   |
| LAVI, ml/m²         | 1.01 [0.99 - 1.03] | 0.203   |
| LVMI, gm²           | 1.01 [1.00 - 1.02] | 0.007   |

**Electrocardiography**

|                     | HR [95%-CI]     | P-value |
|---------------------|------------------|---------|
| No IAB (ref)        |                 |         |
| IAB                 | 5.23 [1.56 - 17.57] | 0.009   |
| AF                  | 7.05 [1.90 - 26.18] | 0.004   |
| QRS, ms             | 1.01 [1.00 - 1.02] | 0.046   |
| QTC, ms             | 1.00 [0.99 - 1.01] | 0.743   |

ACEi=Angiotensin-converting enzyme inhibitor; AF= atrial fibrillation; ARB=Angiotensin receptor blocker; BMI=Body Mass Index; bpm=beats per minute; CI= confidence interval; DBP=diastolic blood pressure; DCM=dilated cardiomyopathy; DM=diabetes mellitus; FH CMP=self-reported family history of cardiomyopathy; HFH=heart failure hospitalization; HR= heart rate; IAB= inter-atrial block; LAVI=left atrial volume index; LVEDDI=left ventricular end diastolic diameter indexed by body surface area; LVEF=left ventricular ejection fraction; LVH=left ventricular hypertrophy (LVMI≥95 in women or LVMI≥115 in men); LVMI=left ventricular mass indexed by body surface area; MRA=mineralocorticoid receptor antagonist; NT-proBNP= N-terminal-pro hormone Brain Natriuretic Peptid; NYHA=New York Heart Association classification; OMT=percentage of optimal medical heart failure therapy in line with the ESC 2016 guidelines(5); ref=reference; SBP=systolic blood pressure.
Figure S3. Multivariable overview (applying backward selection on the variables shown in Figure S2) of Hazard Ratios (HR) for the study endpoint (life-threatening arrhythmias).

| multivariable adjusted | HR [95%-CI]         | P-value |
|------------------------|---------------------|---------|
| FH CMP                 | 2.88 [1.47 - 5.65]  | 0.003   |
| LVMI, gm^{-2}         | 1.01 [1.00 - 1.02]  | 0.013   |

**P morphology**

|         | HR [95%-CI]         | P-value |
|---------|---------------------|---------|
| No IAB (ref) |                     |         |
| IAB     | 4.10 [1.20 - 14.06] | 0.026   |
| AF      | 4.97 [1.30 - 19.03] | 0.020   |

AF= atrial fibrillation; FH CMP=self-reported family history of cardiomyopathy; IAB= inter-atrial block.
Figure S4. Univariable overview of Hazard Ratios (HR) for the study endpoint (life-threatening arrhythmias) performed on the not imputed dataset of the Maastricht Dilated Cardiomyopathy Registry.

| univariable unadjusted | N   | HR [95%-CI]       | P-value |
|------------------------|-----|-------------------|---------|
| Age≥57years            | 228 | 0.76 [0.42 - 1.37] | 0.358   |
| Female                 | 165 | 0.92 [0.50 - 1.68] | 0.781   |
| NYHA≥3                 | 53  | 1.67 [0.77 - 3.63] | 0.192   |
| FH CMP                 | 61  | 3.10 [1.66 - 5.79] | <0.001  |
| NT-proBNP≥105pmol/L    | 193 | 0.97 [0.54 - 1.76] | 0.930   |
| **Medications**        |     |                   |         |
| ACEi                   |     |                   |         |
| ARB/ACEi               |     |                   |         |
| ≥50%OMT                |     |                   |         |
| ARB/ACEi               |     |                   |         |
| ≥50%OMT                |     |                   |         |
| MRA                    |     |                   |         |
| ≥50%OMT                |     |                   |         |
| **Physical examination** |   |                   |         |
| BMI≥26kg/m             | 240 | 1.14 [0.64 - 2.04] | 0.644   |
| VentRate_HE75          | 242 | 0.72 [0.40 - 1.29] | 0.262   |
| SBP≥132mmHg            | 233 | 0.91 [0.49 - 1.66] | 0.765   |
| DBP≥79mmHg             | 222 | 0.71 [0.39 - 1.29] | 0.257   |
| **Echocardiography**   |     |                   |         |
| LVEF≤35%               | 304 | 1.69 [0.86 - 3.29] | 0.123   |
| LVEDD<30               | 244 | 1.44 [0.80 - 2.61] | 0.223   |
| LAVI<39mLm             | 210 | 0.85 [0.46 - 1.58] | 0.614   |
| LVH                    | 227 | 2.67 [1.38 - 5.16] | 0.003   |

**Electrocardiography**

| P morphology          |     |                   |         |
| No IAB (ref)          | 108 |                   |         |
| IAB                   | 291 | 5.23 [1.56 - 17.57] | 0.009   |
| AF                    | 70  | 7.05 [1.90 - 26.18]| 0.004   |
| QRS<120ms             | 247 | 1.90 [1.06 - 3.39] | 0.031   |
| QTc<500ms             | 47  | 1.08 [0.42 - 2.80] | 0.869   |

ACEi=Angiotensin-converting enzyme inhibitor; AF= atrial fibrillation; ARB=Angiotensin receptor blocker; BMI=Body Mass Index; bpm=beats per minute; CI= confidence interval; DBP=diastolic blood pressure; DCM=dilated cardiomyopathy; DM=diabetes mellitus; FH CMP=self-reported family history of cardiomyopathy; HFH=heart failure hospitalization; HR= heart rate; IAB= inter-atrial block; LAVI=left atrial volume index; LVEDDI=left ventricular end-diastolic diameter indexed by body surface area; LVEF=left ventricular ejection fraction; LVH=left ventricular hypertrophy (LVMI≥95 in females or LVMI≥115 in males); LVMI=left ventricular mass indexed by body surface area; MRA=mineralocorticoid receptor antagonist; NT-proBNP= N-terminal-pro hormone Brain Natriuretic Peptide; NYHA=New York Heart Association classification; OMT=percentage of optimal medical heart failure therapy in line with the ESC 2016 guidelines(5); ref=reference; SBP=systolic blood pressure.
Figure S5. Multivariable overview (applying backward selection on the dataset of subjects that had no missing data on the univariable associated variables with the study endpoint: N=438 in which N=46 LTA events occurred) of Hazard Ratios (HR) for the study endpoint (life-threatening arrhythmias), with P-morphology stratified as No IAB (PWD≤120ms), IAB (PWD>120ms), or AF.

| multivariable adjusted | N  | HR [95% CI]   | P-value |
|------------------------|----|--------------|---------|
| FH CMP                 | 52 | 2.97 [1.55 - 5.71] | 0.001   |
| LVH                    | 227| 2.95 [1.52 - 5.73] | 0.001   |
| **P morphology**       |    |              |         |
| No IAB (ref)           | 101|              |         |
| IAB                    | 269| 4.60 [1.41 - 15.03] | 0.012   |
| AF                     | 68 | 5.86 [1.60 - 21.50] | 0.008   |

AF= atrial fibrillation; CI= confidence interval; FH CMP=self-reported family history of dilated cardiomyopathy; IAB= inter-atrial block; LVH=left ventricular hypertrophy (LVMI≥95 in females or LVMI≥115 in men); PWD= P-wave duration; ref= reference.
Figure S6. Kaplan–Meier curves of survival free of life-threatening arrhythmias stratified by the presence or absence of interatrial block (IAB), in the presence or absence of Left Atrial (LA) enlargement (defined as a Left Atrial volume indexed by body surface area higher than the median of 40 as observed in current population) in the derivation cohort.

The survival distribution was significantly (P=0.035) different for IAB with an enlarged LA (IAB, LAVI>40) compared to No IAB with enlarged LA (No IAB, LAVI>40) after Bonferroni correction for multiple comparison. No significant difference (P>0.05) was observed.
Figure S7. Penalized univariable Spline analysis (df=2) of the association between P-wave duration (PWD) and 10y risk of life-threatening arrhythmias.

In the a) Maastricht Dilated Cardiomyopathy cohort, and b) Utrecht cardiomyopathy cohort (UNRAVEL). The orange line indicates the estimated hazard-ratios, blue shows the related 95%-Standard Error. The density plots at the bottom (shown in gray) show the distribution of the PWD within the cohorts. The estimated HR was equal to 1 at a PWD of 128ms and 125ms in the Maastricht Dilated Cardiomyopathy cohort and Utrecht cardiomyopathy cohort (UNRAVEL), respectively.
Figure S8. a) Kaplan–Meier curves of survival free of life-threatening arrhythmias stratified by No interatrial block (IAB), IAB, and Atrial Fibrillation (AF) performed on the pooled data of the Maastricht Dilated Cardiomyopathy cohort and the Utrecht Cardiomyopathy cohort (UNRAVEL). The survival distribution between the groups was significantly different ($P<0.001$, $\chi^2=16.8$). This difference was significantly different for both IAB or AF vs No IAB ($P=0.002$ and $P<0.001$, respectively), but not for IAB vs AF ($P=0.551$) after applying Bonferroni correction.

b) Kaplan–Meier curves of survival free of life-threatening arrhythmias stratified by No interatrial block (IAB), Partial IAB, Advanced IAB, and Atrial Fibrillation (AF) performed on the pooled data of the Maastricht Dilated Cardiomyopathy cohort and the Utrecht Cardiomyopathy cohort (UNRAVEL). The survival distribution between the groups was significantly different ($P<0.001$, $\chi^2=18.6$). This difference was significantly different for Partial IAB, Advanced IAB or AF vs No IAB ($P=0.012$, $P=0.002$, $P<0.001$, respectively), but not for Partial IAB vs Advanced IAB ($P=0.999$) after applying Bonferroni correction.