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**MORTALITY EXPERIENCE: SYSTOLIC HEART  
MURMURS AND PEPTIC ULCER**

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**SYSTOLIC HEART MURMURS**

We recently added another three years of mortality experience to an earlier Prudential study of male applicants classified on examination as having a systolic heart murmur at the apex. The study covers issues of the years 1950-62. The actual mortality from issue to the anniversary in 1966 was compared to the expected mortality by the 1955-60 Male Select Basic Table.

It appears from Table 1 that applicants with functional murmurs are not standard risks at the older issue ages. The experience for policy-year durations 1-2 was 167 per cent, based on twenty deaths. Presumably the experience by ages at issue and for durations 1-5 would show somewhat higher ratios if the early duration experience under issue years 1963-65 were included in the study.

Although rating classifications in Table 2 differed by age and varied somewhat over the thirteen issue years, it is believed that the over-all mortality ratio of 214 per cent for organic murmurs is close to the expected for the average of the assigned ratings. Some issues carried slightly increased ratings or had minor debits because of other impairments, mostly hypertension or cardiac arrhythmia. The portion of the issues in which there was no other impairment, even minor, experienced a mortality of 282 per cent, based on seventy-three deaths. We have been unable to determine any specific reason for this higher ratio. Possibly, when other circulatory impairments are present, examiners and underwriters tend to classify a murmur as organic which, in the absence of any other impairment, would be classified as functional. The higher ratio may thus represent the mortality of true organic murmurs, with the lower ratio for all issues resulting from the inclusion of some murmurs which were not organic.

**PEPTIC ULCER**

This study covered Prudential issues of 1952-63, male lives only, exposed from issue to policy anniversary in 1965. Expected deaths were calculated on the 1955-60 Male Select Basic Table.

For the first five policy years in Table 4 the extra deaths were 0.70 per 1,000 years of exposure. There was also a small group of policies with this

impairment which were given permanent percentage ratings. This group experienced a mortality of 155 per cent based on forty-seven deaths; half of the exposure (as against one-third for the temporary extra premium cases) was at issue ages 40 and over, with thirty-nine deaths and a ratio of 157 per cent which increased by duration.

The label "peptic ulcer" means that the precise location of the ulcer was unknown at underwriting time. The higher ratios in Table 5, compared to those for ulcers known to be duodenal in Table 4, suggest that the "peptic ulcer" label represents inadequate underwriting information. Presumably, more complete details would have revealed some gastric ulcer or complicated duodenal ulcer histories.

TABLE 1  
FUNCTIONAL APICAL SYSTOLIC MURMUR  
(Standard Male Issues 1950-62, Exposed to 1966; Expected Deaths  
by the 1955-60 Male Select Basic Table)

| EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
| Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 0-39.....                  | 32                               | 94                         | 1-5.....               | 49                               | 140                        |
| 40-64.....                 | 57                               | 152                        | 6-16.....              | 40                               | 110                        |
| 0-64.....                  | 89                               | 124                        | Ages 40-64 at issue:   |                                  |                            |
|                            |                                  |                            | 1-5.....               | 29                               | 165                        |
|                            |                                  |                            | 6-16.....              | 28                               | 140                        |

TABLE 2  
ORGANIC APICAL SYSTOLIC MURMUR  
(Substandard Male Issues 1950-62, Exposed to 1966; Expected Deaths  
by the 1955-60 Male Select Basic Table)

| EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
| Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 15-39.....                 | 51                               | 244                        | 1-5.....               | 59                               | 201                        |
| 40-49.....                 | 59                               | 253                        | 6-16.....              | 89                               | 224                        |
| 50-64.....                 | 38                               | 153                        |                        |                                  |                            |
| 15-64.....                 | 148                              | 214                        |                        |                                  |                            |

TABLE 3

## DUODENAL ULCER WITHOUT OPERATION—STANDARD ISSUES

| ATTACK WITHIN: | EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
|                | Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 1-2 years....  | {20-39                     | 18                               | 87                         | 1-5                    | 28                               | 84                         |
|                | {40 up                     | 28                               | 92                         | 6-13                   | 18                               | 101                        |
|                | All                        | 46                               | 90                         | .....                  | .....                            | .....                      |
| 3-5 years....  | {20-39                     | 56                               | 124                        | 1-5                    | 79                               | 96                         |
|                | {40 up                     | 88                               | 100                        | 6-13                   | 65                               | 126                        |
|                | All                        | 144                              | 108                        | .....                  | .....                            | .....                      |
| 6-10 years...  | {20-39                     | 21                               | 96                         | 1-5                    | 60                               | 110                        |
|                | {40 up                     | 69                               | 112                        | 6-13                   | 30                               | 103                        |
|                | All                        | 90                               | 108                        | .....                  | .....                            | .....                      |
| 1-10 years...  | {20-39                     | 95                               | 108                        | 1-5                    | 167                              | 99                         |
|                | {40 up                     | 185                              | 103                        | 6-13                   | 113                              | 115                        |
|                | All                        | 280                              | 105                        | .....                  | .....                            | .....                      |

TABLE 4

DUODENAL ULCER WITHOUT OPERATION—ISSUES WITH  
TEMPORARY EXTRA PREMIUM  
(Attack within 1-2 Years)

| EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
| Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 20-39.....                 | 51                               | 126                        | 1-5.....               | 94                               | 137                        |
| 40 up.....                 | 87                               | 124                        | 6-13.....              | 44                               | 104                        |
| All.....                   | 138                              | 125                        |                        |                                  |                            |

**TABLE 5**  
**PEPTIC ULCER WITHOUT OPERATION—STANDARD ISSUES**

| ATTACK WITHIN: | EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
|                | Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 1-2 years....  | All                        | 17                               | 173                        | .....                  | .....                            | .....                      |
| 3-5 years....  | All                        | 54                               | 175                        | .....                  | .....                            | .....                      |
| 6-10 years.... | All                        | 28                               | 122                        | .....                  | .....                            | .....                      |
| 1-5 years....  | {20-39                     | 28                               | 177                        | 1-5                    | 48                               | 184                        |
|                | {40 up                     | 43                               | 173                        | 6-13                   | 23                               | 160                        |
|                | All                        | 71                               | 175                        | .....                  | .....                            | .....                      |
| 1-10 years...  | {20-39                     | 36                               | 164                        | 1-5                    | 68                               | 161                        |
|                | {40 up                     | 63                               | 151                        | 6-13                   | 31                               | 146                        |
|                | All                        | 99                               | 156                        | .....                  | .....                            | .....                      |

**TABLE 6**  
**DUODENAL ULCER WITH OPERATION—S AND SS ISSUES\***

| OPERATION WITHIN: | EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|-------------------|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
|                   | Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 1-2 years....     | {20-39                     | 17                               | 281                        | 1-5                    | 36                               | 213                        |
|                   | {40 up                     | 39                               | 173                        | 6-13                   | 20                               | 172                        |
|                   | All                        | 56                               | 196                        | .....                  | .....                            | .....                      |
| 3-5 years....     | {20-39                     | 12                               | 135                        | 1-5                    | 43                               | 145                        |
|                   | {40 up                     | 58                               | 140                        | 6-13                   | 27                               | 130                        |
|                   | All                        | 70                               | 139                        | .....                  | .....                            | .....                      |
| 6-10 years....    | {20-39                     | 14                               | 258                        | 1-5                    | 35                               | 139                        |
|                   | {40 up                     | 46                               | 143                        | 6-13                   | 25                               | 203                        |
|                   | All                        | 60                               | 160                        | .....                  | .....                            | .....                      |
| 1-10 years...     | {20-39                     | 43                               | 211                        | 1-5                    | 114                              | 159                        |
|                   | {40 up                     | 143                              | 149                        | 6-13                   | 72                               | 161                        |
|                   | All                        | 186                              | 160                        | .....                  | .....                            | .....                      |

\* More than 5 years postoperative, all issues were standard; otherwise, a temporary extra premium was applied except for 27 per cent of the exposure 3-5 years postoperative, which was issued standard. In this 3-5-year postoperative group, cases issued with a temporary extra premium produced a ratio of 149 per cent, based on fifty-three deaths.

The extra deaths per 1,000 years of exposure for Table 6 were as follows:

| OPERATION WITHIN: | POLICY YEARS |      |      |
|-------------------|--------------|------|------|
|                   | 1-5          | 6-13 | 1-13 |
| 1-2 years.....    | 2.78         | 3.55 | 2.97 |
| 3-5 years.....    | 1.19         | 1.62 | 1.30 |
| 6-10 years.....   | 1.16         | 5.80 | 2.11 |
| 1-10 years.....   | 1.59         | 3.25 | 1.99 |

The unfavorable ratio for more than 5-year postoperative standard issues in Table 6 is a persistent phenomenon, as shown by comparison with the same category in the Society of Actuaries Study (see Table 7).

TABLE 7  
IMPAIRMENT STUDY, 1951

| EXPERIENCE BY AGE AT ISSUE |                                  |                            | EXPERIENCE BY DURATION |                                  |                            |
|----------------------------|----------------------------------|----------------------------|------------------------|----------------------------------|----------------------------|
| Ages at Issue              | No. Policies Terminated by Death | Mortality Ratio (Per Cent) | Policy-Year Durations  | No. Policies Terminated by Death | Mortality Ratio (Per Cent) |
| 15-39.....                 | 25                               | 200                        | 1-5.....               | 48                               | 219                        |
| 40-64.....                 | 68                               | 154                        | 6-15.....              | 45                               | 129                        |
| 15-64*.....                | 93                               | 164 ± 11                   |                        |                                  |                            |

\* The current Prudential study for ages 20 and up showed sixty policies terminated by death and a mortality ratio of 160 ± 14 per cent; the Prudential contribution to the 1951 study was eighteen deaths with a ratio of 160 per cent.

It appears that the time elapsed since operation is not too important an underwriting factor. A review of a portion of the claims on 3-10-year post-operative cases did not reveal any information of significant underwriting value. The operative history was gastrectomy in 92 per cent of the claims reviewed. Only one death could be directly attributed to the ulcer history, a postgastrectomy syndrome. Cardiovascular causes represented 43 per cent of the deaths; malignancies (one of the stomach), 20 per cent; accidents, 12 per cent; natural causes in New York,<sup>1</sup> 10 per cent, which is about a normal distribution of causes for standard issues at the ages in this claim sample.

Data for gastric and other ulcer classifications were too meager for study.

<sup>1</sup> Death certificates from New York often certify only that death was not caused by accident, homicide, suicide, or poisoning and was due to natural causes.