EE509

# Healthcare resource utilization and associated costs in patients with advanced Merkel cell carcinoma in Germany: analysis from the MCC TRIM registry study

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## CONCLUSIONS

- This real-world study, conducted within a healthcare system offering universal coverage, provides important insights into healthcare resource utilization (HCRU) patterns and associated costs in patients with advanced Merkel cell carcinoma (aMCC) in Germany
- These nationwide data showed that patients with aMCC are an elderly population (median age, 77 years) with multiple comorbidities, and two-thirds of patients are male
- Healthcare costs per patient per month (PPPM) were highly concentrated in the last few months prior to death and were primarily driven by inpatient care near the end of life
- Future research should assess strategies to reduce costs, such as early supportive care and effective resource planning

## PLAIN LANGUAGE SUMMARY

- Merkel cell carcinoma is a rare skin cancer
- MCC TRIM is a study of people with Merkel cell carcinoma in Germany between 2019 and 2024
- As part of the study, researchers looked at the cost for healthcare systems to care for people with advanced Merkel cell carcinoma
  - Advanced means that the cancer has spread to other parts of the body and cannot be cured
- Researchers collected data from 276 people with advanced Merkel cell carcinoma
- They found that most healthcare costs happened in the last few months of life when people needed to stay in the hospital
- Overall, this information can help with healthcare planning for people with advanced Merkel cell carcinoma

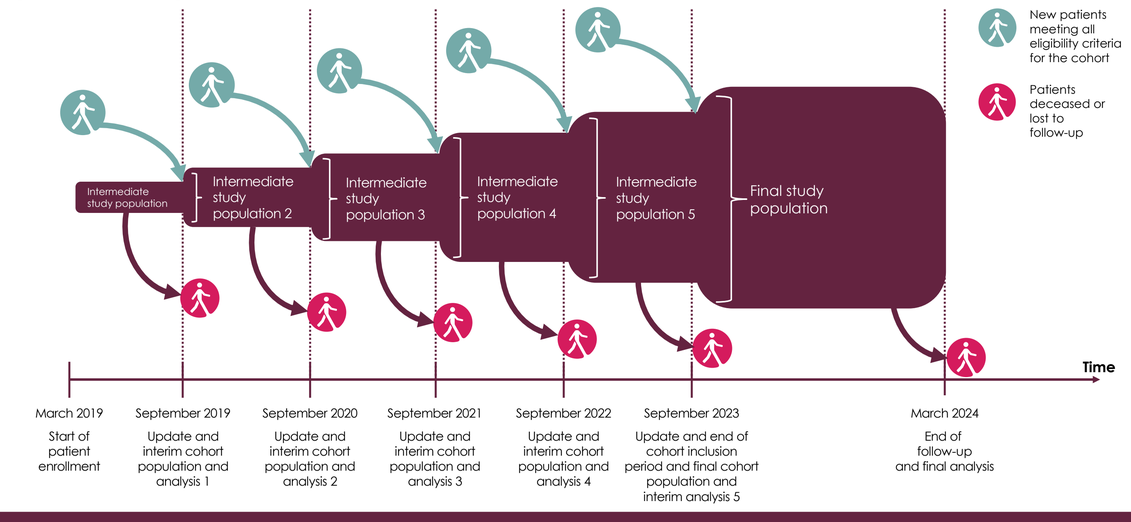
## BACKGROUND

- MCC is a rare and aggressive neuroendocrine cancer of the skin
  - The incidence of MCC is low (0.13/100,000 population in Europe), and it occurs more commonly in males than in females[1]
  - The proportion of patients diagnosed with distant metastatic disease represents 4% to 12% of total MCC cases[1]
- The introduction of immunotherapy (IO), including avelumab, has improved outcomes in patients with aMCC[2,3]
- Limited data are available on HCRU for patients with aMCC in Europe and Germany[4]
- The objective of this study was to quantify HCRU patterns and associated costs in patients with aMCC to inform healthcare planning and resource allocation

## METHODS

- MCC TRIM is a prospective, noninterventional, multicenter registry study that enrolled patients with MCC in Germany between April 2019 and September 2023
  - Primary data obtained from a study-specific electronic case report form and secondary data obtained from the German national skin cancer registry ADOReg were combined
  - The Independent Ethics Committee of University of Duisburg-Essen approved the MCC TRIM protocol on September 28, 2018
  - Data were analyzed from the final data cutoff of the MCC TRIM registry (March 2024)
- For this analysis, patients diagnosed with unresectable stage III or IV MCC were included in the advanced stage analysis set (ASAS)
  - Baseline characteristics were collected when patients were diagnosed with advanced disease
  - Categorical and continuous baseline variables were summarized using descriptive statistics
- Associated costs were obtained from standard unit costs from reference sources in Germany (Einheitlicher Bewertungsmaßstab [EBM] catalog for outpatient services and Diagnosis-Related Groups [DRG] catalog for inpatient services) during the year the resource was used
- Resources evaluated were summarized in 3 groups: inpatient care (hospitalization, intensive care unit [ICU] hospitalization), outpatient care (outpatient visits, emergency department [ED] visits), and procedures (imaging orders, radiotherapy)
  - Drug costs were not considered
- HCRU was assessed as units and standardized by associated direct medical costs PPPM to account for variations in follow-up

**Figure 1. Study design and timeline of the MCC TRIM cohort**




## RESULTS

### Baseline characteristics

- The ASAS included 276 patients (114 stage III; 162 stage IV); 65.6% (95% CI, 60.0%-71.2%) were male and mean age at initial diagnosis was 74.9 years (SD, 10.0) (**Table 1**)
- In 186 patients not initially diagnosed with aMCC, the median time between initial diagnosis and aMCC diagnosis was 314 days (IQR, 199-575)
- At diagnosis of aMCC, Eastern Cooperative Oncology Group performance status in patients with available data (n=225) was 0 in 61.8%, 1 in 28.0%, and 2-4 in 10.2%
- At diagnosis of aMCC, the most frequently recorded comorbidity was diabetes in 61 patients (22.1%), followed by heart disease in 37 patients (13.4%) (**Table 2**)

**Table 1. Patient characteristics at aMCC diagnosis (N=276)**

| | | |
|---|---|---|
| **Age at initial diagnosis, years** | | |
| Mean (SD) | 74.9 (10.0) | |
| Median (IQR) | 77 (69-82) | |
| | **n** | **% (95% CI)** |
| **Sex** | | |
| Male | 181 | 65.6 (60.0-71.2) |
| Female | 95 | 34.4 (28.8-40.0) |
| **Tumor stage at baseline** | | |
| Stage III | 114 | 41.3 (35.5-47.1) |
| Stage III | 1 | 0.4 (0-1.1) |
| Stage IIIA | 26 | 9.4 (6.0-12.9) |
| Stage IIIB | 87 | 31.5 (26.0-37.0) |
| Stage IV | 162 | 58.7 (52.9-64.5) |
| **ECOG PS** | | |
| Not recorded | 51 | 18.5 (13.9-23.1) |
| 0 | 139 | 50.4 (44.5-56.3) |
| 1 | 63 | 22.8 (17.9-27.8) |
| 2 | 15 | 5.4 (2.8-8.1) |
| 3 | 4 | 1.4 (0-2.9) |
| 4 | 4 | 1.4 (0-2.9) |
| **Year of index/enrollment** | | |
| 2019 | 42 | 15.2 (11.0-19.5) |
| 2020 | 90 | 32.6 (27.1-38.1) |
| 2021 | 60 | 21.7 (16.9-26.6) |
| 2022 | 32 | 11.6 (7.8-15.4) |
| 2023 | 52 | 18.8 (14.2-23.5) |
| **Description of metastasis** | | |
| Distant | 162 | 58.7 (52.9-64.5) |
| Lymph node | 119 | 43.1 (37.3-49.0) |
| Satellite/in-transit | 82 | 29.7 (24.3-35.1) |
| Not available | 15 | 5.4 (2.8-8.1) |

**aMCC,** advanced Merkel cell carcinoma; **ECOG PS,** Eastern Cooperative Oncology Group performance status.

**Table 2. Summary of comorbidities at aMCC diagnosis (N=276)**

| | n | % (95% CI) |
|---|---|---|
| **Other skin cancers** | | |
| Melanoma | 6 | 2.2 (0.5-3.9) |
| Squamous cell carcinoma | 24 | 8.7 (5.4-12.0) |
| Basal cell carcinoma | 22 | 8.0 (4.8-11.2) |
| Actinic keratosis | 25 | 9.1 (5.7-12.4) |
| **Other malignancies** | | |
| Solid tumors | 21 | 7.6 (4.5-10.7) |
| Hematological malignancy | 18 | 6.5 (3.6-9.4) |
| **Systemic/connective tissue diseases** | | |
| Rheumatoid arthritis | 10 | 3.6 (1.4-5.8) |
| Systemic sclerosis | 0 | 0 (0-0) |
| **Gastrointestinal inflammatory diseases** | | |
| Inflammatory bowel disease | 6 | 2.2 (0.5-3.9) |
| **Other comorbidities** | | |
| Diabetes | 61 | 22.1 (17.2-27.0) |
| COPD | 10 | 3.6 (1.4-5.8) |
| Cerebrovascular disease/stroke | 12 | 4.3 (1.9-6.8) |
| Moderate or severe renal disease | 29 | 10.5 (6.9-14.1) |
| Ischemic heart disease/ myocardial infarction | 37 | 13.4 (9.4-17.4) |
| Moderate or severe liver disease | 7 | 2.5 (0.7-4.4) |
| Thyroid disorders | 36 | 13.0 (9.1-17.0) |

**COPD,** chronic obstructive pulmonary disease.

### HCRU

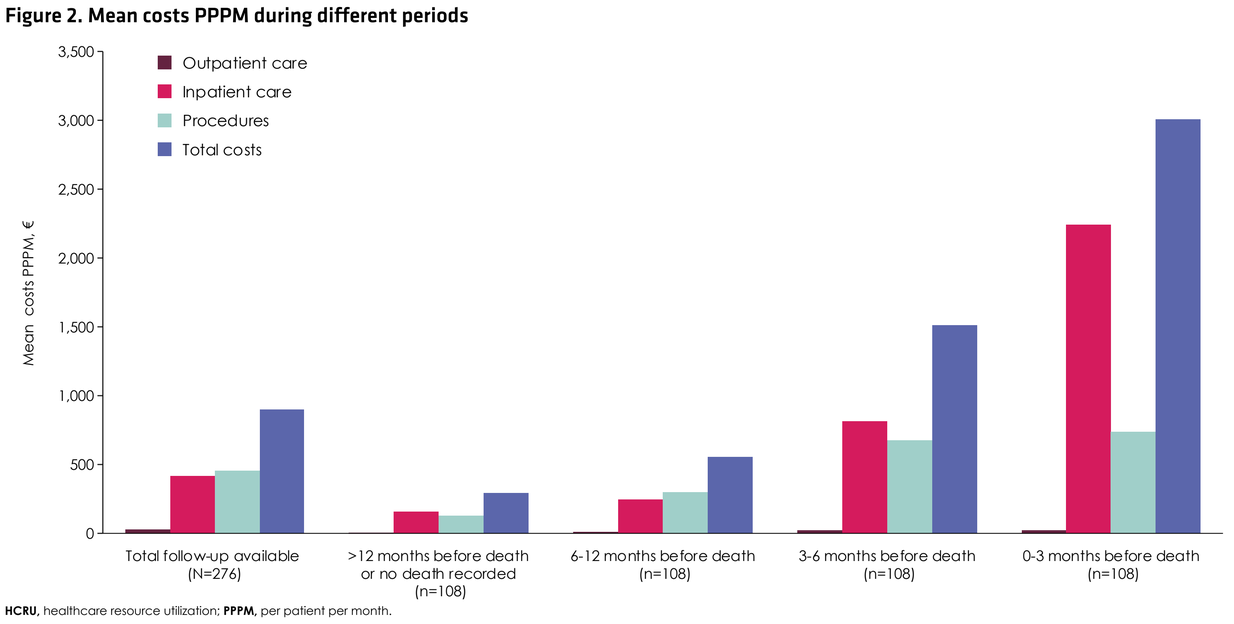
- The median number of outpatient visits was 0.5 PPPM (IQR, 0.2-1.4), with associated median costs of €12 PPPM (IQR, €3-€37) and mean costs of €25 PPPM (SD, €33) (**Table 3**)
- The median number of hospitalizations was 0 PPPM (IQR, 0.0-0.1), with associated median costs of €103 PPPM (IQR, €0-€332)
- When analyzed separately, radiotherapy session numbers had the highest mean associated costs €395 PPPM (SD, €1,512)
- In deceased patients (n=108), mean total costs increased from €290.5 PPPM (SD, €793.2) >12 months prior to death to €3,004.1 PPPM (SD, €5,952.3) during the last 3 months before death (**Figure 2**)

**Table 3. HCRU and associated direct medical costs (N=276)**

| | Units | | Associated costs, € | |
|---|---|---|---|---|
| | Total per patient | PPPM | Total per patient | PPPM |
| **Outpatient visits** | | | | |
| Mean (SD) | 22.7 (26.7) | 0.9 (1.0) | 586.0 (743.7) | 25.4 (32.7) |
| Median (IQR) | 12 (4-34.5) | 0.5 (0.2-1.4) | 280.4 (82.1-791.9) | 11.8 (3.0-37.1) |
| Range | 0-130 | 0.0-7.0 | 0.0-4,027.5 | 0.0-212.0 |
| **ED visits** | | | | |
| Mean (SD) | 0.6 (1.4) | 0.0 (0.1) | 6.8 (18.2) | 0.2 (0.4) |
| Median (IQR) | 0 (0-1) | 0.0 (0.0-0.0) | 0.0 (0.0-3.1) | 0.0 (0.0-0.1) |
| Range | 0-14 | 0.0-0.4 | 0.0-158.4 | 0.0-3.4 |
| **Hospitalizations** | | | | |
| Mean (SD) | 2.4 (3.4) | 0.1 (0.2) | 6,185.5 (8,325.6) | 288.7 (509.6) |
| Median (IQR) | 2 (0-4) | 0.0 (0.0-0.1) | 3,790.5 (0.0-8,001.4) | 102.9 (0.0-332.3) |
| Range | 0-26 | 0.0-0.9 | 0.0-51,879.7 | 0.0 (3,560.0) |
| **ICU hospitalizations** | | | | |
| Mean (SD) | 0.1 (0.6) | 0.0 (0.0) | 1,844.6 (9,203.5) | 126.7 (710.8) |
| Median (IQR) | 0 (0-0) | 0.0 (0.0-0.0) | 0.0 (0.0-0.0) | 0.0 (0.0-0.0) |
| Range | 0-4 | 0.0-0.3 | 0.0-64,598.1 | 0.0-5,479.3 |
| **Imaging scan numbers** | | | | |
| Mean (SD) | 8.0 (8.0) | 0.3 (0.4) | 1,468.9 (1,499.7) | 61.7 (81.0) |
| Median (IQR) | 5 (2-12) | 0.2 (0.1-0.4) | 894.2 (422.1-2,143.7) | 41.0 (15.2-76.8) |
| Range | 0-48 | 0.0-4.5 | 0.0-10,198.9 | 0.0-966.4 |
| **Radiotherapy session numbers** | | | | |
| Mean (SD) | 2.7 (5.6) | 0.1 (0.3) | 10,811.7 (23,275.9) | 395.4 (1,512.0) |
| Median (IQR) | 1 (0-3.5) | 0.0 (0.0-0.1) | 4,114.0 (0.0-12,342.0) | 78.0 (0.0-355.6) |
| Range | 0-49 | 0.0-3.5 | 0.0-185,184.4 | 0.0-20,876.1 |
| **Total costs** | | | | |
| Mean (SD) | 36.6 (37.0) | 1.4 (1.4) | 20,903.5 (29,251.3) | 898.0 (1,866.6) |
| Median (IQR) | 25 (9-50.5) | 1.0 (0.4-2.0) | 10,990.3 (4,135.6-27,385.7) | 379.0 (147.1-923.3) |
| Range | 0-178 | 0.0-8.1 | 0.0-192,830.0 | 0.0-21,386.6 |

**ED,** emergency department; **HCRU,** healthcare resource utilization; **ICU,** intensive care unit; **PPPM,** per patient per month.

**Figure 2. Mean costs PPPM during different periods**




**HCRU,** healthcare resource utilization; **PPPM,** per patient per month.

## STRENGTHS AND LIMITATIONS

### Strengths

- The MCC-TRIM registry is one of the largest and most complete real-world data sources worldwide for this rare cancer
- MCC TRIM is a nationally representative registry of patients with MCC of any stage receiving any treatment in Germany; therefore, the reported findings are representative of real-world clinical practice in Germany
- The diagnosis of MCC among enrolled patients was confirmed uniformly and centrally via laboratories in the German Cancer Research Center (Deutsches Krebsforschungszentrum [DKFZ])
- The registry benefits from primary data collection and robust validation procedures, combined with use of secondary data from electronic medical records, which maximizes completeness and quality, and standardizes recording to reduce the risk of misclassification

### Limitations

- Analyses presented in this study are purely descriptive and may not be directly comparable with other real-world studies because of various known and unknown confounding factors
- Results generated from this study may not be generalizable outside of Germany
- Several components of related costs were out of scope for this analysis, including drug costs and indirect medical costs; therefore, the associated total costs should be considered underestimates



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