

# Use and Cost of Actinic Keratosis Destruction in the Medicare Part B Fee-for-Service Population, 2007 to 2015

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 Editorial

**IMPORTANCE** Actinic keratosis is prevalent and has the potential to progress to keratinocyte carcinoma. Changes in the use and costs of actinic keratosis treatment are not well understood in the aging population.

**OBJECTIVE** To evaluate trends in the use and costs of actinic keratosis destruction in Medicare patients.

**DESIGN, SETTING, AND PARTICIPANTS** A billing claims analysis was performed of the Medicare Part B Physician/Supplier Procedure Summary Master Files and National Summary Data of premalignant skin lesion destructions performed from 2007 to 2015 among Medicare Part B fee-for-service beneficiaries.

**MAIN OUTCOMES AND MEASURES** Mean number of actinic keratosis lesions destroyed and associated treatment payments in 2015 US dollars estimated per 1000 Medicare Part B fee-for-service beneficiaries. Data analysis was performed from November 2017 to July 2018.

**RESULTS** More than 35.6 million actinic keratosis lesions were treated in 2015, increasing from 29.7 million in 2007. Treated actinic keratosis lesions per 1000 beneficiaries increased from 917 in 2007 to 1051 in 2015, while mean inflation-adjusted payments per 1000 patients decreased from \$11 749 to \$10 942 owing to reimbursement cuts. The proportion of actinic keratosis lesions treated by independently billing nurse practitioners and physician assistants increased from 4.0% in 2007 to 13.5% in 2015.

**CONCLUSIONS AND RELEVANCE** This study's findings suggest that actinic keratosis imposes continuously increasing levels of treatment burden in the Medicare fee-for-service population. Reimbursement decreases have been used to control rising costs of actinic keratosis treatment. Critical research may be warranted to optimize access to actinic keratosis treatment and value for prevention of keratinocyte carcinoma.

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Actinic keratosis (AK) was the most common dermatologic diagnosis among all dermatologist visits in the United States for patients 45 years or older during the period from 1993 to 2010.<sup>1</sup> Risk factors for AK development include older age, male sex, fair skin, lifetime UV light exposure, and sunburns.<sup>2</sup> Actinic keratosis is frequently treated to address potential for malignant transformation, relieve patient symptoms, improve quality of life and cosmetic outcomes, and facilitate diagnosis of keratinocyte carcinoma in settings of field cancerization.<sup>3-7</sup>

The estimated burden of AK and its treatment have varied significantly.<sup>8,9</sup> The American Academy of Dermatology

Burden of Skin Diseases reports showed that 10 million to 39.5 million Americans sought care for actinic damage, which included AK, and associated medical costs increased from \$867 million in 2004 to \$1.8 billion in 2013.<sup>10,11</sup> Destructive procedures—including cryotherapy, curettage, electrocautery, and chemical peels—were performed in 77% of 5.2 million dermatologist visits for AK management in 2000-2003, 52% of which were performed in Medicare populations.<sup>12</sup>

Updated longitudinal data on the prevalence of AK, as well as the costs and use of treatment for AK, are critically needed as the aging and Medicare-eligible US population expands<sup>13</sup> and as physician relative work value and Medicare reimburse-

ment for AK destruction procedures were reduced in 2014.<sup>14,15</sup> We aim to quantify national trends of the cost and use of AK destructive treatment in the Medicare Part B fee-for-service population during the period from 2007 to 2015.

## Methods

Aggregated clinician-level claims data were obtained from the Centers for Medicare & Medicaid Services Medicare Part B Physician/Supplier Procedure Summary Master Files from 2007 to 2015.<sup>16,17</sup> These files contain all Medicare Part B fee-for-service billing claims that were submitted and paid, as sorted by clinician specialty and Healthcare Common Procedure Coding System (HCPCS) codes, including those for the destruction of premalignant lesions of the skin (equivalent to *Current Procedural Terminology* codes 17 000-17 004).<sup>18</sup> Because the cost of AK treatment is based on the number of AK lesions destroyed, the prevalence of AK was estimated conservatively by the sum of (HCPCS 17 000 claims + 17 003 claims) + (15 × 17 004 claims). Treatment use rates per 1000 Medicare Part B fee-for-service beneficiaries were normalized by published annual enrollment numbers. Analysis was stratified by specialty to determine market share among dermatologists, all other physicians, and independently billing nonphysician clinicians (NPCs) (including physician assistants and nurse practitioners). The study data do not contain any patient-level, personally identifiable, or protected health information and have been designated for public use by the Centers for Medicare & Medicaid Services. This study does not constitute research involving human participants nor require institutional review board oversight.

Prices for each claim were obtained from the nonfacility national payment amount without modifiers from the Medicare Physician Fee Schedule.<sup>19</sup> Aggregate Medicare allowable charges and payments for AK destructions were obtained from the Part B National Summary Data Files and compared with total Medicare Part B expenditures.<sup>20,21</sup> All prices were adjusted for inflation using the Personal Consumption Expenditures-Health Index as 2015 US dollars.<sup>22,23</sup> Data analyses were performed from November 2017 to July 2018 using SAS, version 9.4 (SAS Institute Inc), and Microsoft Excel 2016 (Microsoft Corp).

## Results

### Number of AK Lesions Treated and Billing Claims by Specialty

More than 35.6 million AK lesions were treated in 2015, increasing from 29.7 million in 2007. In contrast, the estimated number of Medicare Part B fee-for-service enrollees increased modestly, from 32.3 million in 2007 to 33.8 million in 2015. The number of AK lesions treated per 1000 Medicare Part B fee-for-service beneficiaries increased from 917.2 lesions in 2007 to 1051.1 lesions in 2015, with a mean compound annual growth rate of 1.7% (Figure 1). Healthcare Common Procedure Coding System 17 000 claims increased from 4.6 mil-

### Key Points

**Question** How is the use and cost of actinic keratosis destruction changing in the aging population?

**Findings** This billing claims analysis found that, in the Medicare Part B fee-for-service population, the estimated number of actinic keratosis lesions treated per 1000 beneficiaries increased from 917 in 2007 to 1051 in 2015, while mean inflation-adjusted payments decreased from \$11 749 to \$10 942 per 1000 beneficiaries owing to successive reimbursement cuts. In 2015, a total of 13.5% of actinic keratosis lesions were treated by independently billing nurse practitioners and physician assistants.

**Meaning** Actinic keratosis appears to impose high and increasing levels of treatment burden in the aging population.

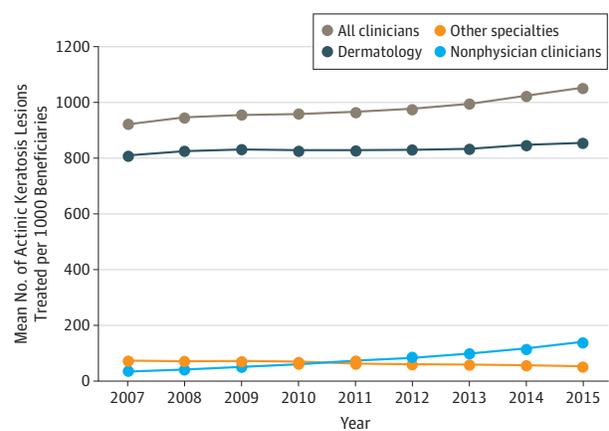
lion in 2007 to 5.5 million in 2015; 17 003 claims increased from 14.6 million in 2007 to 17.6 million in 2015; and 17 004 claims increased from 0.70 million in 2007 to 0.83 million in 2015.

The proportion of AK lesions treated by dermatologists decreased from 88.1% in 2007 to 81.3% in 2015, while the proportion treated by independently billing NPCs increased from 4.0% in 2007 to 13.5% in 2015 (Figure 1). The mean compound annual growth rate of treated AK lesions during the period from 2007 to 2015 differed among dermatologists (1.3%) and independently billing NPCs (19.0%).

### AK Treatment Prices, Allowable Charges, and Medicare Payments

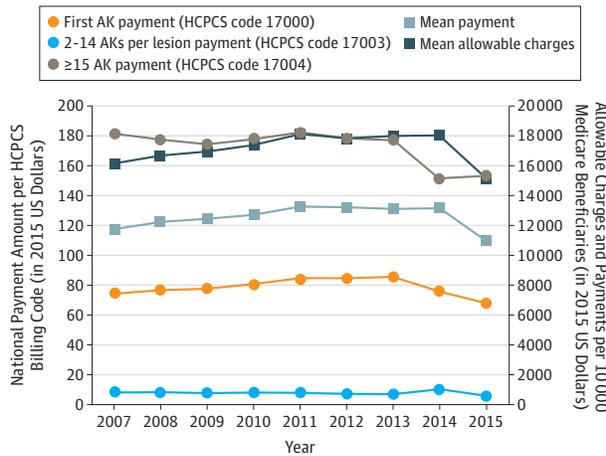
Prices for HCPCS 17000 claims increased by 0% to 4.7% per year during the period from 2007 to 2013, then decreased by 11% per year during the period from 2014 to 2015 (Figure 2). Prices for HCPCS 17 004 claims fluctuated by -2.0% to 2.6% per year during the period from 2007 to 2013, then decreased by 15% in 2014 and increased by 1.2% in 2015.

Figure 1. Mean Number of Actinic Keratosis Lesions Destroyed per 1000 Medicare Beneficiaries by Clinician Specialties (2007-2015)



Mean actinic keratosis destructions per 1000 Medicare beneficiaries increased from 917.2 lesions in 2007 to 1051.1 lesions in 2015. The proportion of lesions treated by independently billing nonphysician clinicians increased from 4.0% to 13.5% during the period from 2007 to 2015.

**Figure 2. Medicare National Payment Amounts by Actinic Keratosis (AK) Destruction Claims and Mean AK Destruction Allowable Charges and Payments by 1000 Beneficiaries (2007-2015)**



Medicare national payment amount for the destruction of the first AK lesion decreased by 11% per year in 2014 and 2015, while that for the destruction of 15 or more lesions decreased by 15% in 2014. Mean payments for AK destructions per 1000 beneficiaries increased from \$11 749 in 2007 to \$13 233 in 2011, plateaued at \$13 134 until 2014, and then decreased to \$10 942 in 2015. HCPCS indicates Healthcare Common Procedure Coding System.

Averaged across the period from 2007 to 2015, annual Medicare allowable charges for AK destruction are \$564.7 million and payments and for AK destruction are \$413.1 million. Allowable charges for AK destructions increased from \$521.5 million in 2007 to \$609.9 million in 2014, then decreased to \$510.6 million in 2015. Medicare payments for these charges increased from \$379.9 million in 2007 to \$444.0 million in 2014, then decreased to \$370.3 million in 2015. In 2015, payments for AK destruction comprised 0.4% of the \$102.2 billion overall Medicare Part B fee-for-service expenditures and 14.8% of the \$2.5 billion expenditure specifically in dermatology.

Mean allowable charges for AK destructions per 1000 beneficiaries increased by 3.0% annually from \$16 128 in 2007 to \$18 113 in 2011, plateaued at \$18 041 until 2014, and then decreased by 16.4% to \$15 090 in 2015 (Figure 2). Mean annual Medicare payments for AK destructions per 1000 beneficiaries increased by 3.0% from \$11 749 in 2007 to \$13 233 in 2011, plateaued at \$13 134 until 2014, and then decreased by 16.7% to \$10 942 in 2015.

## Discussion

Actinic keratosis imposed continuously increasing treatment burdens in the Medicare Part B fee-for-service population during the period from 2007 to 2015. Prior data estimated 2.9 million annual destructive procedures with fewer than 15 AK lesions and 0.23 million annual procedures for 15 or more lesions during the period from 1998 to 2000.<sup>12</sup> Our data showed 1.6 to 1.9 times the number of AK destructions for fewer than 15 AK lesions and 3.0 to 3.6 times the number of AK destructions for 15 or more lesions during the period from 2007 to 2015.

Increasing trends in use of treatment for AK lesions remain despite adjustment for rising Medicare enrollment, likely owing to a combination of increasing incidence of AK in the Medicare population, early detection and treatment, and increasing access to NPCs.

In contrast to rising use of treatment for AK lesions, Medicare payments for AK destructions decreased from significant fee-for-service reimbursement cuts. For example, nominal Medicare reimbursement in 1999 for *Current Procedural Terminology* code 17000 was \$131 and for code 17004 was \$258 (or \$198 for code 17000 and \$389 for code 17004 when adjusted to 2015 values),<sup>12</sup> compared with \$68 for code 17000 and \$153 for code 17004 in 2015. Mean annual Medicare payments for AK treatments during the period from 2007 to 2015 was \$413.1 million, markedly reduced from \$520 million (\$785 million when adjusted to 2015 values) during the period from 1990 to 2000.<sup>12</sup> Decreasing Medicare fee-for-service reimbursements since 2014, while cutting overall Medicare expenditures, has not curbed increases in AK destruction procedures in 2015. Prior health economics studies showed that insured patients' demand for health care is inelastic to price changes but, rather, reflects overall access to care.<sup>24,25</sup> Financial incentives have little effect on clinician choices when treatment is considered nondiscretionary.<sup>26</sup> In the absence of prognostic markers for the malignancy potential of specific AK lesions, identified AK lesions are deemed to require treatment despite low individual risks for malignant transformation and known potential for regression.<sup>27,28</sup> Patient-level and clinician-level differences in deciding whether to treat, how to treat, how often to treat, and how many AK lesions to treat—as well as access to dermatologic care overall from dermatologists or NPCs—may account for significant variations in cost and use of lesion-directed AK management.<sup>14,29</sup>

Increases of AK lesion-directed destructive procedures were accompanied by concurrent increases in AK field treatments and skin cancer diagnostic and treatment procedures.<sup>30,31</sup> Medicare Part D spending on topical AK therapy, including fluorouracil, imiquimod, and ingenol mebutate, concurrently increased from \$101.1 million to \$133.5 million during the period from 2011 to 2015 (in 2015 US dollars).<sup>30</sup> Skin cancer biopsy among Medicare fee-for-service beneficiaries in the past decade has also increased by 142% during the period from 2000 to 2015, and skin cancer treatment among Medicare fee-for-service beneficiaries in the past decade has increased by 56% during the period from 2000 to 2015.<sup>31</sup> Outside the Medicare population, annual AK-related treatment costs of \$52 million to \$59 million were demonstrated in a US commercially insured population during the period from 2011 to 2012<sup>14</sup> and of more than \$190 million in the Veterans Health Administration in 2012.<sup>32</sup> Consistent with these prior studies, our data provided additional ecologic evidence to suggest the increasing treatment use and cost burden of AK and keratinocyte carcinomas in the United States.

In the current era of value-based care,<sup>33</sup> rising use of AK treatment with unexplained variations in management call for innovations to measure and improve value and patient centeredness in AK treatment and prevention of keratinocyte carcinoma. Application of the chronic care model to manage AK

and keratinocyte carcinomas is proposed to coordinate care delivery, which may enable field-directed therapies for high-risk patients with severe actinic burden or a history of multiple keratinocyte carcinomas.<sup>34</sup> Clinical decision aids can guide treatment selection by aligning patients' and physicians' understanding of AK, providing individualized prognostic information, and incorporating patients' personal values and preferences about treatment benefits, risks, and costs.<sup>35,36</sup> Research should address the cost-effectiveness of AK surveillance and treatment strategies and optimize their intensity and frequency.<sup>37,38</sup> Evidence-based clinical practice guidelines on AK management will be necessary for developing and disseminating high-value pathways of care for AK.<sup>39,40</sup> Since management of AK has accounted for more than 14% of US dermatologist visits,<sup>41</sup> optimization of AK care delivery has the potential of improving critical access to medical dermatology care. Rigorous natural history data are critically needed to define the clinical characteristics of AKs with a higher likelihood of transformation into invasive squamous cell carcinoma.

Growth in AK destructive procedures is partly attributable to increases in treatment access from independently billing NPCs, who treated 13.5% of AK lesions in 2015. An influx of NPCs in dermatology was fueled by continued shortage in dermatologist supply, increasing training and supply of NPCs, lower salary costs for NPCs, and expansion of NPCs' scope of practice.<sup>42,43</sup> Dermatologists were affiliated with 92% of independently billing NPCs who perform dermatologic procedures,<sup>44</sup> but physician supervision may vary.<sup>42</sup> News media highlighted concerns of adequate NPC supervision with anecdotes of excessively high volume of AK treatment.<sup>45</sup> One study suggested that NPCs may have lower accuracy in skin cancer diagnosis compared with attending dermatologists, but the comparison was not statistically significant.<sup>46</sup> Future research should balance improving access to and value of AK treatment in the context of expanding NPC involvement in care delivery.

## Limitations

Our data pertain only to AK-related procedures in Medicare Part B fee-for-service beneficiaries and could not capture claims from Medicare Advantage beneficiaries (accounting for 8.4%-16.8% of all Medicare enrollees in 2007-2015).<sup>47</sup> Photodynamic therapy for AK was not included in our analysis since its billing code included treatment indications for both premalignant and malignant lesions and its inclusion would introduce misclassification; thus, our data on AK lesion count likely underestimated the true treatment burden of AKs beyond destructive therapies. Nevertheless, since higher AK lesion count is associated with impairments in health-related quality of life,<sup>3</sup> our results emphasized to policymakers and the public the high and rising patient burden of AK as a chronic disease. Discussion of treatment cost alone would discount the effect on patients from rising disease prevalence in the setting of successive fee-for-service price cuts. Validation of destruction claims against AK diagnostic codes was not performed in our clinician-level data. As AKs are mostly clinically diagnosed without histologic confirmation, misclassification of diagnosis and the number of lesions cannot be excluded. Reliability studies<sup>9,48,49</sup> on AK counting among dermatologists yielded correlation coefficients ranging from 0.18 to 0.75. Reliability and validity of AK diagnosis and count among NPCs should be further examined.

## Conclusions

Actinic keratosis imposes continuously increasing levels of treatment burden in the Medicare fee-for-service population. Reimbursement cuts have been used to control rising costs of AK treatment. Critical research is warranted to optimize access to AK treatment and value for prevention of keratinocyte carcinoma.

### ARTICLE INFORMATION

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**Acquisition, analysis, or interpretation of data:**

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**Drafting of the manuscript:** Yeung, Baranowski, Duszak.

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**Statistical analysis:** Yeung, Baranowski, Hemingway, Hughes.

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