Clinical and Economic Burden of Non-Obstructive Hypertrophic Cardiomyopathy: A Literature Review

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INTRODUCTION

- Hypertrophic cardiomyopathy (HCM) is a chronic, progressive disease characterized by left ventricular hypertrophy.
- Non-obstructive HCM (nHCM) is a type of HCM with an estimated prevalence of 0.05% in the United States and accounted for 58% of US cases of HCM in 2019.[1]
- Previous studies report mixed findings on the disease burden for nHCM and, to the best of our knowledge, no literature review studies summarizing those findings for nHCM have been published.
- The objective of this targeted literature review was to review and summarize the current evidence of the clinical and economic burden of nHCM.
- Findings from this study will be useful to:
  - Understand unmet needs for nHCM.
  - Identify research gaps.
  - Anticipate the value of future treatments currently in development for lowering disease burden and unmet needs in patients with nHCM.

METHODS

Targeted Literature Review: Search Strategy and Study

- PubMed was used to identify English-language studies in nHCM published from 2005 to 2024 where full text was available.
- Two distinct searches were conducted:
  (1) Clinical burden.
  (2) Economic burden.
- Details of the search terms and strategy are provided in **Table 1** and **Figure 1**.
- A supplemental search for abstracts and white papers was conducted using Google, and review studies were excluded.

Clinical and Economic Outcomes

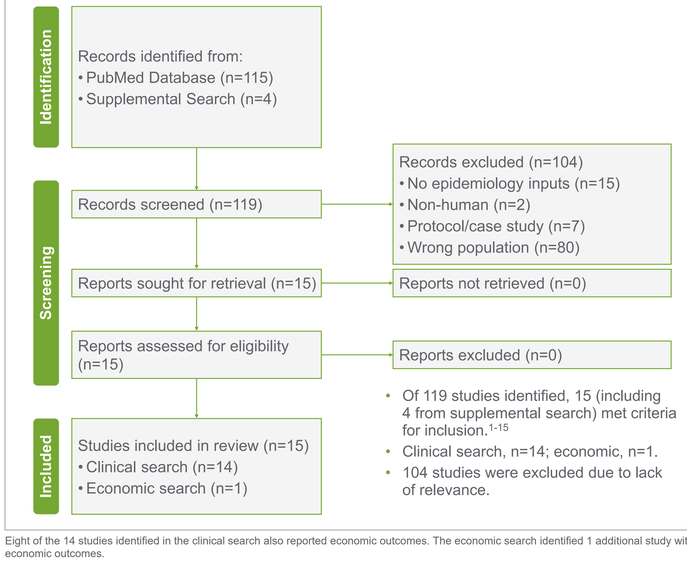
- We sought to describe and report the available evidence on the following (**Table 1**):
  (1) Epidemiology such as disease prevalence, incidence, mortality, and rate of disease progression.
  (2) Healthcare resource utilization, including hospitalization, heart transplant, and implantable cardioverter defibrillator (ICD) discharge, and direct medical costs.

Table 1: Search strategy for clinical and economic burden studies for nHCM

Search strategy	Search terms
Clinical burden (epidemiology)	'non obstructive hypertrophic cardiomyopathy'[tiab] or 'nHCM'[tiab] or 'non obstructive HCM'[tiab] or 'nonobstructive hypertrophic cardiomyopathy'[tiab] or 'NOCM'[tiab] or 'NHC'[tiab] **AND** 'incidence'[tiab] or 'prevalence'[tiab] or 'mortality'[tiab] or 'morbidity'[tiab] or 'age distribution'[tiab] or 'sex distribution'[tiab] or 'time trend'[tiab] or 'risk factors'[tiab] or 'epidemiology'[tiab] or 'gender distribution'[tiab] or 'demographics'[tiab] or 'population-based'[tiab]
Economic burden	'non obstructive hypertrophic cardiomyopathy'[tiab] or 'nHCM'[tiab] or 'non obstructive HCM'[tiab] or 'nonobstructive hypertrophic cardiomyopathy'[tiab] or 'NOCM'[tiab] or 'NHC'[tiab] **AND** 'costs'[tiab] or 'HCRU'[tiab] or 'healthcare resource use'[tiab] or 'healthcare resource utilization'[tiab] or 'economic'[tiab] or 'financial'[tiab] or 'expenditure'[tiab]

tiab=title/abstract

Figure 1: PRISMA approach for study selection



- Of 119 studies identified, 15 (including 4 from supplemental search) met criteria for inclusion.[1-15]
- Clinical search, n=14; economic, n=1.
- 104 studies were excluded due to lack of relevance.

Eight of the 14 studies identified in the clinical search also reported economic outcomes. The economic search identified 1 additional study with economic outcomes.

RESULTS

Clinical Outcomes

- Among 14 clinical studies:
  - 8 (57%) studies were conducted in the United States (**Table 2**).[1,3,5-7,9-11]
  - 6 (43%) studies included >1000 patients,[1,8,10,12,14,15] only 2 of which were based in the United States (**Table 2**).
  - 7 (50%) studies did not report either incidence or mortality rates (**Table 3**).[4-6,9,12-14]
  - 8 (57%) studies reported nHCM prevalence, which ranged from 0.01–0.17%, accounting for 26–84% of all HCM and varying widely by regions.[1,3,7,10,12-15]
  - 5 (36%) studies reported mortality rates, which ranged from 0.5–10%.[3,7,8,10,11]
- Outcomes reported have wide ranges and may be attributed to small sample sizes.

Economic Outcomes

- 9 studies reported data on health care resource utilization outcomes such as hospitalization, ICD discharge, and heart transplant (**Table 4**).[2,4,5-7,9-11,14]
- Only 1 US-based study reported direct cost.[2]
- Hospitalization rates of 8.40% and 37.70% were reported.[4,14]
- Inpatient hospitalization rates per patient per-year of 0.17–0.60% were reported.[2]
- ICD discharge ranged from 4–21%.[5-7,9,11]
- Heart transplant was reported between 0.81–50%.[5,7,10,11]
- The economic study reported annual per-patient costs for nHCM stratified by symptom status and presence of complications ($22,711–$73,630).[2]

Limitations

- A targeted (not systematic) search was employed to retrieve studies.

Table 2: Characteristics of included studies

Reference #	Study	Location	Data Source	N
1	Butzner M et al., 2021	USA	Claims database	8498
2	Amonkar S et al., 2023	USA	Claims database	18,011
3	Hebl VB et al., 2016	USA	Single-center cohort	706
4	Jang JH et al., 2020	Korea	Single-center cohort	202
5	Kalra A et al., 2016	USA	Single-center cohort	274
6	Lu DY et al., 2018	USA	Single-center cohort	214
7	Maron MS et al., 2016	USA, Italy	Multi-center cohort	249
8	Pelliccia F et al., 2017	Varied	SLR/MA	5058
9	Pozios I et al., 2015	USA	Single-center cohort	96
10	Reza N et al., 2024	USA	Claims database	9842
11	Rowin EJ et al., 2018	USA	Single-center cohort	52
12	Schultze M et al., 2022	UK, Germany	EHR/claims database	UK: 2285; Germany:1309
13	Seferović PM et al., 2019	EU	Literature	N/A
14	Terasaka N et al., 2023	Japan	Claims database	21,714
15	Laine M et al., 2024	Finland	Population-based registry	5834

EHR, electronic health record; MA, meta-analysis; N/A, not available; SLR, systematic literature review.

Table 3: Summary of the clinical outcomes for nHCM studies included

Reference #	Study	Incidence	Prevalence	Mortality	Progression rate	CV Death, n (%)
1	Butzner M et al., 2021	0.03%	0.047%; 58% of all HCM	–	–	–
2	Amonkar S et al. 2023	–	33% of all HCM	–	–	–
3	Hebl VB et al., 2016	–	26% of all HCM	2.60%	–	–
4	Jang JH et al., 2020	–	–	–	–	2.50%
5	Kalra A et al., 2016	–	–	–	4%[a]	1.50%
6	Lu DY et al., 2018	–	–	–	30%[a]	–
7	Maron MS et al., 2016	–	43% of all HCM	6.00% (0.5%/y)	10.0%[a]	3.20%
8	Pelliccia F et al., 2017	–	–	8.3% (1.55%/y)	–	1.1% (SCD)[b] 0.4% (HF)[b]
9	Pozios I et al., 2015	–	–	–	6.30%	1.00%
10	Reza N et al., 2024	–	40% of all HCM	2.50%	–	–
11	Rowin EJ et al., 2018	–	–	10%	–	–
12	Schultze M et al., 2022	–	UK: 0.0131%; 32% of all HCM Germany: 0.0442%; 51% of all HCM	–	–	–
13	Seferović PM et al., 2019	–	30–60% of all HCM	–	7–10%	–
14	Terasaka N et al., 2023	–	0.17%; 84% of all HCM	–	–	–
15	Laine M et al., 2024	0.01%	0.06%; 70% of all HCM	–	–	–

[a] Progression to NYHA class III or IV. [b] Annual incidence of SCD and annual death due HF.
CV, cardiovascular; HCM, hypertrophic cardiomyopathy; HF, heart failure; nHCM, non-obstructive hypertrophic cardiomyopathy; NYHA, New York Heart Association; SCD, sudden cardiac death.

Table 4: Summary of the economic outcomes for nHCM studies included

Reference #	Study	Hospitalization, n (%)[a]	ICD discharge	Heart transplant	Costs (per year)
1	Butzner M et al., 2021	–	–	–	–
2	Amonkar S et al., 2023	SYMP pre[b] IP visits: 0.47; SYMP post IP visits: 0.60; ASYMP pre[b] IP visits: 0.17; ASYMP post IP visits: 0.28	–	–	$22,711–$73,630
3	Hebl VB et al., 2016	–	–	–	–
4	Jang JH et al., 2020	8.40%	–	–	–
5	Kalra A et al., 2016	–	4.00%	1.50%	–
6	Lu DY et al., 2018	–	7.9%	–	–
7	Maron MS et al., 2016	–	4.00%	2.80%	–
8	Pelliccia F et al., 2017	–	–	–	–
9	Pozios I et al., 2015	–	8.30%	–	–
10	Reza N et al., 2024	–	–	0.81%	–
11	Rowin EJ et al., 2018	–	21%	50%	–
12	Schultze M et al., 2022	–	–	–	–
13	Seferović PM et al., 2019	–	–	–	–
14	Terasaka N et al., 2023	37.70%	–	–	–
15	Laine M et al., 2024	–	–	–	–

[a] Unless otherwise noted. [b] Pre- and post-complication; number of visits per-patient per-year.
ASYMP, asymptomatic; ICD, implantable cardioverter defibrillator; IP, inpatient; nHCM, non-obstructive hypertrophic cardiomyopathy; SYMP, symptomatic.

CONCLUSIONS

- This review indicates there is limited evidence characterizing clinical and economic outcomes for nHCM.
- Future research with larger sample sizes and with a global perspective is necessary to measure the magnitude of the nHCM population and burden of disease, as well as assessing the potential impact of novel therapeutics in development for the treatment of nHCM.

References

1. Butzner M, et al. Am J Cardiol 2021;159:107-12. 2. Amonkar S, et al. Circulation 2023;148. 3. Hebl VB, et al. Mayo Clin Proc 2016;91:279-87. 4. Jang Ji-H, et al. Heart Vessels 2020;35:214-22. 5. Kalra A, et al. Am J Cardiol 2016;17:1808-14. 6. Lu D-Y, et al. J Am Heart Assoc 2018;7:e006657. 7. Maron MS, et al. J Am Coll Cardiol 2016;67:1399-409. 8. Pelliccia F, et al. Int J Cardiol 2017;243:379-84. 9. Pozios I, et al. Am J Cardiol 2015;116:938-44. 10. Reza N, et al. 2024 ESC-HF Congress, Lisbon, Portugal [poster]. 11. Rowin E, et al. Am J Cardiol 2018;121:986-96. 12. Schultze M, et al. Eur Heart J 2022;43(suppl 2):ehac544-1747. 13. Seferović PM, et al. Eur J Heart Fail 2019;21:553-76. 14. Terasaka N, et al. J Cardiol 2023;81:316-22. 15. Laine M, et al. Eur Heart J 2024;45(suppl 1):ehae666-2026.

Disclosures

PG, MB, SS: Employees of and own stock in Cytokinetics, Incorporated. **LC, JO, MS:** Employees of Stratevi LLC. **TA:** Employee of the Hypertrophic Cardiomyopathy Center, University of California, San Francisco.

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