



Information Retrieval Search

What is Biomedical & Health Informatics?
William Hersh
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Oregon Health & Science University



Retrieval

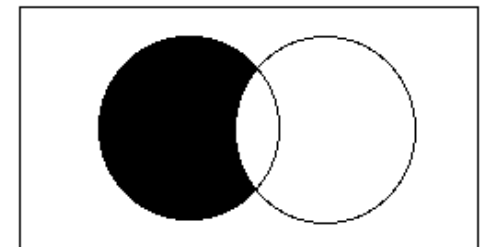
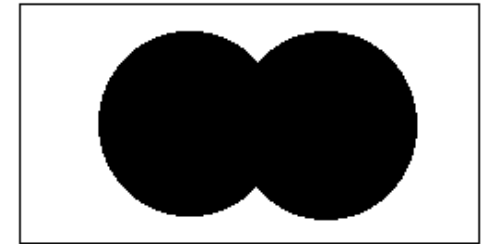
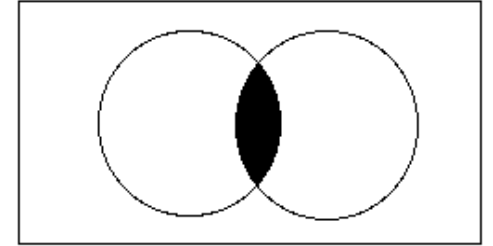
- Two general approaches – most systems make use of both, e.g., PubMed and Google
 - Boolean, set-based, exact-match
 - Natural language, automated, partial-match
- Early systems tended to be Boolean
 - Preferred by power users?
- More recent systems based on natural language
 - Simpler for less experienced searchers?

Boolean retrieval

- Basic approach
 - Build sets of content items (i.e., documents) based on search terms from controlled vocabulary or text words
 - Combine with AND, OR, NOT
- Most bibliographic systems use Boolean operators
 - Allow searching on both assigned indexing terms and text words
- Systems retrieving other types of content use them too, though they are sometimes hidden, e.g., Google performs AND of all words in query

Boolean operators

- AND – only content items that have all terms
- OR – content items that have any term
- NOT – content items with one term but not other



Some advanced features of Boolean systems

- Proximity operators require words to be within a certain range
 - e.g., colon (4) cancer, “colon cancer”
- Explosions perform OR down a hierarchy
 - PubMed “autoexplodes” many MeSH terms, e.g.,
 - All diseases in a category, e.g., anemias
 - All drugs in a certain class, e.g., ACE inhibitors
- Subheadings refine a heading
 - e.g., diagnosis of hypertension

PubMed – <https://pubmed.gov>

- NLM system for searching MEDLINE
 - Includes some OLDMEDLINE (before 1966) as well as other records not indexed in MEDLINE
- Based on Boolean heritage but has added automated features over the years
 - Search algorithm tries to map input to MeSH terms, author name, and other phrases
 - Has traditional Boolean set capability in Advanced interface but most users do not use it
- Historical output order was reverse chronological but now defaults to “Sort by Relevance” (Fiorini, 2018)

Other valuable features of PubMed

- Spelling correction
- Proximity searching using quotes ("...")
- Graphical interface for applying filters
- Link Out to full text (and other resources)
 - Link to publisher site, may not be free
- Clinical Queries
 - Help find best evidence for EBM question types
- MyNCBI
 - Allows saved searches, custom filters, emailing of results, etc.

Tour of PubMed

- User wants to know about treatment of congestive heart failure with angiotensin-converting enzyme (ACE) inhibitors
 - PubMed maps query into appropriate Boolean statement
- Simple AND yields way too many results, so want to narrow down, especially to best evidence
 - Done by applying filters or using Clinical Queries

Main screen at:

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Advanced

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[Biological age is increased by stress and restored upon recovery.](#)

Poganik JR, et al. Cell Metab. 2023. PMID: 37086720

Latest Literature

New articles from highly accessed journals

[Am Heart J \(2\)](#)

[Cochrane Database Syst Rev \(2\)](#)

A search on: congestive heart Failure

Note many
features, to be
discussed in
following slides

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congestive heart failure

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MYNCBI FILTERS 253,785 results

RESULTS BY YEAR



TEXT AVAILABILITY

- Abstract
- Free full text
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ARTICLE ATTRIBUTE

- Associated data

ARTICLE TYPE

- Books and Documents
- Clinical Trial
- Meta-Analysis
- Practice Guideline
- Randomized Controlled Trial
- Review
- Systematic Reviews

PUBLICATION DATE

- 1 year
- 5 years
- 10 years

Additional filters

Reset all filters

1 **Usefulness of a personalized algorithm-based discharge checklist in patients hospitalized for acute heart failure.**
Allain F, Loizeau V, Chautourier L, Hallouche M, Herrou L, Hodzic A, Blanchart K, Belin A, Manrique A, Milliez P, Sabatier R, Legallois D.
ESC Heart Fail. 2020 Apr 22. doi: 10.1002/ehf2.12604. Online ahead of print.
PMID: 32320135
AIMS: The aim of this study is to evaluate the usefulness of a personalized discharge checklist (PCL) based on simple baseline characteristics on mortality, readmission for heart failure (HF), and quality of care in patients hospitalized for acute HF. ...
Cite Share

2 **Multicenter experience with the antegrade fenestration and reentry technique for chronic total occlusion recanalization.**
Azzalini L, Maswad K, Uretsky BF, Agostoni P, Galassi AR, Harada Ribeiro M, Filho EM, Morales-Victorino N, Attallah A, Gupta A, Zivalonghi C, Montorfano M, Bellini B, Carlino M.
Catheter Cardiovasc Interv. 2020 Apr 22. doi: 10.1002/ccd.28941. Online ahead of print.
PMID: 32320133
Study endpoints were AFR success, procedural success, and target-lesion failure (TLF) on follow-up. RESULTS: We included 41 patients. ...In n = 14/41 (34.1%) cases with AFR failure, use of alternative techniques led to successful CTO recanalization in eight additional patients. ...
Cite Share

3 **Fragmented QRS in prediction of ischemic heart disease diagnosed by stress cardiovascular magnetic resonance imaging.**
Yooprasert P, Vathesatogkit P, Thirawuth V, Prasertikulchai W, Tangcharoen T.
Ann Noninvasive Electrocardiol. 2020 Apr 22:e12761. doi: 10.1111/anac.12761. Online ahead of print.
PMID: 32320122
BACKGROUND: In patients with ischemic heart disease (IHD), many studies demonstrated an association between fragmented QRS complex (fQRS) on 12-lead ECG and myocardial scar, heart failure, and increased mortality. ...CONCLUSION: In patients without known history of coronary artery disease, fragmented QRS is independently associated with ischemic heart disease diagnosed by stress cardiac MRI...
Cite Share

4 **Assessment of Limitations to Optimization of Guideline-Directed Medical Therapy in Heart Failure From the GUIDE-IT Trial: A Secondary Analysis of a Randomized Clinical Trial.**

A search on: ACE inhibitors

(Angiotensin-
converting
enzyme
inhibitors)

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ace inhibitors

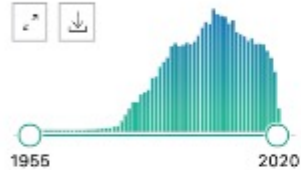
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RESULTS BY YEAR



1955 2020

TEXT AVAILABILITY

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Assessment of Limitations to Optimization of Guideline-Directed Medical Therapy in Heart Failure From the GUIDE-IT Trial: A Secondary Analysis of a Randomized Clinical Trial.

1

Fiuzat M, Ezekowitz J, Alemayehu W, Westerhout CM, Sbolli M, Cani D, Whellan DJ, Ahmad T, Adams K, Piña IL, Patel CB, Anstrom KJ, Cooper LS, Mark D, Leifer ES, Felker GM, Januzzi JL, O'Connor CM.

JAMA Cardiol. 2020 Apr 22. doi: 10.1001/jamacardio.2020.0640. Online ahead of print. PMID: 32319999

Only 130 patients (15.5%) achieved optimal GDMT ($\geq 50\%$ of the target dose of β -blockers or **angiotensin-converting enzyme inhibitors**/angiotensin receptor blockers or any dose of mineralocorticoid antagonists) at 6 months, an increase from the baseline (79 of 891 [8.9%]) but not different by treatment arm. ...Higher doses of **angiotensin-converting enzyme inhibitors** (HR, 0.84; 95% CI, 0.75-0.93; $P < .001$) and angiotensin receptor blockers (HR, 0.84; 95% CI, 0.71-0.99; $P = .04$) were associated with reduced risk of all-cause death. ...

“ Cite Share

ARNI in cardiovascular disease - current evidence and future perspectives.

2

Kuchulakanti PK.

Future Cardiol. 2020 Apr 22. doi: 10.2217/fca-2019-0089. Online ahead of print. PMID: 32319309

Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers are the mainstay of therapy for cardiovascular disease and heart failure (HF). ...

“ Cite Share

A novel nomogram to predict all-cause readmission or death risk in Chinese elderly patients with heart failure.

3

Yang M, Tao L, An H, Liu G, Tu Q, Zhang H, Qin L, Xiao Z, Wang Y, Fan J, Feng D, Liang Y, Ren J.

ESC Heart Fail. 2020 Apr 21. doi: 10.1002/ehf2.12703. Online ahead of print. PMID: 32319228

Anaemia, abnormal neutrophils, and admission without **angiotensin-converting enzyme inhibitors**/angiotensin receptor blockers were the specific independent risk factors of 30 day all-cause readmission or death (all $P < 0.05$), whereas serum sodium ≤ 140 mmol/L and admission without beta-blockers were the specific independent risk factors of 1 year all-cause readmission or death (all $P < 0.05$). ...

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Combined with a Boolean AND

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congestive heart failure and ace inhibitors

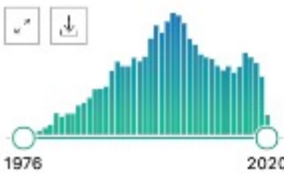
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You actually don't need to type the AND

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congestive heart failure ace inhibitors

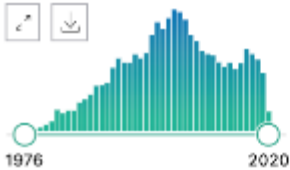
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Search	Actions	Details	Query	Results
#14	...	▼	<p>Search: congestive heart failure and ace inhibitors Sort by: Most Recent</p> <p>((("heart failure"[MeSH Terms] OR ("heart"[All Fields] AND "failure"[All Fields])) OR "heart failure"[All Fields]) OR (("congestive"[All Fields] AND "heart"[All Fields] AND "failure"[All Fields])) OR "congestive heart failure"[All Fields]) AND (((("angiotensin converting enzyme inhibitors"[Pharmacological Action] OR "angiotensin-converting enzyme inhibitors"[MeSH Terms]) OR ("angiotensin converting"[All Fields] AND "enzyme"[All Fields]) AND "inhibitors"[All Fields])) OR "angiotensin converting enzyme inhibitors"[All Fields]) OR ("ace"[All Fields] AND "inhibitors"[All Fields])) OR "ace inhibitors"[All Fields])</p> <p>Translations</p> <p>congestive heart failure: "heart failure"[MeSH Terms] OR ("heart"[All Fields] AND "failure"[All Fields]) OR "heart failure"[All Fields] OR ("congestive"[All Fields] AND "heart"[All Fields] AND "failure"[All Fields]) OR "congestive heart failure"[All Fields]</p> <p>ace inhibitors: "angiotensin-converting enzyme inhibitors"[Pharmacological Action] OR "angiotensin-converting enzyme inhibitors"[MeSH Terms] OR ("angiotensin-converting"[All Fields] AND "enzyme"[All Fields] AND "inhibitors"[All Fields]) OR "angiotensin-converting enzyme inhibitors"[All Fields] OR ("ace"[All Fields] AND "inhibitors"[All Fields]) OR "ace inhibitors"[All Fields]</p>	11,783

How does it do all of this?



Can sort output by (traditional) reverse chronological or “relevance”

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congestive heart failure and ace inhibitors

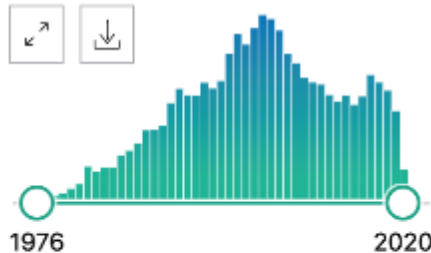
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RESULTS BY YEAR



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11,783 results

1 [Assessment of Limitations to Optimization of Guided-Dose Therapy in Heart Failure From the GUIDE-IT Trial: A Randomized Clinical Trial.](#)

Fiuzat M, Ezekowitz J, Alemayehu W, Westerhout CM, Sbolli K, Piña IL, Patel CB, Anstrom KJ, Cooper LS, Mark D, Leifer E

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What we want: the MEDLINE record

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congestive heart failure and ace inhibitors

Advanced Search User Guide

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> JAMA Cardiol. 2020 Apr 22. doi: 10.1001/jamacardio.2020.0640. Online ahead of print.

Assessment of Limitations to Optimization of Guideline-Directed Medical Therapy in Heart Failure From the GUIDE-IT Trial: A Secondary Analysis of a Randomized Clinical Trial

Mona Fiazat¹, Justin Ezekowitz^{2,3}, Wendimagegn Alemayehu³, Cynthia M Westerhout³, Marco Sbolli^{4,5}, Dario Cani^{4,5}, David J Whellan⁶, Tariq Ahmad⁷, Kirkwood Adams⁸, Ileana L Piña⁹, Chetan B Patel¹, Kevin J Anstrom¹, Lawton S Cooper¹⁰, Daniel Mark¹, Eric S Leifer¹⁰, G Michael Felker¹, James L Januzzi¹¹, Christopher M O'Connor^{1,5}

Affiliations + expand
PMID: 32319999 DOI: 10.1001/jamacardio.2020.0640

Abstract

Importance: Despite evidence that guideline-directed medical therapy (GDMT) improves outcomes in patients with heart failure (HF) and reduced ejection fraction, many patients are undertreated. The Guiding Evidence-Based Therapy Using Biomarker Intensified Treatment (GUIDE-IT) trial tested whether a strategy of using target concentrations of N-terminal pro-brain natriuretic peptide (NT-proBNP) to guide optimization of GDMT could improve outcomes.

Objective: To examine medical therapy for HF in GUIDE-IT and potential reasons why the intervention did not produce improvements in medical therapy.

Design, setting, and participants: GUIDE-IT, a randomized clinical trial performed at 45 sites in the United States and Canada, was conducted from January 16, 2013, to September 20, 2016. A total of 894 patients with HF and reduced ejection fraction ($\leq 40\%$) were randomized to NT-proBNP-guided treatment with a goal to suppress NT-proBNP concentrations to less than 1000 pg/mL vs usual care. This secondary analysis examined the medical therapy titration and reasons why the intervention did not produce improvements in care and outcomes. Data were analyzed March 27 to June 28, 2019.

Main outcomes and measures: For each encounter, medication titrations were captured. A reason was requested if a modification was not made. A Cox proportional hazards regression model was used to assess the independent association of drug class with outcomes.

Results: Among the 838 patients available for analysis (566 men [67.5%]; median age, 62.0 years), 6223 visits occurred during 24 months. Adjustments of HF medication were made

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Abstract

But 11K+ still
way too many

Can filter by RCT

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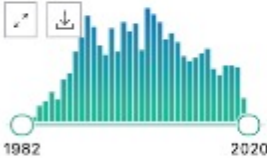
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RESULTS BY YEAR



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ARTICLE ATTRIBUTE

- Associated data

ARTICLE TYPE

- Books and Documents
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- Practice Guideline
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- Systematic Reviews

PUBLICATION DATE

- 1 year
- 5 years
- 10 years

Additional filters

Reset all filters

Filters applied: Randomized Controlled Trial. Clear all

1 **ACE inhibitors in congestive heart failure.**
Riegger AJ.
Cardiology. 1989;76 Suppl 2:42-9. doi: 10.1159/000174558.
PMID: 2670220 Review.
The renin-angiotensin-aldosterone system plays an important role in the development of **congestive heart failure** (CHF). In patients with chronic **heart failure**, **angiotensin-converting enzyme (ACE) inhibitors**, such as captopril, enalapril, and quinapril, have been shown to improve hemodynamics, reduce symptoms of fatigue and dyspnea, increase exercise capacity, correct hyponatremia, reduce diuretic requirements and ventricular arrhythmias, and conserve potassium and magnesium. ...**ACE inhibitors** improve prognosis in patients with **severe heart failure** and in patients with hyponatremia; the question of effect on survival in mild to moderate **heart failure** has yet to be answered....

2 **Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial.**
Seferovic JP, Claggett B, Seidelmann SB, Seely EW, Packer M, Zile MR, Rouleau JL, Swedberg K, Lefkowitz M, Shi VC, Desai AS, McMurray JJV, Solomon SD.
Lancet Diabetes Endocrinol. 2017 May;5(5):333-340. doi: 10.1016/S2213-8587(17)30087-6. Epub 2017 Mar 18.
PMID: 28330649 Free PMC article. Clinical Trial.
BACKGROUND: Diabetes is an independent risk factor for **heart failure** progression. Sacubitril/valsartan, a combination angiotensin receptor-neprilysin inhibitor, improves morbidity and mortality in patients with **heart failure** with reduced ejection fraction (HFrEF), compared with the **angiotensin-converting enzyme** inhibitor enalapril, and improves peripheral insulin sensitivity in obese hypertensive patients. ...

3 **Health-Related Quality of Life Outcomes in PARADIGM-HF.**
Lewis EF, Claggett BL, McMurray JJV, Packer M, Lefkowitz MP, Rouleau JL, Liu J, Shi VC, Zile MR, Desai AS, Solomon SD, Swedberg K.
Circ Heart Fail. 2017 Aug;10(8):e003430. doi: 10.1161/CIRCHEARTFAILURE.116.003430. PMID: 28784687 Clinical Trial.
BACKGROUND: Patients with **heart failure** and reduced ejection fraction have impaired health-related quality of life (HRQL) with variable responses to therapies that target mortality and **heart failure** hospitalizations. In PARADIGM-HF trial (Prospective Comparison of ARNI [Angiotensin Receptor-Neprilysin Inhibitor] With ACEI [Angiotensin-Converting-Enzyme Inhibitor] to Determine Impact on Global Mortality and Morbidity in Heart Failure),



Still too many, so can filter by Systematic Review

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congestive heart failure and ace inhibitors Search

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MYNCBI FILTERS 125 results

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Additional filters

Reset all filters

Filters applied: Systematic Reviews. Clear all

1 Drug treatment effects on outcomes in **heart failure** with preserved ejection fraction: a systematic review and meta-analysis. Zheng SL, Chan FT, Nabeebaccus AA, Shah AM, McDonagh T, Okonko DO, Ayis S. Heart. 2018 Mar;104(5):407-415. doi: 10.1136/heartjnl-2017-311652. Epub 2017 Aug 5. PMID: 28780577 [Free PMC article](#). [Review](#). BACKGROUND: Clinical drug trials in patients with **heart failure** and preserved ejection fraction have failed to demonstrate improvements in mortality. ...There was no effect seen with **ACE inhibitors**, aldosterone receptor blockers, mineralocorticoid receptor antagonists and other drug classes, compared with placebo. ... [Cite](#) [Share](#)

2 Beta-blockers and **inhibitors** of the renin-angiotensin aldosterone system for chronic **heart failure** with preserved ejection fraction. Martin N, Manoharan K, Thomas J, Davies C, Lumbers RT. Cochrane Database Syst Rev. 2018 Jun 28;6(6):CD012721. doi: 10.1002/14651858.CD012721.pub2. PMID: 29952095 [Free PMC article](#). [Review](#). OBJECTIVES: To assess the effects of beta-blockers, **angiotensin converting enzyme inhibitors**, angiotensin receptor blockers, angiotensin receptor neprilysin **inhibitors**, and mineralocorticoid receptor antagonists in people with **heart failure** with preserved ejection fraction. ...MRA treatment was associated with a greater risk of hyperkalaemia (16% of participants in the intervention group versus 8% in the control group; RR 2.11; 95% CI 1.77 to 2.51; 4291 participants; 6 studies; high-quality evidence).Eight studies (2061 participants) investigating **angiotensin converting enzyme inhibitors** (ACEI) were included with the overall quality of evidence assessed as moderate. ... [Cite](#) [Share](#)

3 Higher versus lower doses of **ACE inhibitors**, angiotensin-2 receptor blockers and beta-blockers in **heart failure** with reduced ejection fraction: Systematic review and meta-analysis. Turgeon RD, Kolber MR, Loewen P, Ellis U, McCormack JP. PLoS One. 2019 Feb 28;14(2):e0212907. doi: 10.1371/journal.pone.0212907. eCollection 2019. PMID: 30817783 [Free PMC article](#).

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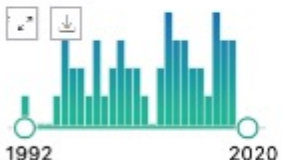
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1 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of **Heart Failure**: A Report of the American College of Cardiology/American **Heart** Association Task Force on Clinical Practice Guidelines and the **Heart Failure** Society of America. Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Colvin MM, Drazner MH, Filippatos GS, Fonarow GC, Givertz MM, Hollenberg SM, Lindenfeld J, Masoudi FA, McBride PE, Peterson PN, Stevenson LW, Westlake C. *Circulation*. 2017 Aug 8;136(6):e137-e161. doi: 10.1161/CIR.0000000000000509. Epub 2017 Apr 28. PMID: 28455343 Review. No abstract available. Cite Share

2 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of **Heart Failure**: A Report of the American College of Cardiology/American **Heart** Association Task Force on Clinical Practice Guidelines and the **Heart Failure** Society of America. Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Colvin MM, Drazner MH, Filippatos GS, Fonarow GC, Givertz MM, Hollenberg SM, Lindenfeld J, Masoudi FA, McBride PE, Peterson PN, Stevenson LW, Westlake C. *J Am Coll Cardiol*. 2017 Aug 8;70(6):776-803. doi: 10.1016/j.jacc.2017.04.025. Epub 2017 Apr 28. PMID: 28461007 Free article. No abstract available. Cite Share

3 National **Heart** Foundation of Australia and Cardiac Society of Australia and New Zealand: Australian clinical guidelines for the management of **heart failure** 2018. Atherton JJ, Sindone A, De Pasquale CG, Driscoll A, MacDonald PS, Hopper I, Kistler P, Briffa TG, Wong J, Abhayaratna WP, Thomas L, Audehm R, Newton PJ, O'Loughlin J, Connell C, Branagan M. *Med J Aust*. 2018 Oct 15;209(8):363-369. Epub 2018 Aug 2. PMID: 30067937 **Angiotensin-converting enzyme inhibitors, β -blockers and mineralocorticoid receptor antagonists improve outcomes in patients with HF associated with a reduced left ventricular ejection fraction. Additional treatment options in selected patients with persistent HF associated with reduced left ventricular ejection fraction include**



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Scope:

Systematic Reviews

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LCZ696 and preservation of renal function in heart failure: A meta-analysis of 6 randomized trials.
Chen X, Jin C, Xie L, Xiang M.
Rev Cardiovasc Med. 2020 Mar 30; 21(1):113-118.

Cardiovascular Outcomes in Relation to Antihypertensive Medication Use in Women with and Without Cancer: Results from the Women's Health Initiative.
Reding KW, Aragaki AK, Cheng RK, Baric A, Wassertheil-Smoller S, Chubak J, Limacher MC, Hundley WC, D'Agostino R Jr, Vitolina MZ, et al.
Oncologist. 2020 Apr 6; . Epub 2020 Apr 6.

Postponement of Death by Pharmacological Heart Failure Treatment: A Meta-Analysis of Randomized Clinical Trials.
Hansen MR, Hróbjartsson A, Videbæk L, Ennis ZN, Pareek M, Paulsen NH, Brice M, Olsson M, Pottegård A, Damkier P, et al.
Am J Med. 2020 Mar 13; . Epub 2020 Mar 13.

Pharmacological interventions for heart failure in people with chronic kidney disease.
Lunney M, Russo M, Natale P, Quinn RR, Rankinsley PE, Konstantinidis I, Palmer SC, Tonelli M, Strippoli GF, Ravani P.
Cochrane Database Syst Rev. 2020 Feb 27; 2:CD012466. Epub 2020 Feb 27.

Sex differences in mineralocorticoid receptor antagonist trials: a pooled analysis of three large clinical trials.
Rossello X, Ferreira JP, Pocock SJ, McMurray JJV, Solomon SD, Lam CSP, Gierd N, Pitt B, Rossignol P, Zannad F.
Eur J Heart Fail. 2020 Feb 19; . Epub 2020 Feb 19.

Medical Genetics

Topic:

Results: 5 of 336

Current Management and Treatment
Athinier A, Falduto A, Gigli M, Pappalardo A, Sinagra G.
Dilated Cardiomyopathy: From Genetics to Clinical Management. 2019. 2019 May 18.

Association of Regulatory Genetic Variants for Protein Kinase C α with Mortality and Drug Efficacy in Patients with Heart Failure.
Luzum JA, Ting C, Peterson EL, Gui H, Shugg T, Williams LK, Li L, Sedee W, Wang D, Lanfear DE.
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Comparison of First-Line Dual Combination Treatments in Hypertension: Real-World Evidence from Multinational Heterogeneous Cohorts.
You SC, Jung S, Swertel JN, Ryan PB, Schuemic MJ, Suchard MA, Lee S, Cho J, Hripesak G, Park RW, et al.
Korean Circ J. 2020 Jan; 50(1):52-68. Epub 2019 Aug 28.

Effectiveness of poly pill for primary and secondary prevention of cardiovascular diseases (Polytran): a pragmatic, cluster-randomised trial.
Roshandel G, Khoshnia M, Poustchi H, Hamming K, Kamangar F, Gharavi A, Ostovaneh MR, Nateghi A, Majed M, Navabakhsh B, et al.
Lancet. 2019 Aug 24; 394(10169):872-883.

Sex-linked differences in the mortality in Ren-2 transgenic hypertensive rats with aorto-caval fistula: effects of treatment with angiotensin converting enzyme alone and combined with inhibitor of soluble epoxide hydrolase.



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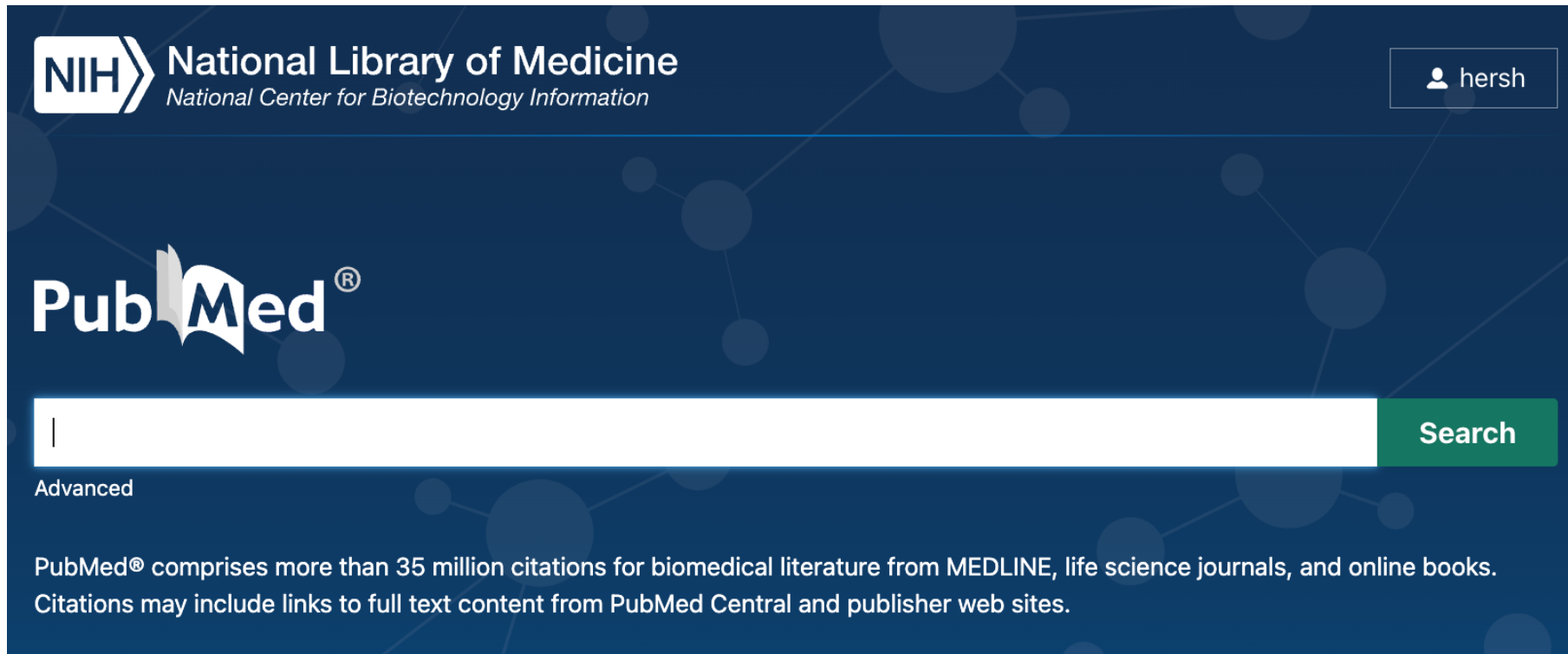
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