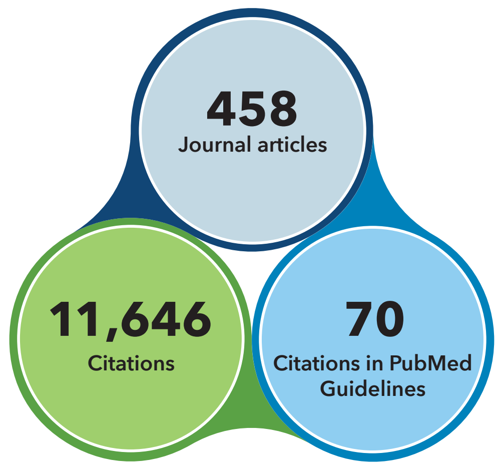
Kaiser Permanente Research Brief

Men's health

This brief summarizes the contributions of Kaiser Permanente Research since 2007 on the topic of men's health. Although men's health encompasses a wide range of health issues, this brief will focus on specific conditions affecting men (such as prostate cancer, testicular cancer, benign prostatic hyperplasia, and erectile dysfunction), as well as certain conditions for which men have specific or elevated risks (such as infertility, hypogonadism, bladder cancer, cardiovascular disease, back pain, and opioid use disorders).

Kaiser Permanente publications related to men's health since 2007



Source: Kaiser Permanente Publications Library and Scite metrics, as of March 7, 2022 .

Men in the United States are at risk for a variety of acute and chronic health problems. Approximately 1 in 9 will be diagnosed with prostate cancer at some point, making it the second-most common cancer among American men, and the American Cancer Society estimated that over 30,000 men died of this disease in 2019.[1] Testicular cancer is less common than prostate cancer, affecting 1 in every 250 males, but it typically affects much younger men and boys, with an average age at diagnosis of just 33.[1] In addition, more than three-quarters of the 80,000 Americans who will be diagnosed with bladder cancer this year are men, and nearly 13,000 men were expected to die from this cancer in 2019.[1] Men are also more likely than women to suffer from common chronic illnesses. Cardiovascular disease causes 1 of every 4 deaths in men, and a large majority of sudden cardiac events occur in men.[2] Furthermore, men are more likely than women to be diagnosed with opioid use disorders.[3]

Many of the health problems men face can significantly affect quality of life. Benign prostatic hyperplasia, or BPH, a noncancerous enlargement of the prostate gland often leading to urinary health problems, is a very common condition, affecting more than 14 million men.[4] Erectile dysfunction also affects approximately 20% of men, and becomes more common with age: One study estimated that ED is experienced by 5% of men under 40, but 70% of men 70 and older.[5] ED often occurs in men with low testosterone, or hypogonadism, which is estimated to affect 6% of Americans.[6,7] Infertility is an issue for 1 in 6

This brief summarizes a selection of the publications contained within the Kaiser Permanente Publications Library, which indexes journal articles and other publications authored by individuals affiliated with Kaiser Permanente. The work described in this brief originated from across Kaiser Permanente's 8 regions and was supported by a wide range of funding sources including internal research support as well as both governmental and nongovernmental extramural funding.

couples in the United States, and male infertility is implicated in two-thirds of all cases.[8] Moreover, while low back pain is more common in women,[9] men are much more likely to be prevented from working by this pain.[10]

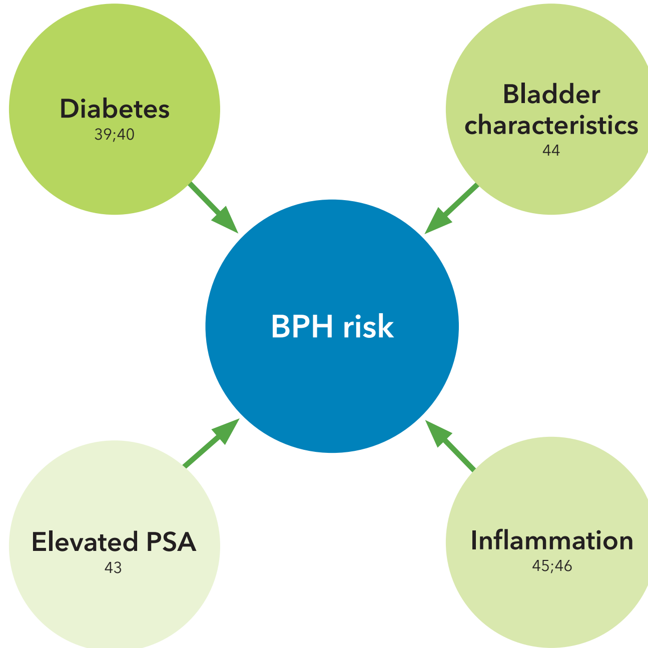
Men's health is an active area of study for Kaiser Permanente Research. Scientists across the organization have used our rich, comprehensive, longitudinal data to advance knowledge in the areas of understanding risk, improving patient outcomes, and translating research findings into policy and practice. We have published more than 450 articles related to men's health since 2007.[11] Together, these articles have been cited nearly 12,000 times. These articles are the product of observational studies, randomized controlled trials, meta-analyses, and other studies led by Kaiser Permanente scientists. Our unique environment – a fully integrated care and coverage model in which our research scientists, clinicians, medical groups, and health plan leaders collaborate – lets us contribute generalizable knowledge on men's health, and many other research topics.

Understanding Risk

For which health problems are men at increased risk?

Men experience a variety of unique health problems, and our research has explored risk factors associated with these conditions. Our scientists have done extensive work on the genetic causes of male cancers such as prostate cancer,[12-25] and have also found other health conditions to be associated with increased risks of these cancers, including obesity,[26] infertility,[27] sexually transmitted diseases,[28] and inflammatory illness.[29-31] In addition, our research has demonstrated links between lifestyle factors and cancer risks. Smoking tobacco (alone[32] or in conjunction with cannabis[33]) and poor diet[34] may be associated with cancer risk in men. Conversely, the use of statins[35;36] and certain medications for benign prostatic hyperplasia[37] may protect against the development of prostate cancer.

These and other risk factors have also been implicated in the development of BPH, and in reproductive or sexual problems in men. Kaiser Permanente research has found that men with type 2 diabetes are at increased risk of both ED[38] and urination problems suggestive of BPH,[39;40] while men who smoke are at elevated risk of ED[41] but not urinary retention.[42] Other risk factors for BPH include elevated levels of PSA (prostate-specific antigen),[43] certain bladder characteristics,[44] and inflammation.[45;46] Use of statins, however, was found to be protective against the risk of BPH.[47] Low levels of testosterone are associated with erectile dysfunction,[48] as is advancing age.[49] Our scientists have also identified a genetic link[50] to the development of ED. Other factors associated with ED and other forms of reproductive dysfunction include diet and other lifestyle factors,[51] exposures to BPA (bisphenol A, an industrial chemical found in plastic)[52-55] and the use of nonsteroidal anti-inflammatory drugs,[56] opioids,[57] and multiple medications.[58] Our research has also linked BPA exposure,[59;60] opioid use,[61;62] and genetic factors[13;63;64] to the risk of low testosterone. Finally, Kaiser Permanente research into cardiovascular risks has found androgen deprivation therapy for prostate cancer[65,66] to be linked to metabolic illness in men, and lifestyle factors including poor physical fitness have been linked to atherosclerosis.[67] Younger men who experience ED may also be at higher risk for cardiovascular events.[68]



Are there subgroups of men who are at particularly high risk for these health problems?

Studies done at Kaiser Permanente have explored racial and ethnic disparities in diseases commonly experienced by men. Although Black men may be at risk of faster elevations in PSA,[69] evidence suggests that prostate cancer is identified more often[19] and treated more aggressively[70] in White men. Black men with localized prostate cancer are more likely to reject, and less likely to complete, radiotherapy.[71;72] Our scientists have also found lower risks of ED in Black and Asian men,[73] and elevated risks for urinary problems in Asian and Hispanic men.[74] Although the reasons for these disparities are unclear, our researchers have found that racial disparities in access to care may be less common among Kaiser Permanente members,[75] compared to men outside our organization.[76]

What are the consequences of health conditions common to men?

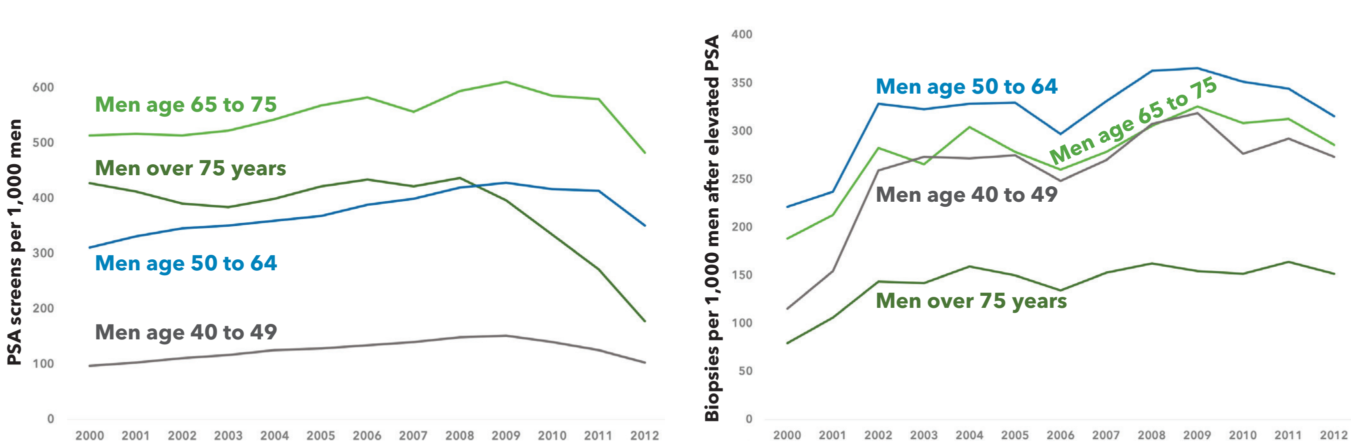
Another line of research has focused on the health risks that may result from the health problems that men often face. Although many of these conditions carry the risk of mortality, they may also have significant effects on quality of life. Anxiety and other psychological problems also occur commonly in men with these diagnoses.[77-80] BPH can significantly affect bladder function, and the fertility and sexual function problems these men often experience can impact personal relationships.[81] Studies of health-related quality of life following prostate surgery in our members found that these patients frequently suffer short-term sexual dysfunction, as well as longer-term urinary incontinence.[82;83] Conservatively-managed patients, however, may be at risk for greater health-related anxiety.[80] These findings have been echoed in a study of quality of life following radiation treatment for prostate cancer.[84]

Improving Patient Outcomes

What prevention or early intervention strategies are effective in mitigating the health risks faced by men?

Kaiser Permanente researchers have studied numerous interventions for preventing health problems experienced by men. Early screening for prostate cancer has been associated with reduced mortality,[85-89] and prompt follow-up on abnormal PSA results using electronic health records[90] may further improve outcomes. However, screening guidelines have become more targeted in recent years due to concerns about high false-positive rates and the significant heterogeneity of the disease; this has led to declining use of PSA tests in all age groups over time.[91;92] Our scientists have also conducted genomic research involving PSA, which may be used to refine screening through the use of molecular genetic

As guidelines for PSA screening in prostate cancer have changed, screening rates in older men have declined, even though rates of biopsies remain steady.[91]



testing.[93-95] We have also found that social support increases the likelihood of receiving appropriate screening.[96]

Some of our preventive programs at Kaiser Permanente aim to address underlying causes of men's health problems. For example, although the reduction of cardiovascular and lung disease is the primary goal of smoking cessation programs, these programs have also been shown to reduce ED.[41] Kaiser Permanente research has also addressed risk assessment and prevention strategies for specific cancers. Research conducted by our scientists has helped clinicians to understand the significance of microscopic hematuria (small amounts of blood in the urine) for the risk of bladder cancer. Although such cancer is rare in patients with microscopic hematuria, male sex is a risk factor for such a diagnosis, and is part of a Hematuria Risk Index developed by Kaiser Permanente researchers and clinicians to gauge patient risk and decrease unnecessary use of invasive testing.[97] Research on 5-alpha-reductase inhibitors in the treatment of BPH has also explored the effectiveness of these medications for preventing death from prostate cancer[37] and other causes.[98]

What are the key factors in effective treatment of the common health problems experienced by men?

A significant area of research at Kaiser Permanente involves the effectiveness and safety of treatments for men's health problems. One area of focus surrounds the decision-making process regarding active treatment (such as surgery or radiation) versus conservative management of prostate cancer, in which the risks of complications must be weighed against the likelihood of long-term disease progression.[99-103] These decisions are often associated with significant anxiety,[78;80;104;105] and our scientists have studied risk stratification approaches intended to match lower-risk men with less invasive treatments.[106-110] Recent studies have found that supporting men's decisions about surveillance, either through web-based education and coaching[108;111] or individualized risk prediction,[110] reduces anxiety and improves the quality of decisions. Kaiser Permanente researchers have also studied genetic and other factors associated with poor responses to many forms of prostate cancer treatment.[112;113] Our scientists have conducted numerous evaluations of available tests for prostate cancer occurrence and progression, which enables clinicians to choose the most effective among these tests.[114-119] Recent research has also found that increasing physical activity is associated with improved quality of life in men undergoing androgen deprivation therapy for prostate cancer.[120]

Our scientists have also worked to improve care for patients with bladder cancer by studying patient and clinician factors associated with various types of urinary diversion procedures.[121;122] The Be-Well Study being conducted by Kaiser Permanente researchers is exploring the role of diet and other lifestyle factors in the care of patients with bladder cancer.[123;124] In keeping with Kaiser Permanente's broader focus on total patient health, another focus concerns compliance with recommended preventive health care services while treating male-specific health conditions.[125-127] Despite concerns that patients' overall health management would suffer after a diagnosis of prostate cancer, 2 studies conducted among our members found that delivery of preventive services (including colon cancer screening and flu shots) increased after such diagnoses.[125;126] In response to evidence that guidelines for testosterone therapy are frequently not followed, our researchers have also studied the safety of these treatments. One study, conducted outside of Kaiser Permanente, found that testosterone therapy increased the risk of nonfatal myocardial infarction in some men,[128] while another study conducted with Kaiser Permanente members found that testosterone reduced cardiovascular risks.[129] More recent work has found no evidence of a relationship between testosterone therapy and risks for cardiovascular or prostate cancer.[130;131]

What are the key components of approaches to reduce disparities in care and outcomes experienced by men?

Kaiser Permanente has effectively reduced racial and ethnic disparities in men's health through the use of systems, including its Complete Care program,[132] to ensure the delivery of recom-

Two years after prostate cancer treatment, quality-of-life scores related to sexual function remain low, but scores related to urinary incontinence are only affected for patients undergoing robotic prostatectomy.[82]

	Androgen deprivation		Robotic prostatectomy		Radiation therapy	
	Sexual function	Urinary incontinence	Sexual function	Urinary incontinence	Sexual function	Urinary incontinence
Baseline	42	86	63	92	50	89
1 month	25	83	15	30	36	79
12 months	17	81	27	66	36	84
24 months	13	82	33	66	35	84

mended care.[133-135] PSA screening rates in Kaiser Permanente are higher among ethnic minority populations[75] compared to American men generally,[76] as are the rates of timely biopsies after abnormal PSA test results[136] and the quality of prostate cancer care.[137-139] Evidence also exists that our efforts have reduced disparities in the incidence of cardiovascular disease between groups defined by race or ethnicity.[140]

Translating Research Findings Into Policy and Practice

Kaiser Permanente is a learning health care organization that works to systematically use research to inform and improve practice. Research, clinical, and operational partners within Kaiser Permanente have tested a range of interventions to reduce the risk of common men's health problems, and to improve the outcomes men experience. Our work on the use of microscopic hematuria evaluation in bladder cancer management[97] led directly to changes in national practice guidelines.[141] Kaiser Permanente researchers in Northern California have used artificial intelligence techniques to identify men with medical record information suggestive of testicular cancer, leading to improved monitoring and care.[142] In addition, our researchers in Southern California have supported the implementation of PSA SureNet, which leverages our electronic health records to ensure that men with elevated PSA test results receive appropriate clinical management.[90,143] Kaiser Permanente's electronic health record system has also been used to rapidly implement changes in prostate cancer screening guidelines, and to develop a prostate cancer risk calculator to guide decision-making in men with abnormal PSA test or physical exam results.[144]

Kaiser Permanente research contributes not only to policy and practice change within our own care delivery organization but has also advanced national understanding of men's health. To date, Kaiser Permanente's research on men's health since 2007 has been cited 70 times within recent consensus statements and clinical practice guidelines published by a wide range of entities, including the American Cancer Society,[145] the American Academy of Family Physicians,[146] the American Urological Association,[147] the Genitourinary Pathology Society,[148] and a joint guideline involving the American Urological Association, American Society for Radiation Oncology, and Society of Urologic Oncology.[149] In addition, Kaiser Permanente researchers and clinician scientists have directly contributed as authors of the prostate cancer screening guidelines published by the U.S. Preventive Services Task Force.[87;88]

Kaiser Permanente is also an established leader in the field of men's health research. The California Men's Health Study was a multi-year study conducted in a group of nearly 85,000 diverse male Kaiser Permanente members.[33-35;73;150-154] Many participants in the CMHS have subsequently chosen to enter the Kaiser Permanente Research Bank, a long-term genetic research effort.[155] We are also involved in the National Cancer Institute's Community Oncology Research Program[156,157] and its Genitourinary Cancers Steering Committee,[158] and in the NRG Oncology collaboration.[159-161] Our scientists are leaders in important National Cancer Institute-sponsored research, including the Be-Well Study[124] and the Breast and Prostate Cancer Cohort Consortium.[13;17;63;64]

Kaiser Permanente's 185 research scientists and 1,530 support staff members are based at 9 research centers. There are currently 2,355 studies underway, including clinical trials. Since 2007 our research scientists have published more than 20,000 articles in peer reviewed journals. Kaiser Permanente currently serves 12.5 million members in 8 states and the District of Columbia.

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