

research



Patterns of war related injuries in Gaza p 21



Reducing need for intubation with non-invasive ventilation p 25



Use of PSA testing and retesting in primary care p 26

Gaza: documenting the trauma of war

SPECIAL PAPER Survey study of international healthcare workers **FAST TRACK**

Patterns of war related trauma in Gaza during armed conflict

El-Taji O, Ali A, Alser O, et al; on behalf of the International Medical Responders for Gaza collaborators

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Study question What are the patterns of war related injuries experienced in Gaza, Palestine?

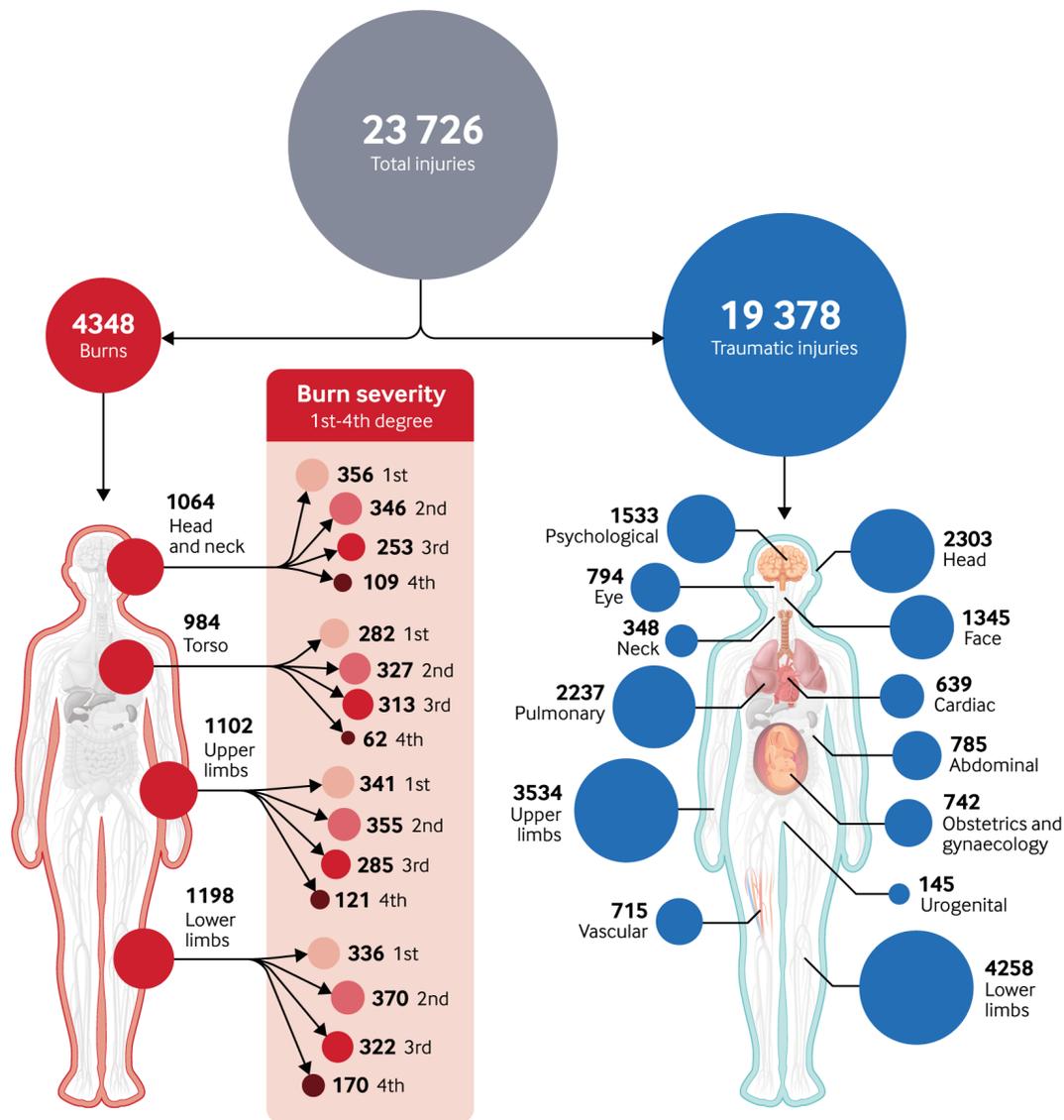
Methods A Delphi informed survey was distributed through non-governmental organisation rosters and secure WhatsApp and email groups. Respondents completed the survey using contemporaneous logbooks and shift records. The main outcome was the type of injuries observed by international healthcare workers during the conflict in Gaza.

Study answer and limitations The survey collected data on 12 anatomical regions, mechanisms of trauma, and general medical conditions. 78 healthcare workers reported 23 726 trauma related injuries and 6960 injuries related to weapons. The most common traumatic injuries were burns (n=4348, 18.3%), lower limb injuries (n=4258, 17.9%), and upper limb injuries (n=3534,

14.9%). Explosive injuries accounted for most of the weapon related trauma (n=4635, 66.6%), predominantly affecting the head (n=1289, 27.8%), whereas firearm injuries disproportionately affected the lower limbs (n=526, 22.6%). Healthcare workers reported 4188 people with chronic disease across 11 domains requiring long term treatment. This study has several limitations. During periods of large influxes of injured people, recording may have been incomplete, contributing to possible underestimation, and duplication of reporting is possible. Also, the survey reflects injuries among people who survived long enough to reach clinical evaluation and does not capture those who died before medical contact.

What this study adds Healthcare workers deployed to Gaza reported polytrauma (≥ 2 anatomical regions), complex blast injuries from high yield explosives, firearm related injuries to upper and lower limbs, and severe disruption to primary care and the treatment of chronic diseases.

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Top 3 most common traumatic injury types by location

Head	Face	Eye	Neck	
392 Diffuse brain injury	673 Local infection of skin	222 Foreign body in orbit	195 Penetrating neck trauma	
368 Penetrating head injury	256 Penetrating facial trauma	167 Blunt orbital trauma	139 Blunt neck trauma	
253 Focal brain injury	229 Fracture of malar/maxillary bones	135 Penetrating orbital trauma	14 Emergency surgical airway	
Pulmonary	Cardiac	Abdominal	Urogenital	Vascular
940 Traumatic pneumothorax	415 Cardiac arrhythmia	416 Bowel injury	102 Kidney injury	315 Lower limb
425 Pneumonia	121 Penetrating heart trauma	149 Liver injury	19 Ureteric injury	157 Upper limb
403 Open wound of the thorax	77 Cardiac tamponade	110 Splenic injury	12 Bladder injury	157 Limb ischaemia
Upper Limb	Lower Limb	Obstetrics and gynaecology	Psychological	
707 Fracture of radius and ulna	1277 Fracture of tibia and fibula	141 Miscarriage	629 Depression	
459 Crushing injury of wrist and hand	596 Crushing injury of lower limb	134 Sepsis	537 Acute stress reaction	
353 Fracture of shaft of humerus	383 Fracture of foot	119 Emergency caesarean	199 Suicidal ideations	

Body atlas of trauma injuries in Gaza, including distribution of trauma injuries across anatomical regions. Absolute counts are presented, and represented by circle sizes, using area based calculations. The top three injury subtypes per body region are presented. Burns are further subdivided by severity: first degree burns involve only the epidermis (superficial), second degree burns involve the epidermis and a portion of the dermis (partial thickness), third degree burns involve the entire epidermis and dermis (full thickness), and fourth degree burns are full thickness, extending into underlying muscle, tendon, ligament, or bone

Little is known about patterns of injury in civilians subjected to high intensity bombardments, such as those that occurred during the US and UK invasions of Iraq and Afghanistan and which are now occurring in Gaza. In Iraq, for example, according to Human Rights Watch, 29 000 bombs were dropped in only a few weeks in 2003.¹ An observational study by Maitland and colleagues analysed 983 civilian blast and ballistic casualties in Afghanistan in order to generate what they said was the first evidence based assessment of injury burden, and a guide to the immediate medical responses required.² The three most common surgical procedures for civilian blast injuries were debridement, amputation, and laparotomy; for civilian ballistic injuries, these were debridement, laparotomy, and vascular procedures.

In their study, El-Taji and colleagues have now gone much further.³ The authors draw on the first hand experiences of 78 healthcare workers deployed across all five Gaza governorates and representing 22 non-governmental organisations. Two thirds of the workers had previous experience working in war zones, and most kept records or journals of the patients they saw while working in Gaza, which adds credibility to the details reported in this study.

Research of this kind is enormously difficult, especially since accurate record keeping in conflict zones is often impossible, as when computer systems and paper records have been destroyed and medical facilities are overwhelmed by casualties. The reports of these front line professionals provide systematic documentation of the patterns of injury currently overwhelming Gaza hospitals. A multifactorial methodology was applied to a dataset comprising nearly 24 000 traumatic injuries documented by these professionals. Information not captured relate to those people who died on the spot or before they could be brought to a hospital.

Unique setting for war trauma

As a field of study, Gaza has distinctive features that may influence the nature and pattern of injuries and deaths. In most of history, civilians have had some ability to flee active war zones, but scarcely so in this



RIZEK ABDELJAWAD/XINHUA/LAMY

Children are rendered suicidal after witnessing the traumatic deaths of family members

case: Gaza is entirely enclosed. Its citizens are confined to a densely populated urban centre, and this study attests to the effects of high explosive and incendiary munitions driven down narrow urban corridors. Gazans have faced a military assault across the whole of society and its institutions, the intensity and scale of which, allied to telling statements of intent by Israeli leaders, led the International Court of Justice to conclude in January 2024 (only three months after onset) that this was a plausible case for genocide.⁴ Since then, an independent United Nations commission of inquiry, Amnesty International, Israeli human rights organisations B'Tselem, and Physicians for Human Rights, and at least 52 sovereign states, have concluded similarly.⁵⁻⁷ Furthermore, adding to the extremity of the medical situation, Gazans confront famine as a weapon of war.⁸

Regarding the capacity of the health service to respond to these events, there has been systematic flouting of the Geneva Convention conferred immunity afforded to medical facilities and staff. Hospitals have been flattened. In all war zones, rescuers wear clothing identifying them as healthcare professionals, which is supposed to guarantee protection but has made them targets here.^{9,10} According to Médecins Sans Frontières (updated September 2025), 1500 healthcare professionals have been killed.¹¹

As an example of the targeting of healthcare professionals—Adnan Al-Bursh, head of orthopaedics at Gaza's largest hospital, Al-Shifa, was abducted from the hospital in December 2023, where he was reportedly working around the clock. He was 49 years old and in good health. His death was announced four months later,

likely after torture.¹² In July 2025, the *Guardian* reported that 28 Gazan doctors were currently in detention, of whom eight were senior consultants in surgery, orthopaedics, intensive care, cardiology, and paediatrics.¹³

More severe injuries

The current study notes that injury profiles resemble those sustained in combat settings by military personnel, and that the healthcare workers in the survey perceived injury patterns to be more severe than those encountered in previous war zones. Multi-limb trauma, degloving injuries, open skull fractures, extensive visceral and vascular injuries were common, often presenting in unstable patients. Burns were reported by 70% of healthcare workers, and head trauma—including diffuse and penetrating injuries—by 73% of the healthcare workers. Workers reported 742 obstetric cases, of which 36% involved the death of a fetus, mother, or both. The authors have identified an injury phenotype among survivors comprising pervasive polytrauma, substantive trauma to head and extremities, fulminant blast and shrapnel wounds, and extensive burns.

Many other human stories unmask the horror behind the statistics. A 10 year old girl is admitted with a shattered pelvis and femur, ruptured bladder, avulsed ureter, rectal injury, and torn femoral and external iliac arteries. She dies in pain several hours later. There are no anaesthetics or sterile materials, operations take place on emergency department floors, and malnutrition worsens outcomes and delays wound healing. No treatment for cancer is available. Children are rendered suicidal after witnessing the traumatic deaths of family members.

The collated descriptions of the extent and distribution of traumatic injuries, including burns, graphically illustrate the daunting challenges ahead. The study by El-Taji and colleagues adds substantially to our understanding of the scale and nature of civilian suffering in conditions of war without restraint. It illuminates both the tasks facing medical relief and surgery in the acute phase, and the nature of the immense surgical and medical rehabilitation that will have to follow for survivors. It is likely to prove a landmark study.

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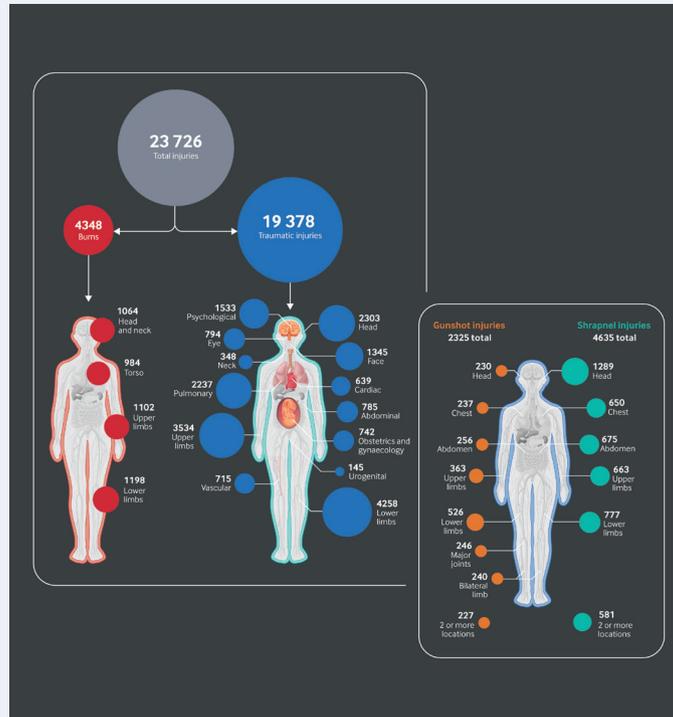
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A study on the patterns of war related injuries in Gaza was born out of necessity

As humanitarian clinicians deployed to Gaza, we have been repeatedly asked the same question over the past two years by colleagues, journalists, and policy makers: What exactly are you seeing there? The World Health Organization and Gaza's health ministry have regularly released headline figures on the number of people who have been killed or wounded, but granular, clinical level data on injuries, broken down by anatomical location, mechanism, and severity, have been absent. When there is a vacuum of detailed data, anecdote can easily dominate, and the limited healthcare data we have can become politicised, questioned, or dismissed. Our study (doi:10.1136/bmj-2025-087524) on war related injuries in Gaza was therefore born out of necessity and not academic curiosity.

We felt a duty to provide structured, neutral evidence from the perspective of frontline practitioners. The figure depicting a body atlas of injuries—the seed of this entire project—was our attempt to show in a single glance what thousands of words could not: the scale, distribution, and severity of injuries endured by civilians.

Collecting data in this environment was extraordinarily challenging. Hospitals were repeatedly damaged or destroyed, systems for storing medical records were rendered unusable, and influxes of casualties regularly overwhelmed any attempt at routine documentation. Clinicians relied on whatever



notes, tallies, or shift records they could maintain in the chaos. Even then, the figures we present almost certainly underestimate the true burden.

What struck us most was the pattern of injuries. The profiles resembled those reported among military personnel on battlefields, yet here they had happened to children and adults in densely populated civilian areas. Blast related polytrauma, multiple amputations, severe burns, and penetrating head injuries were not outliers but part of the daily caseload that healthcare staff were handling. Many of the respondents to our survey who had previously provided care in active war zones reported that the scale and severity of trauma in Gaza was beyond anything they had previously managed.

Our dataset inevitably reflects only those who survived long enough to reach a clinician. It excludes

No dataset can truly capture the suffering

the victims of high explosive weapons whose bodies were obliterated or rendered unrecognisable, those incinerated in fireballs, torn apart by aerial bombardment, or reduced to fragments in the epicentre of 2000 pound munitions. These people never entered hospital records and thus remain absent from our body atlas of injuries. They are the disappeared: the thousands of missing people, many of them children, whose remains could not even be identified. Their absence is itself a reminder of the scale of destruction and the limits of what clinical data can ever capture.

Impossible conditions

Palestinian healthcare workers endured the greatest sacrifice. They kept hospitals running under

bombardment, often without electricity, anaesthetics, or essential supplies. Many lost colleagues, family members, and, in too many cases, their own lives. Our survey's reliance on the perspectives of international responders deployed to Gaza, while necessarily limited, served as a feasible interim proxy for structured documentation, given the extreme operational, communication, and genuine safety constraints under which Palestinian clinicians were working. Their courage under impossible conditions dwarfs any contribution from international teams like ours.

What do we hope this work achieves? At minimum, to provide an independent, clinician reported account of the medical consequences of Israel's attacks on Gaza. But more importantly, to remind readers that behind every statistic lies a patient, a family, and a devastated health system unable to cope. No dataset can truly capture the suffering of colleagues killed while doing their job, of hospitals reduced to rubble, or of patients left without care. Ultimately, the clearest lesson from these findings is that such levels of civilian trauma are incompatible with any functioning health system. For the sake of patients and providers alike, this war must end.

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Non-invasive high frequency oscillatory ventilation for primary respiratory support in extremely preterm infants

Li Y, Zhu X, Li L-J, et al

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Study question Is non-invasive high frequency oscillatory ventilation (NHFOV) more efficacious than nasal continuous positive airway pressure (NCPAP) in reducing invasive mechanical ventilation as primary respiratory support for extremely preterm infants with respiratory distress syndrome?

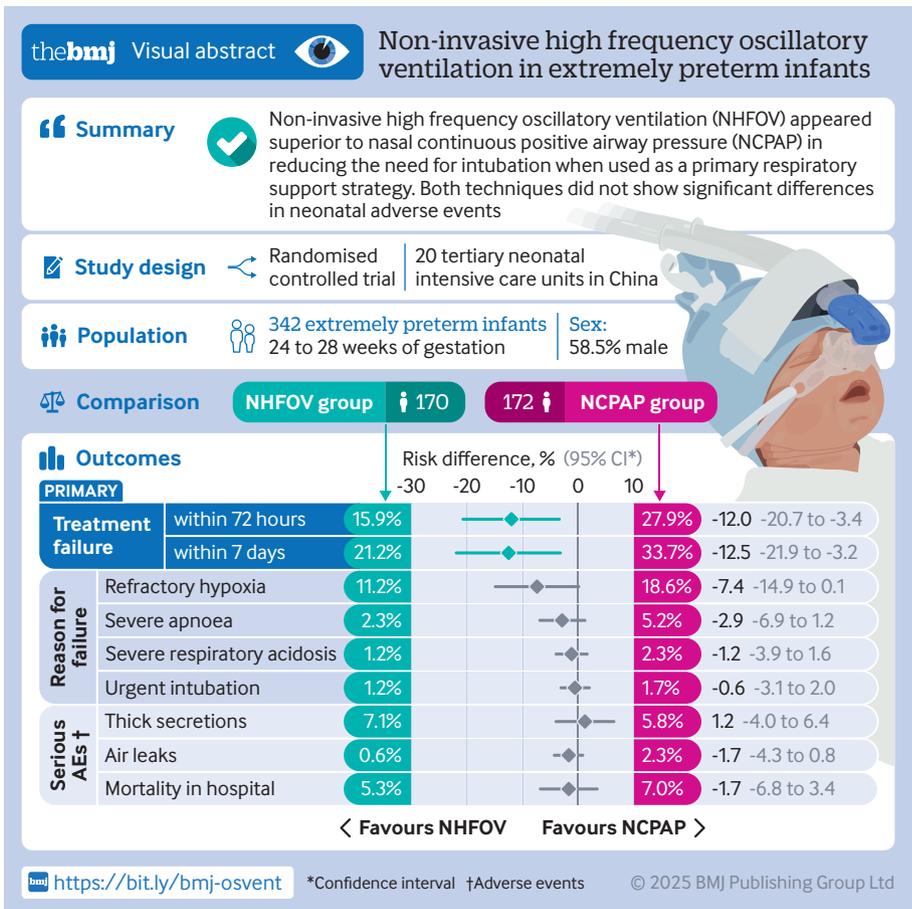
Methods This multicentre, randomised controlled trial recruited 342 extremely preterm infants (born between 24 and 28 weeks of gestation) from 20 tertiary neonatal intensive care units in China between August 2022 and August 2024. Infants were randomly allocated to receive NHFOV or NCPAP as primary respiratory support for respiratory distress syndrome. The primary outcome was treatment failure, which was defined as the need for invasive mechanical ventilation within 72 hours after birth. Secondary outcomes included the need for invasive mechanical ventilation within seven days after birth.

Study answer and limitations Treatment failure within 72 hours occurred in 27 of 170 infants (15.9%) in the NHFOV group and 48 of 172 (27.9%) in the NCPAP group (risk difference -12.0 percentage points, 95% confidence interval -20.7 to -3.4; P=0.007). Treatment failure within seven days was also lower in the NHFOV group than in the NCPAP group (-12.5 percentage points, -21.9 to -3.2; P=0.008). However, the cohort included few infants born <26 weeks (41/342, 12%), making the generalisability of results to this subgroup uncertain.

Comparison of risk differences between NHFOV and NCPAP in treatment failure within 72 hours after birth among extremely preterm infants. Values are number (percentage) unless stated otherwise

Outcomes	NHFOV (n=170)	NCPAP n=172)	Risk difference, percentage points (95% CI)	P value
Treatment failure within 72 hours	27/170 (15.9)	48/172 (27.9)	-12.0 (-20.7 to -3.4)	0.007
Reason for treatment failure:				
Refractory hypoxia	19 (11.2)	32 (18.6)	-7.4 (-14.9 to 0.1)	0.05
Severe apnoea	4 (2.3)	9 (5.2)	-2.9 (-6.9 to 1.2)	0.16
Severe respiratory acidosis	2 (1.2)	4 (2.3)	-1.2 (-3.98 to 1.6)	0.42
Urgent intubation	2 (1.2)	3 (1.7)	-0.6 (-3.1 to 2.0)	0.66

CI=confidence interval; NCPAP=nasal continuous positive airway pressure; NHFOV=non-invasive high frequency oscillatory ventilation.



What this study adds NHFOV appeared superior to NCPAP in reducing the need for intubation when used as a primary respiratory support strategy in extremely preterm infants.

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Development Program of China and Natural Science Foundation of Chongqing. No competing interests declared. Data openly and publicly available (<https://data.mendeley.com/datasets/66gc4zb37c/1>).

Trial registration ClinicalTrials.gov NCT05141435.

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Prostate specific antigen retesting intervals and trends in England

Collins KK, Oke JL, Virdee PS, Perera R, Nicholson BD

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Study question How are prostate specific antigen (PSA) tests utilised in primary care in England?

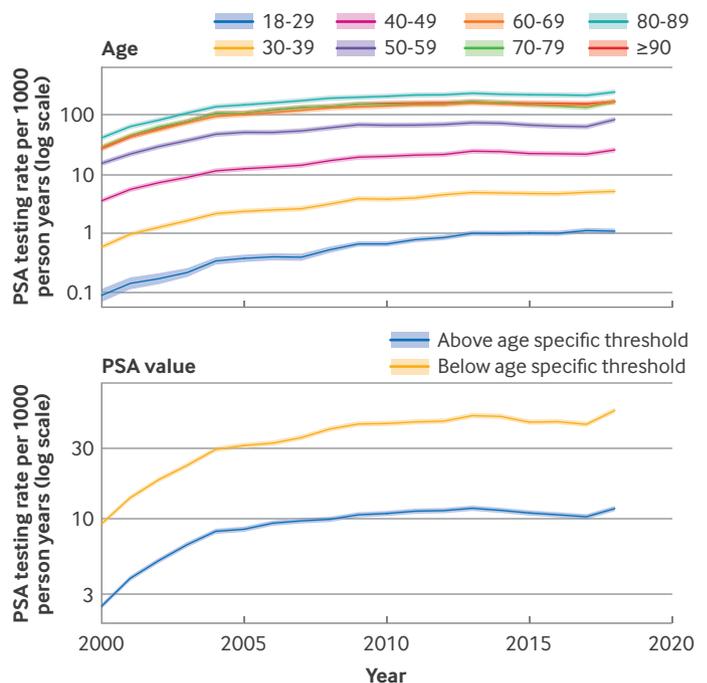
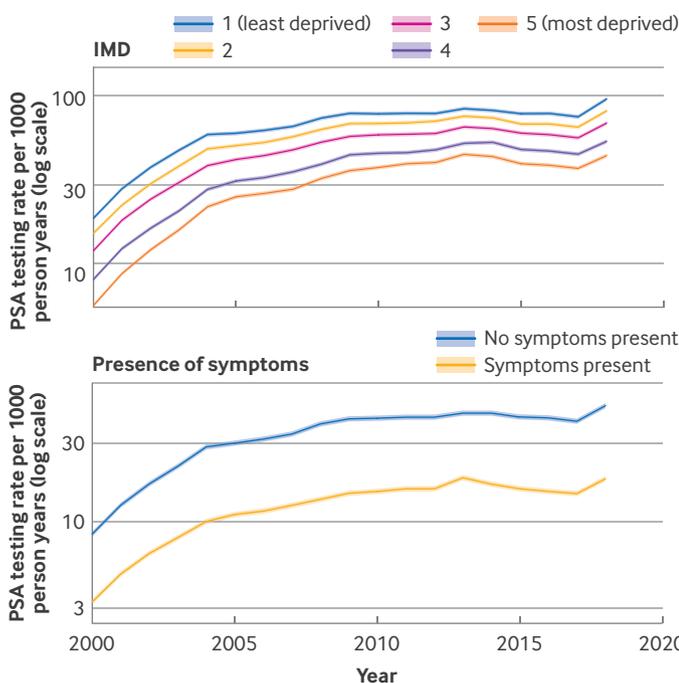
Methods This population based cohort study included 10 235 805 male patients aged ≥ 18 years registered at 1442 general practices in England that contributed to the Clinical Practice Research Datalink between 2000 and 2018. Temporal trends and annual percentage changes were analysed using age standardised PSA testing rates. Mixed effects negative binomial regression models investigated individual patient rate ratios of PSA testing. Linear mixed effects models examined factors associated with an individual patient's length of intervals between PSA retesting. All results were analysed by region, deprivation, age, ethnicity, family history of prostate cancer, symptom presentation, and PSA value.

Study answer and limitations 1 521 116 patients who had at least one PSA test were analysed, resulting in 3 835 440 PSA tests overall. 48.4%

(735 750) of these patients had multiple PSA tests and 72.8% (535 990) of them never presented with a PSA value above the age specific referral threshold. The median retesting interval overall was 12.6 months (interquartile range 6.2-27.5 months). Once tested, patients had shorter retesting intervals if they were older, were of an ethnicity other than white, had a family history of prostate cancer, or had previously raised PSA levels. This study was limited by what clinicians chose to record in their primary care data about PSA test utilisation.

What this study adds PSA testing in primary care before a diagnosis of prostate cancer varies in England. More than 70% of patients with multiple PSA tests never presented with a raised PSA value, and more than two thirds of PSA tests were repeated within two and a half years. PSA retesting is occurring more frequently than recommended in guidance for patients without recorded symptoms and in those with low PSA values, raising concerns about overtesting.

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Age standardised PSA testing rates per 1000 person years by patient from 2000 to 2018. Rates are shown with 95% confidence intervals (shaded areas) on a logarithmic scale. PSA values were categorised as above the age specific threshold if patients were aged 18-49 years with a PSA value >2.5 ng/mL, 50-59 years with a PSA value >3.5 ng/mL, 60-69 years with a PSA value >4.5 ng/mL, and ≥ 70 years with a PSA value >6.5 ng/mL

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