ISSN 2664-8075 (Print) & ISSN 2706-5774 (Online)
South Asian Research Journal of Applied Medical Sciences
Abbreviated Key Title: South Asian Res J App Med Sci

| Volume-8 | Issue-2 | Mar-Apr- 2026 | **DOI: https://doi.org/10.36346/sarjams.2026.v08i02.003**

Review Article

Abdominal Aortic Aneurysm Masquerading as Routine Illness in Primary Care: A Narrative Literature Review of Diagnostic Challenges, Atypical Presentations, and Implications for Out-of-Hours Services

Dr. Abdalla Shaban M. El Tumi[1]*, Dr. Asmaa Alshwaihdi[2]
[1]MBBCh (2010), MSc QM University of London (2017), MRCGP UK (2022)
[2]MBBCh (2017), University of London

***Corresponding Author:** Dr. Abdalla Shaban M. El Tumi
MBBCh (2010), MSc QM University of London (2017), MRCGP UK (2022)

Article History
Received: 08.02.2026
Accepted: 03.04.2026
Published: 04.04.2026

Abstract: ***Background:*** Abdominal aortic aneurysm (AAA) is a potentially fatal vascular condition that frequently presents with atypical features, creating diagnostic challenges particularly in primary and out-of-hours care settings. When ruptured, AAA carries a mortality rate approaching 80–90%, and delayed diagnosis significantly worsens outcomes. ***Objective:*** This narrative literature review examines the evidence on atypical AAA presentations, misdiagnosis rates, the role of screening and diagnostic tools, and the implications for primary care clinical governance and quality improvement. ***Methods:*** A structured search of PubMed, Cochrane Library, Scopus, and Web of Science was conducted covering literature published between March 2022 and December 2025. Search terms included 'abdominal aortic aneurysm,' 'primary care,' 'misdiagnosis,' 'rupture,' 'atypical presentation,' 'point-of-care ultrasound,' 'out-of-hours,' and 'screening.' Peer-reviewed studies, systematic reviews, clinical guidelines, and meta-analyses were included. ***Key Findings:*** Up to 39% of ruptured AAAs are initially misdiagnosed, with common mimics including renal colic, musculoskeletal pain, and urinary tract infection. Only 25–50% of patients with rAAA present with the classic triad of abdominal pain, hypotension, and pulsatile mass. Women, elderly patients, and those presenting to non-specialist settings are at particular risk of delayed diagnosis. Point-of-care ultrasound (POCUS) demonstrates sensitivity exceeding 98% and specificity of 99.84% for AAA diagnosis. Current NHS screening remains restricted to men aged 65, leaving women and younger high-risk individuals undetected. ***Conclusion:*** Improved diagnostic vigilance, expanded POCUS availability, enhanced telephone triage protocols, and inclusive screening policies are urgently needed in primary and out-of-hours care. Quality improvement programmes targeting AAA recognition should be implemented across urgent primary care settings.

Keywords: Abdominal Aortic Aneurysm, Ruptured AAA, Primary Care, Misdiagnosis, Atypical Presentation, Point-of-Care Ultrasound, Out-Of-Hours Services, Vascular Emergency, Screening, Quality Improvement.

1. INTRODUCTION

Abdominal aortic aneurysm (AAA) is defined as a permanent, localised dilatation of the abdominal aorta to a diameter of 3.0 cm or greater [1, 2]. It is an insidious and frequently silent condition, with the majority of aneurysms remaining asymptomatic until the catastrophic event of rupture. Ruptured AAA (rAAA) is one of the most lethal surgical emergencies in clinical medicine, carrying an overall mortality rate estimated between 65% and 90%, with many patients dying before reaching hospital [9]. In the United Kingdom, AAA accounts for approximately 3,000 deaths annually, while globally, rupture is responsible for an estimated 200,000 deaths per year [7].

The epidemiology of AAA has traditionally favoured older men, with established risk factors including age over 65, male sex, cigarette smoking, hypertension, hyperlipidaemia, and a family history of the condition [1, 2]. However, contemporary evidence demonstrates that women now account for approximately 34% of all deaths attributable to ruptured

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

Citation: Abdalla Shaban M. El Tumi & Asmaa Alshwaihdi (2026). Abdominal Aortic Aneurysm Masquerading as Routine Illness in Primary Care: A Narrative Literature Review of Diagnostic Challenges, Atypical Presentations, and Implications for Out-of-Hours Services. *South Asian Res J App Med Sci, 8*(2), 55-63.

AAA, with female patients exhibiting a fourfold higher rupture risk compared to men for a given aneurysm diameter [19]. These statistics underscore the evolving demographics of a condition historically viewed as predominantly male.

The diagnostic challenge of AAA in primary care settings arises from its protean clinical presentations. The so-called 'classic triad' of sudden severe abdominal or back pain, hypotension, and a pulsatile abdominal mass is present in only 25–50% of cases [4-9]. The remainder of patients present with nonspecific symptoms that may readily be attributed to more common benign conditions such as renal colic, musculoskeletal back pain, gastrointestinal pathology, or as illustrated by the clinical incident motivating this review urinary tract infection (UTI). In the older female patient presenting to urgent primary care, these diagnostic pitfalls are particularly treacherous [5-16].

The rationale for this review is rooted in a real-world clinical event in an out-of-hours primary care setting, in which a 74-year-old female patient initially presumed to have a UTI suffered a catastrophic collapse and subsequently died of rAAA. This incident, while harrowing, is far from unique. It reflects a systemic pattern of missed or delayed AAA diagnoses at the primary care interface, where clinicians face time pressure, limited diagnostic resources, and wide differential diagnoses for common symptoms such as abdominal pain and dizziness in elderly patients [5-14].

The objectives of this review are threefold: first, to synthesise current evidence on the clinical presentations of AAA and rAAA, including atypical features most likely to be encountered in primary care; second, to evaluate existing evidence on diagnostic tools, particularly point-of-care ultrasound (POCUS), screening strategies, and escalation pathways; and third, to identify implications for clinical governance, quality improvement, and future research in out-of-hours and urgent primary care.

The scope of this review encompasses adult patients aged 50 years and over presenting to primary, urgent, or out-of-hours care settings, with a focus on studies published between March 2022 and December 2025. Both UK-based and international evidence is considered, given the shared clinical challenges of AAA diagnosis across healthcare systems [1-3].

2. LITERATURE SEARCH STRATEGY

A systematic search strategy was developed in accordance with best practice recommendations for narrative literature reviews. Searches were conducted across four major databases: PubMed/MEDLINE, the Cochrane Library, Scopus, and Web of Science. Additional sources included clinical guideline repositories from the European Society for Vascular Surgery (ESVS) [2], the American College of Cardiology/American Heart Association (ACC/AHA) [1], the National Institute for Health and Care Excellence (NICE), and the NHS England Abdominal Aortic Aneurysm Screening Programme [10, 11].

The search was restricted to literature published between March 2022 and December 2025 to ensure contemporary relevance, though seminal earlier studies were referenced where necessary to provide foundational context. The following search terms were used in various combinations: 'abdominal aortic aneurysm,' 'AAA,' 'ruptured AAA,' 'primary care,' 'out-of-hours,' 'general practice,' 'urgent care,' 'misdiagnosis,' 'atypical presentation,' 'urinary tract infection,' 'renal colic,' 'back pain,' 'point-of-care ultrasound,' 'POCUS,' 'bedside ultrasound,' 'screening,' 'women,' 'elderly,' 'vascular emergency,' 'ABCDE assessment,' and 'quality improvement.' Boolean operators (AND, OR) were applied to refine searches.

Inclusion criteria were: (1) peer-reviewed original research articles, systematic reviews, meta-analyses, clinical guidelines, and narrative reviews; (2) studies involving adult patients (aged ≥18 years) with confirmed or suspected AAA; (3) studies examining diagnostic accuracy, clinical presentation, misdiagnosis, screening, or management of AAA; (4) publications in the English language; and (5) studies with adequate methodological description. Exclusion criteria included: (1) studies limited to paediatric populations; (2) conference abstracts without full-text peer review; (3) case reports without systematic analysis; (4) studies examining only post-operative outcomes without reference to the primary diagnostic encounter; and (5) studies with irretrievably high risk of bias.

The search yielded 312 potentially relevant records after deduplication. Title and abstract screening reduced this to 89 full-text articles for review. After application of inclusion and exclusion criteria, 29 primary studies and guidelines were selected for inclusion in the evidence synthesis, supplemented by key historical references cited in major guidelines. A PRISMA-style selection process was followed, with reasons for exclusion documented at each stage. Quality assessment was conducted informally in the narrative approach, with attention to study design, sample size, comparator groups, and generalisability.

The timeframe of included studies reflects a rapidly evolving evidence base, particularly regarding POCUS technology [13], the 2022 ACC/AHA guidelines on aortic disease [1], the 2024 ESVS guidelines on abdominal aorto-iliac artery aneurysms [2], and the 2024 European Society of Cardiology (ESC) guidelines on peripheral arterial and aortic

diseases [12]. These recent guideline updates provide the most authoritative contemporary framework for AAA management relevant to the primary care context.

3. TYPE OF REVIEW AND METHODOLOGICAL RATIONALE

This article constitutes a narrative literature review. The narrative review format was selected as the most appropriate methodology for the clinical and educational objectives of this work. Unlike a systematic review or meta-analysis, which require exhaustive retrieval and quantitative synthesis of all relevant literature on a defined question, the narrative review affords the flexibility to synthesise evidence across diverse study designs, guideline documents, and clinical case analyses, while contextualising findings within a specific practice-based scenario.

The motivating clinical incident the collapse and death of a 74-year-old female patient whose rAAA initially presented as an apparent UTI in an urgent primary care out-of-hours setting highlights a complex, multi-factorial diagnostic problem. No single randomised controlled trial or systematic review adequately addresses all relevant dimensions of this problem: atypical presentations, primary care diagnostic limitations, sex-based differences in AAA epidemiology, out-of-hours resource constraints, and the clinical governance implications for quality improvement. A narrative approach permits the integrated synthesis of evidence from across these domains.

Furthermore, the intended audience of this review general practitioners, urgent care physicians, out-of-hours clinicians, and primary care educators will benefit more from a clinically contextualised, readable synthesis than from a rigidly structured systematic review. Narrative reviews have been shown to be effective vehicles for translating complex or heterogeneous evidence into actionable clinical guidance, particularly where the existing evidence base is characterised by observational studies, registry data, and expert consensus rather than high-quality randomised trials. This is precisely the case for AAA in primary care: while the disease itself is extensively studied in surgical and vascular contexts, its interface with primary and urgent care is largely documented through observational studies, cohort analyses, and quality improvement reports.

This review acknowledges the limitations inherent in the narrative approach, including potential selection bias in article inclusion and the absence of formal quality scoring. To mitigate these limitations, the search strategy was pre-specified, searches were conducted across multiple databases, and the evidence presented is weighted towards higher-quality study designs where available. Specific attention is paid to the level and quality of evidence underpinning each key recommendation, and where evidence is limited or extrapolated from specialist settings, this is explicitly noted. Uncertainty and contradictions in the literature are highlighted and discussed, consistent with principles of transparent scholarly reporting.

The narrative review design also facilitates meaningful attention to the social, systemic, and educational dimensions of the problem: the emotional impact on clinicians involved in adverse events, the systems-level failures that contribute to missed diagnoses, and the implications for practice transformation. These dimensions, while resistant to quantitative synthesis, are essential to a holistic understanding of AAA in primary care.

4. Main Body

4.1 Pathophysiology and Risk Factors

AAA develops as a consequence of progressive weakening of the aortic wall, involving degradation of extracellular matrix proteins particularly elastin and collagen through the actions of matrix metalloproteinases, inflammatory mediators, and haemodynamic stress [23]. Atherosclerosis has historically been regarded as the primary aetiological driver, though contemporary evidence highlights the multifactorial nature of aneurysm formation, involving genetic predisposition, chronic inflammation, oxidative stress, and endothelial dysfunction [9-18]. The infrarenal aorta is most commonly affected, likely due to its reduced vasa vasorum density and distinct haemodynamic characteristics.

Established risk factors include male sex (with a four-to-one male predominance), age above 65 years, cigarette smoking (the most important modifiable risk factor, increasing both incidence and growth rate), hypertension, hyperlipidaemia, and a family history of AAA [9]. The 2022 ACC/AHA guidelines [1], and the 2024 ESVS guidelines [2] both emphasise that first-degree relatives of AAA patients carry a fourfold increased risk. Notably, the prevalence of AAA in women is rising as lifetime smoking prevalence increases among female cohorts, challenging the historical assumption of AAA as predominantly a male disease [19].

Growth of established aneurysms is typically slow (mean 2–3 mm per year), but accelerates with increasing diameter. The 2024 ESVS guidelines [2], acknowledge that the annual rupture risk ranges from approximately 1% for aneurysms under 5.0 cm to over 6% for those exceeding 7.0 cm, with rapid expansion (>1 cm/year) also indicating elevated rupture risk. The intervention threshold of 5.5 cm for men and 5.0 cm for women (recognising women's higher rupture risk at smaller diameters) is recommended by current guidelines [1, 2].

4.2 Clinical Presentation and the Diagnostic Triad

The textbook presentation of rAAA the classic triad of sudden severe abdominal or back pain, hypotension, and a palpable pulsatile abdominal mass is recognised in only 25–50% of patients reaching clinical assessment [4-9]. Bergmark and colleagues [4], conducted a population-based study across Stockholm County involving all verified rAAA patients from January 2010 to October 2021, finding that the standard triad of signs (STS) underestimated rAAA occurrence by up to 75%. They proposed an expanded Modified Abdominal Aortic Aneurysm Rupture Signs (MARS) criteria encompassing all pain-associated, hypovolaemic, and imaging-based features to improve diagnostic sensitivity.

Atypical presentations reported in the literature include isolated back or flank pain mimicking renal colic or musculoskeletal disease; syncope or near-syncope without prominent pain; lower limb ischaemia resulting from thromboembolism or external compression; haematuria or gastrointestinal haemorrhage from fistula formation; and as in the case prompting this review abdominal discomfort and dizziness presenting in the context of concurrent UTI symptoms [21]. A particularly instructive 2022 case report documented an rAAA presenting with focal neurological deficits initially attributed to cerebrovascular accident, with the abdominal pathology recognised only after haemodynamic deterioration [21].

Lower extremity findings warrant particular attention in the primary care context. The clinical case described at the outset of this review involved progressive pain and loss of sensation in the left lower limb, consistent with limb ischaemia secondary to haematoma compression or embolic occlusion a recognised but underappreciated complication of rAAA [27]. General practitioners should include AAA in the differential diagnosis of any unexplained acute limb ischaemia in elderly patients.

The sensitivity of physical examination for detecting a pulsatile abdominal mass has been reported between 51% and 100%, but in obese patients or those in haemodynamic extremis, this finding may be entirely absent [9]. Palpation sensitivity decreases substantially with abdominal girth and is unreliable in the acute setting. As noted in the StatPearls 2023 review [27], over 30% of rAAA patients are initially misdiagnosed, with the most common incorrect diagnoses being renal colic, diverticulitis, and gastrointestinal haemorrhage.

4.3 Misdiagnosis, Delayed Diagnosis, and Mortality Impact

The clinical and mortality consequences of delayed or missed AAA diagnosis are substantial and well-documented. In a large registry study drawing on the Swedish Cause of Death Registry and the Swedish National Registry for Vascular Surgery (2010–2015), Smidfelt and colleagues [5], identified that 38.9% of 455 rAAA patients were initially misdiagnosed. The mortality rate in misdiagnosed patients was 74.6%, compared to 62.9% in correctly diagnosed patients a statistically and clinically significant difference ($p = 0.01$). Diagnostic error thus contributed meaningfully to preventable death.

A large US cohort study utilising the TriNetX federated health research network (n = 4,174 rAAA patients from 2003 to 2023) [6], found that 90-day mortality was 28% overall, rising to 46.3% when systolic blood pressure at presentation was at or below 90 mmHg. These data reinforce the crucial importance of early haemodynamic recognition: any elderly patient presenting with unexplained hypotension even in the context of an apparently benign precipitant requires urgent exclusion of rAAA. Metabolic acidosis (reflected by falling serum bicarbonate) was identified as an early marker of haemorrhagic severity, potentially preceding overt haemodynamic compromise.

Postoperative mortality after rAAA repair remains substantial despite advances in endovascular aneurysm repair (EVAR). A 2022 Vascular Quality Initiative analysis of 5,157 rAAA repairs [8], reported a 28% 30-day mortality, with the median time to death of just one day after repair, reflecting the severity of physiological compromise at presentation. Without surgical or endovascular intervention, rAAA is uniformly fatal. The Society for Vascular Surgery recommends a door-to-intervention time of under 90 minutes, a target that is critically dependent on rapid pre-hospital and emergency department recognition [6].

The risk of misdiagnosis is compounded in older women. Women account for a disproportionate share of rAAA-related mortality relative to their lower overall AAA prevalence, partly because they are not included in the NHS AAA screening programme [10], partly because their AAAs tend to be smaller at rupture [19], and partly because atypical presentations are more frequent in the context of higher comorbidity burden, including UTI, which shares symptomatology with the early phase of rAAA [16].

4.4 AAA Mimicking Urinary Tract Infection in Elderly Women

The overlap between AAA and UTI presentations in elderly women is clinically significant and underexplored in the literature. Older women are at elevated risk of asymptomatic bacteriuria and UTI-like presentations driven by hormonal, anatomical, and immunological changes [26]. As documented by Wareing [24], and Nicolle *et al*., (2019), the prevalence

of asymptomatic bacteriuria in women aged 65–90 years is 6–16%, rising to over 40% in those over 90. This creates an environment where positive urine findings can engender diagnostic premature closure, diverting clinical attention from more serious underlying pathology.

A retrospective cohort study from a university hospital [16], demonstrated that among patients over 75 with bacteraemic UTI, urinary symptoms were present in only 36.2%, and 44 patients (41.9%) had no fever at initial assessment. Only 58% of patients received an accurate early UTI diagnosis. These data suggest that the diagnostic reliability of 'UTI' as an explanation for systemic symptoms in elderly women is substantially lower than clinicians may assume. In the primary care context, a patient presenting with lower urinary tract symptoms who subsequently develops acute severe abdominal pain and haemodynamic collapse should prompt immediate reconsideration of the diagnostic framework, with AAA at the top of the emergent differential.

A BMC Primary Care study of GP perspectives on UTI management highlighted the inadequacy of telephone consultations for excluding serious mimics: in-person assessment improved UTI diagnostic accuracy substantially, with culture positivity rates following virtual assessment (29%) less than half those for in-person encounters (64%). In the out-of-hours setting, where telephone triage predominates, these diagnostic limitations are particularly hazardous when the presenting complaint could mask a vascular catastrophe [14].

The motivating clinical case in this review exemplifies this pathway precisely. The patient's initial presentation with apparent UTI symptoms led to a prescription of antibiotics, and it was only upon the sudden onset of severe abdominal pain and haemodynamic collapse visible only because the patient remained physically in the clinical area that the true diagnosis was recognised and emergency intervention initiated. Had this patient been managed remotely or discharged on antibiotic therapy, the outcome might have been even more rapid. This underscores the importance of safety-netting, in-person assessment for at-risk populations, and explicit triage protocols that flag AAA as a differential diagnosis for abdominal symptoms in elderly patients [4].

4.5 Diagnostic Tools: Point-of-Care Ultrasound and Imaging

Computed tomography angiography (CTA) of the abdomen and pelvis remains the gold standard for diagnosing AAA and confirming rupture, with sensitivity and specificity approaching 100% [27]. However, in the pre-hospital and primary care environment, CTA is not immediately available, and the transfer of a haemodynamically unstable patient to a radiology suite carries inherent risk. In this context, point-of-care ultrasound (POCUS) has emerged as a transformative diagnostic adjunct [25].

A systematic review and meta-analysis by Shaban and colleagues [7], evaluated nine studies of POCUS for AAA diagnosis in the emergency department, finding a pooled sensitivity of 98.33% and specificity of 99.84%. These figures are comparable to formal radiological ultrasound and substantially superior to physical examination alone. Moreover, POCUS requires no contrast, no ionising radiation, and critically does not require removal of the patient from the assessment area [13]. The Rapid Ultrasound in Shock and Hypotension (RUSH) examination, which incorporates aortic POCUS, has been validated as a systematic approach to undifferentiated haemodynamic instability [17].

The application of POCUS in primary care is gaining traction. A primary care nursing review documented PoCUS for AAA screening in primary care settings, with sensitivity of 93% and specificity of 97%, noting its particular value for excluding AAA in patients without significant obesity. Systematic reviews of emergency ultrasound confirm that POCUS for abdominal aorta assessment shows sensitivities of 94–100% and specificities of 98–100%, similar to formal radiology suite scans [7]. The 2023 ACEP clinical ultrasound guidelines [28] classify aortic POCUS as a core application in emergency medicine.

Despite this evidence base, POCUS availability in UK out-of-hours and urgent primary care settings remains inconsistent. Training, equipment procurement, governance, and credentialing represent barriers that primary care organisations are beginning to address, but progress is uneven [25]. The clinical case in this review occurred in a setting where no intravenous access equipment was immediately available, let alone POCUS highlighting the resource gap between evidence-based recommendations and the realities of out-of-hours primary care.

4.6 Screening: Current Limitations and Unmet Needs

The NHS Abdominal Aortic Aneurysm Screening Programme (NAAASP) invites all men at age 65 for a one-time abdominal ultrasound scan [10, 11]. The programme has demonstrated a 66% reduction in AAA-related mortality at 14 years of follow-up [29]. The NHS annual standards report for 2023–2024 recorded that over 271,000 men were screened, with 2,004 aneurysms detected and 810 men referred for potential intervention. Coverage was 81.9% above the acceptable threshold of 75%.

However, women are entirely excluded from systematic screening, despite accounting for 34% of rAAA deaths [19]. Women with a small AAA have a fourfold higher rupture risk than men for the same diameter, yet the lower baseline prevalence (approximately 0.5% in women aged 65–70) has historically been cited as a reason against screening [19]. The 2024 ESC guidelines on peripheral arterial and aortic diseases recommend considering screening in women aged 70 or over with symptoms suggestive of AAA, which represents a step forward but falls short of a systematic programme. A modelling study examining the cost-effectiveness of screening women found meaningful reductions in AAA-related mortality and concluded that targeted screening of women may be cost-effective [19].

Beyond sex-based exclusion, current UK screening does not extend to men under 65 with high-risk profiles (significant smokers, family history, peripheral arterial disease), nor to women of any age as a routine offer. The 2024 ESVS guidelines [2], recommend screening in adults aged 65 and over who smoke, in first-degree relatives aged 50 or over, and in patients diagnosed with peripheral arterial disease. These recommendations are substantially broader than current NHS practice, representing a significant gap in population-level AAA prevention that primary care practitioners who carry knowledge of patients' cardiovascular risk profiles are uniquely positioned to address through opportunistic case-finding [11, 12].

5. Tables and Figures

Table 1: Summary of Key Studies Included in This Review

Author(s) & Year	Study Type	Sample / Setting	Key Focus	Main Findings Relevant to Review
Bergmark *et al.*, [4] (2024)	Population-based cohort	Stockholm County, 2010–2021	Diagnostic triad validity	Standard triad misses up to 75% of rAAA. Proposed MARS expanded criteria for improved sensitivity.
Smidfelt *et al.*, [5] (2020)	Registry cohort study	n=455, West Sweden	Misdiagnosis & mortality	38.9% initially misdiagnosed. Mortality 74.6% (misdiagnosed) vs 62.9% (correctly diagnosed), p=0.01.
Jehle *et al.*, [6] (2024)	Retrospective cohort (TriNetX)	n=4,174 rAAA, US 2003–2023	Mortality predictors	90-day mortality 28% overall; 46.3% with SBP ≤90. Metabolic acidosis as marker of severity.
Shaban *et al.*, [7] (2024/25)	Systematic review & meta-analysis	9 studies, Emergency Depts	POCUS diagnostic accuracy	POCUS sensitivity 98.33%, specificity 99.84% for AAA detection in ED.
Reitz & Liang [8] (2022)	Registry cohort (VQI)	n=5,157 rAAA repairs, US 2010–2020	Post-operative mortality	28% 30-day post-operative mortality. Median time to death 1 day, reflecting physiological severity at presentation.
Isselbacher *et al.*, [1] (2022)	Clinical Guideline (ACC/AHA)	Guideline document	Diagnosis & management	Comprehensive framework for AAA screening, surveillance thresholds, and repair indications.
Wanhainen *et al.*, [2] (2024)	Clinical Guideline (ESVS)	Guideline document	AAA management & screening	Updated intervention thresholds; expanded screening including women ≥70. Minimum institutional volumes defined.
Czerny *et al.*, [3] (2024)	Clinical Guideline (EACTS/STS)	Guideline document	Aortic organ syndromes	TGFβ pathway in aneurysm formation; incidence 27/100,000 person-years for AAA in Swedish prospective cohort.
NHS England NAAASP [10] (2024)	Programme standards report	>271,000 men screened, England	AAA screening coverage	Coverage 81.9%; 2,004 aneurysms detected; 810 referred. Women excluded from routine screening.
ESC Guidelines [12] (2024)	Clinical Guideline	Guideline document	Screening & PAD	Recommends considering AAA screening in women ≥70 with symptoms. Broader risk-stratified approach than NHS.

Table 2: Red Flag Features Requiring Immediate AAA Exclusion in Primary Care

Clinical Feature	Significance / Action
Sudden severe abdominal, back or flank pain in patient aged >55 [4,9]	Immediate emergency referral; do not delay for investigations
Hypotension or syncope without clear cause [6,9]	Consider rAAA in all elderly patients; call 999 immediately
Pulsatile abdominal mass on examination [4,27]	Present in <50% of rAAA. Highly suspicious; immediate emergency referral.
Acute unilateral limb pain, pallor, or weakness in elderly patient [9]	Consider embolic or compressive complication of rAAA
Abdominal pain + dizziness + collapse in high-risk patient [5,6]	Presumed rAAA until proven otherwise; immediate resuscitation
Haematuria or GI bleed in patient with known/suspected AAA [9]	Consider aorto-ureteric or aorto-enteric fistula; urgent surgical review
Unexplained deterioration in elderly woman attributed to UTI [14,15,16]	Reassess urgently; consider AAA if abdominal symptoms or haemodynamic instability emerge

6. DISCUSSION

This review synthesises a compelling body of evidence demonstrating that AAA and in particular rAAA represents a persistent diagnostic challenge at the interface of primary, urgent, and out-of-hours care. The literature consistently documents that atypical presentations are the rule rather than the exception [27], that misdiagnosis rates of 30–39% carry direct mortality consequences [5], and that specific patient subgroups most notably elderly women and those presenting to resource-limited settings are at disproportionate risk of diagnostic error [19].

The evidence reviewed highlights a critical tension between the epidemiological familiarity of common presentations (UTI, renal colic, musculoskeletal back pain) and the rarity but lethality of their vascular mimics. Cognitive biases, including premature diagnostic closure and anchoring, are implicated in a significant proportion of misdiagnosed rAAA cases [5]. In the clinical case motivating this review, the availability of a prior diagnostic label (UTI) may have initially precluded consideration of AAA a pattern documented across multiple case series and registry studies [21]. Educational strategies targeting these cognitive pitfalls are increasingly recognised as essential components of patient safety curricula.

The potential role of POCUS in transforming primary care AAA recognition deserves emphasis. With pooled diagnostic sensitivity approaching 99% [7], POCUS represents a genuinely transformative technology for the out-of-hours setting. The barriers to implementation training, equipment cost, governance frameworks are surmountable, and several primary care organisations have already integrated POCUS into urgent care workflows [25]. The absence of POCUS from the setting described in the motivating incident represents a modifiable system-level gap.

Significant gaps remain in the literature. Evidence specifically addressing AAA diagnosis in out-of-hours primary care (as opposed to emergency departments or secondary care) is sparse. Studies examining telephone triage decision-support tools for AAA remain largely undeveloped. Sex-disaggregated outcome data for primary care AAA encounters are limited [11-19]. Future research should prioritise these areas.

7. Limitations of the Review

This review carries several limitations that should be considered when interpreting its findings. First, as a narrative review, it is subject to selection bias: the search and inclusion process, while pre-specified and transparent, was not exhaustive in the manner of a formal systematic review with PRISMA-compliant dual-screened article retrieval. The possibility that relevant studies were missed cannot be excluded.

Second, the geographical heterogeneity of included studies limits direct applicability to the UK out-of-hours primary care context. Many high-quality studies on rAAA outcomes and misdiagnosis rates originate from Scandinavian registry data or North American healthcare systems [6-8], which differ substantially from NHS urgent primary care in terms of structure, resources, and patient demographics.

Third, publication bias is a concern, as studies reporting dramatic or adverse outcomes including misdiagnosis leading to death may be more likely to reach publication than studies documenting routine or uneventful encounters. This may inflate apparent misdiagnosis rates or overstate the prevalence of atypical presentations in the literature relative to clinical reality.

Fourth, the evidence base for POCUS in primary care (as distinct from emergency department) settings remains limited, with most diagnostic accuracy data drawn from emergency medicine studies [17]. The generalisability of these

findings to primary care clinicians with varying levels of POCUS training requires further evaluation. Finally, the rapid pace of guideline development in this field (three major international guidelines between 2022 and 2024 [1-3]) means that some evidence in this review may be superseded by emerging recommendations.

8. CONCLUSION

Abdominal aortic aneurysm represents one of the most lethal diagnostic pitfalls in primary and out-of-hours care. The evidence reviewed in this article demonstrates unequivocally that atypical presentations are common, that misdiagnosis is associated with substantially elevated mortality [5, 6], and that specific patient populations including elderly women presenting with UTI-like symptoms face particular diagnostic vulnerability [19]. The case that motivated this review is not an isolated tragedy; it is a clinical archetype with a well-documented epidemiological and cognitive basis.

From a practice perspective, several actionable recommendations emerge. General practitioners and out-of-hours clinicians should explicitly include AAA in the differential diagnosis of any elderly patient presenting with abdominal symptoms and haemodynamic instability, regardless of the putative primary diagnosis [4-9]. Safety-netting conversations should incorporate explicit AAA warning signs for patients discharged from urgent care. Emergency escalation protocols should be reviewed to ensure appropriately rapid activation: in the case described, calling the internal hospital emergency number (2222) rather than 999 may have ensured faster access to a resuscitation team.

From a policy perspective, the exclusion of women from the NHS AAA screening programme [10, 11], represents a significant inequity that requires urgent review in light of current evidence on female AAA risk and rupture rates [19]. The ESVS and ESC guidelines provide a framework for expanded screening that primary care commissioners should engage with proactively. Additionally, investment in POCUS training and equipment in out-of-hours and urgent primary care settings [25], has the potential to transform diagnostic accuracy for rAAA and other vascular emergencies.

From a quality improvement perspective, the recommendations arising from the motivating clinical case including a Quality Improvement Project (QIP) for telephone triage of abdominal pain in elderly patients, with specific questioning protocols for AAA should be adopted as a minimum standard. Regular simulation training in medical emergencies, ABCDE assessment, and vascular emergency recognition should be embedded in primary care continuing professional development [4, 5]. Team debriefing after adverse events, as undertaken in the case described, supports both clinical learning and psychological safety.

In conclusion, while the outcome of the case that inspired this review was tragic and irreversible, the knowledge generated through systematic reflection and literature synthesis has the potential to prevent future deaths. The appropriate response to diagnostic tragedy in primary care is not paralysis or blame, but purposeful, evidence-informed change at the level of individual practice, organisational systems, and national policy.

Acknowledgements

The author acknowledges the contribution of the clinical team involved in the case that motivated this review, whose professionalism and commitment to reflection exemplify the principles of Good Medical Practice. The patient and her family are remembered with respect and compassion. The author also acknowledges colleagues in urgent primary care who generously engaged in informal peer discussion regarding the implications of this event for practice improvement.

Conflicts of Interest

The author declares no financial or personal conflicts of interest in relation to this publication. No commercial funding was received. No relationships with pharmaceutical companies, device manufacturers, or other entities with interests in the subject matter of this review exist.

Funding Statement

This literature review received no external funding. It was conducted as part of continuing professional development and reflective practice following a critical incident in urgent primary care. No grant funding, institutional support, or industry sponsorship was involved.

REFERENCES

1. Isselbacher EM, Preventza O, Hamilton Black J, *et al*. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. Circulation. 2022;146(24):e334–e482. doi:10.1161/CIR.0000000000001106
2. Wanhainen A, Van Herzeele I, Bastos Goncalves F, *et al*. European Society for Vascular Surgery (ESVS) 2024 Clinical Practice Guidelines on the Management of Abdominal Aorto-Iliac Artery Aneurysms. Eur J Vasc Endovasc Surg. 2024;67(2):192–331. doi:10.1016/j.ejvs.2023.11.123
3. Czerny M, Grabenwöger M, Berger T, *et al*. EACTS/STS Guidelines for Diagnosing and Treating Acute and Chronic Syndromes of the Aortic Organ. Ann Thorac Surg. 2024;118(1):5–115. doi:10.1016/j.athoracsur.2024.01.021

4. Bergmark P, Sadeghi M, Talvitie M, Hultgren R. Initial signs in patients with ruptured abdominal aortic aneurysms: time for an expanded triad? Scand J Trauma Resusc Emerg Med. 2024;32(1):94. doi:10.1186/s13049-024-01268-0
5. Smidfelt K, Drott C, Törngren K, Nordanstig J, Herlitz J, Langenskiöld M. Misdiagnosis of ruptured abdominal aortic aneurysms is common and is associated with increased mortality. J Vasc Surg. 2020;72(4):1281–1288. doi:10.1016/j.jvs.2020.01.057
6. Jehle D, Vosburg C, Weathers A, *et al*. Predictors of Mortality in Ruptured Abdominal Aortic Aneurysms. Cureus. 2024;16(10):e71744. doi:10.7759/cureus.71744
7. Shaban EE, Yigit Y, Alkahlout B, *et al*. Enhancing clinical outcomes: Point of care ultrasound in the precision diagnosis and management of abdominal aortic aneurysms in emergency medicine: A systematic review and meta-analysis. J Clin Ultrasound. 2025;53(2):248–260. doi:10.1002/jcu.23850
8. Reitz KM, Liang NL. Characterization of immediate and early mortality after repair of ruptured abdominal aortic aneurysm. J Vasc Surg. 2022;76(6):1578–1587. doi:10.1016/j.jvs.2022.06.090
9. Gibbons RC, Singh G. Abdominal Aortic Aneurysm Rupture. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Aug 8. PMID: NBK459176
10. NHS England. NHS Abdominal Aortic Aneurysm (AAA) Screening Programme Annual Standards Report: 1 April 2023 to 31 March 2024. London: NHS England; 2024. Available from: www.gov.uk
11. NHS England. Abdominal Aortic Aneurysm Screening: Programme Guidance. Updated January 2024. Available from: www.gov.uk/guidance/abdominal-aortic-aneurysm-screening-programme-overview
12. Aboyans V, Ricco JB, Bartelink MEL, *et al*. 2024 ESC Guidelines on Peripheral Arterial and Aortic Diseases. Eur Heart J. 2024;45(36):3538–3700. doi:10.1093/eurheartj/ehae179
13. Hart R, Levy A. An Approach to Point-Of-Care Ultrasound Evaluation of the Abdominal Aorta. J Vis Exp. 2023;(199):e65487. doi:10.3791/65487
14. Kim JH, Ackerman AL. U.S. primary care physician perceptions on barriers to providing guideline-driven care for UTI and recurrent UTI: a qualitative study. BMC Prim Care. 2024;25(1):234. doi:10.1186/s12875-024-02477-3
15. Tanaka K, Shirai T, Yamashita M, *et al*. Prevalence of and factors associated with atypical presentation in bacteremic urinary tract infection. Sci Rep. 2022;12(1):4931. doi:10.1038/s41598-022-09222-9
16. Vit JM, Bardet A, Dargent A, *et al*. Atypical presentation of bacteremic urinary tract infection in older patients: frequency and prognostic impact. BMC Infect Dis. 2021;21:296. doi:10.1186/s12879-021-05993-6
17. Lee W, Park HK, Cho JA, Lee JH. Role of point-of-care ultrasound in critical care and emergency medicine: update and future perspective. Clin Exp Emerg Med. 2023;10(4):363–381. doi:10.15441/ceem.23.101
18. DeRoo E, Stranz A, Yang H, Hsieh M, Se C, Zhou T. Endothelial Dysfunction in the Pathogenesis of Abdominal Aortic Aneurysm. Biomolecules. 2022;12(4):509. doi:10.3390/biom12040509
19. Thompson SG, Ashton HA, Gao L, *et al*. Screening women aged 65 years or over for abdominal aortic aneurysm: a modelling study and health economic evaluation. Health Technol Assess. 2009;13(41):1–92. doi:10.3310/hta13410 [cited for female AAA risk and prevalence data]
20. Cheung N, Laberge J-M, Bockler D, Gaines P, Ho P. Ruptured AAA: bridging the gap between international guidelines and local clinical realities. Vasc Surg. 2024. doi:10.1016/j.avsg.2024.06.002
21. Kondo Y, Hifumi T, Otani N, *et al*. Abdominal aortic aneurysm rupture presenting with focal weakness and altered mental status: a case report. J Med Case Rep. 2022;16(1):232. doi:10.1186/s13256-022-03424-5
22. Tang T, Walsh SR, Fanshawe TR, *et al*. Analysis of High-Risk Factors and Mortality Prediction of Ruptured Abdominal Aortic Aneurysm. Ann Vasc Surg. 2024;106:34–42. doi:10.1016/j.avsg.2024.04.007
23. Chao S-P, Lu H-S, Zheng L. Mechanism and Pathogenesis of Abdominal Aortic Aneurysm. Signal Transduct Target Ther. 2023;8(1):55. doi:10.1038/s41392-023-01325-7
24. Wareing M. Recurrent lower urinary tract infection in older women. Urol Continence Care Today. 2022;1(1):12–17. Available from: ucc-today.com
25. Ahmad R, Thomas P. Point-of-care ultrasound: An emerging clinical tool to enhance physical assessment. J Am Assoc Nurse Pract. 2022;34(7):970–983. doi:10.1097/JXX.0000000000000742
26. Nicolle LE, Gupta K, Bradley SF, *et al*. Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. Clin Infect Dis. 2019;68(10):e83–e110. doi:10.1093/cid/ciy1121 [contextual reference for ASB prevalence in elderly women]
27. Abdominal Aortic Aneurysm. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. NBK470237. Last updated November 2025.
28. American College of Emergency Physicians. Ultrasound Guidelines: Emergency, Point-of-Care and Clinical Ultrasound Guidelines in Medicine. Ann Emerg Med. 2023;82(6):723–751. doi:10.1016/j.annemergmed.2023.06.005
29. Ying A, Affan ET, Moxon JV, Golledge J. Systematic review and meta-analysis of the effect of abdominal aortic aneurysm screening on all-cause and aneurysm mortality. J Vasc Surg. 2022;75(4):1442–1452. doi:10.1016/j.jvs.2021.08.086.