The Redefinition of Aging in American Surgery

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Context: Adults aged sixty-five and over account for a large fraction of all surgeries performed in the United States each year. While historical growth in rates of surgery in this population is commonly attributed to financial incentives and technological innovations, the shifts in thought that underpinned the spread of surgery among the U.S. elderly remain largely unexplored. We examined changing perspectives on aging over time in American surgery through two case studies: the expansion of general surgical procedures among older U.S. adults between 1945 and 1965, and the spread of coronary artery bypass grafting (CABG) among the U.S. elderly between 1975 and 1995.

Methods: For this article, we used close readings of historical journal articles, textbook excerpts, survey reports, and government documents related to surgery and aging.

Findings: Similar perspectives on aging informed the spread of both general surgical procedures among older adults after World War II and CABG in the elderly from the mid-1970s onward. In each case, surgeons argued against earlier views that surgery was contraindicated in old age using rhetoric that negated the relevance of age to medical decisions. Furthermore, surgeons elevated other types of information—such as the presence or absence of chronic diseases—to supplant age as an explanation for the high operative mortality rates seen among older patients. By stressing the modifiability of operative risk in the elderly, surgeons' arguments positioned old age itself as a new surgical "frontier."

Conclusions: Surgeons' arguments for the expansion of surgery among the U.S. elderly over time worked to negate the relevance of age to medical decisions and to portray the wider use of surgery in the elderly as uniformly beneficial. While potentially promoting broader access to surgical care, such perspectives may also have contributed to ongoing health policy challenges by normalizing

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surgery at any stage in the life-course, with implications for current patterns of surgical utilization and medical spending.

Keywords: medical sociology, aging, surgery, health policy.

FOR OVER THREE DECADES, PROGRESSIVELY INCREASING RATES of surgery among adults aged sixty-five and older have been recognized as a major component of growing U.S. health care costs (Bodenheimer 2005a; Pauly 1979; Wennberg 2010). Predictions that the aging of the population will cause further growth in the utilization of surgical services (Etzioni et al. 2003a), combined with questions surrounding the cost-effectiveness of medical care for older U.S. adults (Cutler, Rosen, and Vijan 2006), have led policymakers to debate the wisdom of age-based rationing of health care resources in general and invasive and costly procedures in particular (Baicker and Chandra 2010; Brody 2012; Callahan 1987; Levinsky 1990; Persad, Wertheimer, and Emanuel 2009; Reese et al. 2010).

Past efforts to understand the reasons behind increasing rates of surgery among older adults have commonly focused on explanations related to the nature of health insurance in the United States, technological advances in medical care, and changing population demographics. Economic arguments have stressed the role of incentives created by fee-for-service insurance programs and Medicare's coverage of most U.S. adults aged sixty-five and over as encouraging high overall rates of surgery in this population (Bodenheimer 2005a; McGuire 2000; Valvona and Sloan 1985; Wennberg, Barnes, and Zubkoff 1982). Alternate explanations have pointed to technological advances in surgery and medicine that have expanded the scope and safety of operative care (Bodenheimer 2005b; Cutler and McClellan 2001), increases in life expectancy over time (Rice and Feldman 1983), and the "compression of morbidity" into a shorter period before the end of life (Fries 1980; Mor 2005) as phenomena that have created an expanded role for surgical interventions at later points in the life course.

These explanations provide only a partial account of how surgical procedures grew to become a commonplace feature of medical care for older U.S. adults during the twentieth century. Excluding obstetrical care, the principal focus of surgery in the United States during the century's first four decades was the treatment of acute illnesses and injuries in children and the middle-aged (Collins 1938); today most

nonobstetrical surgical procedures are carried out to treat cancer and the effects of chronic illnesses in older adults (Buie et al. 2010). This shift was not merely a straightforward response to financial incentives, novel technologies, or population-level demographic changes; rather, it involved fundamental transitions in medical thought related to surgery and aging that yielded new perspectives on the relevance of age to surgical decisions and the proper role of surgery in the life course.

For this article, we studied this transition in medical thought through an examination of two case studies; namely, the expansion of general surgical procedures among older U.S. adults between 1945 and 1965, and the spread of coronary artery bypass grafting (CABG) among the U.S. elderly between 1975 and 1995. In choosing these two case studies, we sought to understand prominent themes, arguments, and perspectives that characterized professional discourse surrounding the diffusion of invasive procedures in the elderly as an innovation in health care at different moments in time and with regard to distinct surgical technologies and degrees of operative risk. Notably, our examples come from periods during which surgical utilization increased for the U.S. population as a whole; yet through them, we show how in each case surgeons employed analogous arguments against the validity of chronological age as a criterion for specific types of operative interventions, often in the face of high operative mortality rates for older versus younger patients. We describe how such arguments repeatedly sought to negate the relevance of age to medical decisions by searching for other phenomena—such as the presence or absence of coexisting diseases—to explain apparent age-related outcome differences. We examine how these arguments worked together to frame surgery in the elderly as uniformly beneficial, and how, in so doing, they contributed to the establishment over time of surgical intervention as a normal feature of aging in the United States. Finally, by highlighting how these perspectives have ultimately come to be called into question by contemporary observers, we explore the ways in which the views of aging that they embraced pose distinct challenges for current health policy efforts to define the appropriate role of surgical intervention within an aging population.

Methods

We conducted close readings of historical documents related to surgery and aging published between the mid-1930s and mid-1990s. To

examine changes in thought related to general surgical procedures in older adults before 1965, we studied academic research publications, editorials, and reviews pertaining to one or more types of abdominal, thoracic, orthopedic, urologic, cardiac, vascular, or oncologic surgery in adults aged sixty and older. We identified these articles through keyword searches of PubMed and the Surgeon General's Index Catalogue using combinations of terms related to surgery (e.g., "surgery," "surgical," "operative") and aging (e.g., "aged," "elderly," "older"). In addition, we reviewed article bibliographies and conducted electronic and hand searches of the tables of contents of selected academic journals in general medicine, surgery, geriatrics, and gerontology and popular publications. We used similar methods to find reports on CABG in older adults published between 1968 and 1995. We reviewed sections of surgical textbooks from each period that we identified through catalog searches of the Library of Congress and two historical medical libraries. Finally, to obtain national estimates of surgical utilization over time, we reviewed U.S. Public Health Service reports on data collected by the National Health Interview Survey and the National Hospital Discharge Survey between 1957 and 2006.

Results

Defining the Frontier: Surgery on the Elderly before 1965

Prior to World War II, old age represented a common contraindication to a range of basic surgical procedures. Alton Ochsner recalled, "In 1927 . . . I taught and practiced that an elective operation for inguinal hernia in a patient over 50 years of age was not justified" (Ochsner 1967, 121). Ochsner's contemporaries recalled similar teachings (Glenn et al. 1960) and Warren Cole and Robert Elman's influential *Textbook of General Surgery* advised as late as 1944 that "there may be no advantage in performing operative repair" for inguinal hernia in the disabled or retired elderly (Cole and Elman 1944, 790). The influence of age on surgical decisions was not confined to the context of hernia repair: one prominent urologist recalled in 1951 that "during the first decade of my practice—1924 to 1934—age *per se* was a definite contraindication to open prostatectomy" (Taylor 1951, 808).

Occasional reports from the 1920s and earlier had advocated for more aggressive use of surgery in patients over fifty (Culler 1921; Tuttle 1901), and case series from the late 1930s and early 1940s reported successful initial experiences with basic abdominal surgeries in older patients (Bailey 1934; Brooks 1937; Grace and Johnson 1937; Morton 1935; Quigley 1939, 1940). Nonetheless, surgeons' recollections of practice before World War II reflect viewpoints that saw advanced age not simply as an indicator of operative risk but rather as a global determinant of an individual's eligibility for medical intervention. One general surgeon contrasted surgical practices in the 1930s with those common in the 1950s: "[Then,] old people who came in were sent to the alms house. . . . Now, young men regard old people as patients" (Glenn et al. 1960, 503). Similarly, a 1955 article on head and neck procedures noted that up to the mid-1930s, a designation of "old age" itself "was considered acceptable as a contraindication to any surgical attempt to cure, to palliate, or even to prolong life in such a serious disease as cancer" (Martin, Rasmussen, and Perras 1955, 707).

Beginning in the mid-1940s, surgery became a progressively more commonplace feature of medical care for older U.S. adults. Citing "new insights gained by surgeons" over the preceding decade, *Time* magazine noted in February 1957:

Even more startling than recent overall advances in surgery is the improved outlook for aged patients who need operations. Surgeons used to dread such cases; all too often the patient went into shock on the operating table, or died soon after of pneumonia. How radically things have changed is pointed out by Surgeon Sidney E. Ziffren of the State University of Iowa. "Successful surgery is now constantly performed in the aged," he notes. "Surgery should not be withheld because of a patient's age." (*Surgery for the Aged* 1957, 54)

Such sentiments also were reflected in real changes in rates of surgery among the U.S. elderly during the postwar years. Between 1957 and 1960, the annual number of operative procedures per 1,000 U.S. adults aged sixty-five and older increased by 15 percent, from 49.1 to 56.4 percent (Gentile 1958; Haase 1962). By 1964, this figure had grown by another 30 percent, to 72.8 percent (Wilder 1974).

This increase was accompanied by a growing focus in academic and policy circles on surgical care in the elderly. Of all articles published between 1935 and 1944 in the *New England Journal of Medicine*, the *Journal of the American Medical Association*, *Annals of Surgery*, and *Archives*

of Surgery, only six focused explicitly on surgery in older adults. Between 1945 and 1954, however, this number more than tripled to nineteen, and increased again to twenty-four between 1955 and 1964. The publication of four American textbooks focusing specifically on surgery in the elderly between 1960 and 1966 (Glenn, Moore, and Beal 1960; Jesseph and Harkins 1963; Mitty 1966; Ziffren 1960) further attested to changing perceptions of older adults as candidates for surgical procedures. Targeted at practicing surgeons, these texts incorporated findings on changing population demographics and, in the case of one prominent 1960 text, included detailed reviews of contemporary research by Nathan W. Shock and others in the National Institute of Health's Unit on Gerontology that sought to characterize the "normal physiology" of aging (Glenn, Moore, and Beal 1960; Park 2013).

Surgical treatment was also recognized as a key dimension of medical care for older adults in the emerging fields of geriatrics and gerontology themselves. Programs for national meetings of both the Gerontological Society (Program 1951) and the American Geriatrics Society (Glenn et al. 1960) from the 1950s listed panel discussions on surgery in the elderly. The early editorial boards of both the *Journal of Gerontology* and the *Journal of the American Geriatrics Society* included leading general surgeons, one of whom, Frank Glenn, then surgeon in chief at New York Hospital, also served as president of the American Geriatrics Society from 1959 to 1960 (Goodwin 2013). At the 1961 White House Conference on Aging, leading gerontologists joined federal policymakers in highlighting the need for "clear-cut criteria pertaining to the assessment of the tolerance of an individual to withstand surgery" as one of sixteen priority areas for medical research related to aging (U.S. Senate 1961, 135).

Close readings of academic writings from the first two decades after World War II reflect the shifting perspectives on aging that underpinned practitioners', researchers', and policymakers' increasing focus on surgery in the elderly. Informed by a concurrent sense of optimism regarding the potential for medical treatments to cure illness (Aronowitz 1998, 2001, 2007; Jones 2013), as well as the efforts of early researchers in geriatrics and gerontology to distinguish between "normal" and "pathological" aging (Cole 1992; Hirshbein 2000; Park 2013), surgeons in the 1940s and 1950s repeatedly argued for the replacement of "outdated defeatist attitudes" toward surgery in the elderly "with a more progressive and optimistic outlook" (Carp 1946, 1103; Parsons and Purks 1949).

Arguing that “old age does not necessarily preclude surgical procedures” (Carp 1946, 1103), authors framed age in years as bad information that, when considered alone, could yield misleading conclusions about a patient’s fitness for surgery. In so doing, they echoed the emphasis placed by I.L. Nascher and other early researchers in geriatrics on describing aging in physiologic, rather than simply chronologic, terms (Cole 1992; Nascher 1979). Insisting that “the anatomic and physiologic age of the subject are [sic] infinitely more important than the chronologic age,” one surgeon commented that “at times, it would seem wiser to leave the actual age off the chart or for the patient conveniently to forget the number of years he has lived” (Pack 1948, 1106–7). Speaking on a panel on therapeutic aspects of geriatric medicine at the 1951 meeting of the Gerontological Society, another surgeon stated that “almost any surgeon would prefer the lean, lanky, lusty individual of 70 to some of the fair, fat, and florid 40 year old individuals . . . that we are sometimes called to operate upon” (Warren et al. 1952, 104).

Similar perspectives were expressed in widespread arguments that old age itself offered proof of a robust constitution. Academic surgeons reasoned that having reached old age itself indicated an “intrinsic good health” that conferred “the necessary reserve to withstand major surgery” (Bosch et al. 1952, 271). Others argued that “the fact of survival to advanced years is usually in itself indicative of strong stock” (Jemerin 1960, 185) and that “old persons are proved performers while younger ones have not gone far enough along to be proved” (Haug and Dale 1952, 435).

At root, such arguments were intended to expose the fallibility of chronological age as the sole indicator of an individual patient’s overall health. Yet when applied to surgical patients as a group, such observations frequently conflicted with the empirical data that their own authors presented. Between the late 1940s and the early 1950s, case series repeatedly showed markedly higher rates of adverse outcomes after general surgical procedures among older versus younger patients (Bosch et al. 1952; Carp 1946; Parsons and Purks 1949). In one typical series of 334 elective and emergent surgeries, postoperative mortality increased from 6 percent among patients aged sixty to sixty-nine years old to 14 percent among those aged seventy to seventy-nine. Among patients eighty to eighty-nine years old, the authors reported an operative mortality rate of 16 percent (Haug and Dale 1952).

Such empirical findings presented an important conceptual challenge to efforts to discredit what one investigator called “the perverted point of view of some surgeons who are reluctant to operate on aged patients” (Pack 1948, 1106). Specifically, while anecdotes of surgeons’ successful experiences in operating on certain healthy older adults argued against the link between aging and increased operative risk, empirical data nonetheless showed consistent increases in operative mortality with age.

An important potential solution to this problem appeared in October 1953, in a widely cited report in the *Annals of Surgery* by Warren H. Cole, chair of surgery at the University of Illinois College of Medicine (Connaughton 1991). Reporting on 3,656 elective and emergent major general surgical operations, Cole’s work departed from earlier case series on surgery in the elderly by explicitly comparing operative mortality between older and younger patients, as defined by age above or below sixty years. Based on this comparison, Cole hypothesized that factors other than age could explain apparent age-related differences in surgical mortality, noting that “if concurrent and complicating diseases can be eliminated, aged people will tolerate operations of moderate magnitude almost as well as young people” (Cole 1953, 145). Cole’s argument that the effects of aging on operative risk were separable from the effects of confounding chronic diseases was largely qualitative, preceding the widespread introduction of multivariate statistics into biomedical research (Aronowitz 1998; Neuman and Bosk 2012; Rothstein 2003). Yet to the extent that it aimed to reduce the impact of aging on surgical outcomes to a set of discrete and potentially modifiable conditions, Cole’s proposition carried strong similarities to contemporary and subsequent efforts that used multivariate regression techniques to define independent and separable “risk factors” for coronary heart disease (Aronowitz 1998) and postoperative complications (Neuman and Bosk 2012).

Implicit in Cole’s argument was the idea that by mitigating the risks of surgery, the proper management of coexisting disease could render operative mortality in the elderly “almost equal to that found in younger patients” (Surgical Survival 1953, 728), thereby effectively neutralizing age as a barrier to surgical intervention. Following this line of argument, subsequent work concentrated on the potential for surgeons themselves to influence the likelihood of adverse outcomes in older patients. A case series published in the *Annals of Surgery* the following year saw “old age itself” as contributing minimally to observed differences in mortality between older and younger patients, which instead were attributed

to “postoperative complications . . . and diminished tolerance to misdirected therapy” (Mithoefer and Mithoefer 1954, 64). Similarly, a 1956 report commented that

in a great many of the operations on elderly patients the nature of the risk is not inherent in the patient’s age, or even in his disease, but in the energy or languor with which his condition is investigated and the decisiveness or indecisiveness with which the method of treatment is decided upon. (Parsons, Whitaker, and Hinton 1956, 849)

The view that surgical outcomes for old and young patients could be equalized through better medical and surgical care represented a radical departure from earlier perspectives that saw advanced age as a strict contraindication to surgery. Whereas age categories previously carried a deterministic significance—defining the conceivable boundaries of safe and appropriate surgical treatment—later views saw the implications of aging as negotiable from the perspective of surgical intervention.

Such changing perspectives on the relevance of age as a “barrier” to surgery implied new ethical challenges related to the definition of appropriate indications for surgery in the elderly. In his 1960 text on the management of the aged surgical patient, Sidney E. Ziffren of the University of Iowa commented,

We must not perform such radical “successful” surgery that even if the patient survives we have only succeeded in prolonging an existence without hope and accompanied by anguish which might have been avoided had surgical intervention not been undertaken. . . . Our first responsibility is to relieve pain and suffering; we must not contribute to it. (Ziffren 1960, 21)

Ziffren’s comments echoed earlier perspectives emphasizing the risks associated with the overuse of medical treatments in the elderly. Writing in 1954 on “overtreatment in the aged,” for example, Malford W. Thewlis, an early leader in research on aging, commented that “the aged often die from drastic diagnostic procedures, massive therapy, or exaggerated care,” faulting in particular surgeons’ views that “the knife was the answer to all problems” (Thewlis 1954, 651).

Yet perspectives like Ziffren’s and Thewlis’s were relatively rare in the frequent discussions of surgical care for the elderly that appeared in journals of surgery, gerontology, and geriatrics in the postwar years. Instead, these discussions centered almost universally on the potential harms associated with the *underutilization* of surgery in the elderly. At times,

these arguments invoked the potential for early surgical intervention to prevent the development of more severe, potentially life-threatening emergencies in the elderly; yet they also frequently embraced a more general heroic ethos that viewed surgical intervention itself as intrinsically good (Fox and Swazey 2002).

Writing in 1955, for example, one observer noted that “the preoperative examination of a patient at any age should be pursued for one purpose only—that is, to determine *when* an indicated operation had best be performed, and not to establish *if* it should be performed at all” (Martin, Rasmussen, and Perras 1955, 711, italics in original). In a panel on surgery in the elderly at the 1959 meeting of the American Geriatrics Society, Preston Wade and Paul Braunstein, two surgeons in Glenn’s department at New York Hospital, offered a similar response when asked about contraindications to surgery in the elderly:

Dr. Wade: Surgery is contraindicated in the moribund patient. That is the only circumstance I know of in which surgery is hopeless. . . .

Dr. Braunstein: I agree with Dr. Wade that patients have to be almost dead to be ruled out. . . . There are few contraindications to surgery, and these are usually temporary and can be treated and eliminated by medical care before operation. (Glenn et al. 1960, 517)

To Robert J. Wilder and Ronald H. Fishbein of the Baltimore City Hospital, the magnitude of surgery’s potential benefits superseded the potential negative consequences of aging, thus making old age itself a new surgical “frontier” that demanded to be explored (Wilder and Fishbein 1961a, 1961b). As they commented in 1961,

We should not hesitate to offer surgical procedures to those beyond the age of 80. Instead, we should continue to improve all facets of preoperative and post-operative care, anesthetic agents, surgical skills, and rehabilitation units so that the widening frontier may ever extend. For who can say what the upper limit of life may be? (Wilder and Fishbein 1961b, 551)

Along with other perspectives that highlighted surgery’s role in pushing “the time for [life’s] last scene . . . farther and farther into the background” (Depeyster and Gilchrist 1961, 161), such comments framed the spread of surgery in the elderly not simply as a matter of individual health but also as a symbol of progress in surgical care and an achievement that spoke more broadly to the success of contemporary surgery as a therapeutic discipline.

*The Frontier Widens: Surgery in the Elderly
after Medicare and the Spread of CABG*

The creation of Medicare in 1965 brought about dramatic changes in the U.S. health economy that carried profound implications for the status of older adults as surgical patients (Starr 1982). In 1963, 75 percent of U.S. adults aged sixty-five and over lacked Blue Cross hospital insurance; 45 percent lacked any type of hospital insurance; and rates of coverage varied widely across U.S. regions. By making health insurance coverage essentially universal among adults aged sixty-five and older, Medicare contributed substantially to a sixfold increase in per-capita spending on medical care between 1950 and 1990. And while the marketwide effects of Medicare appear to have been associated with increases in hospital utilization across all age groups, these increases were most pronounced among adults aged sixty-five and older (Finkelstein 2007).

In the context of surgery, such changes in insurance coverage, combined with improvements in operative care, fueled dramatic growth in rates of established inpatient operations among older adults (Lubitz et al. 2001; Valvona and Sloan 1985). Between 1965 and 1986, for example, the number of cholecystectomies performed per 10,000 adults aged sixty-five and older increased by 43 percent, from 39.9 to 57.0 percent. In contrast, the rate per 10,000 adults aged forty-five to sixty-four fell slightly from 39.0 to 34.9 percent. Similarly, between 1965 and 1986, population rates of prostatectomy for adults aged sixty-five to seventy-four and adults seventy-five and over increased by 53.4 percent and 39.8 percent, respectively. In contrast, prostatectomy rates in adults forty-five to sixty-four grew by 20 percent over the same period, from 30.0 to 35.9 percent per 10,000 population (Pokras et al. 1989). Concurrently, new opportunities for surgical intervention in the elderly emerged with the development of new surgical procedures to treat common diseases of old age such as osteoarthritis (Charnley 1961) and coronary artery disease (Favaloro 1968; Jones 2000).

Such developments presented complex new challenges for health policymakers. On one level, the broader use of surgical care among older U.S. adults aligned with emergent streams of thought that aimed to counter negative attitudes toward the elderly in health care and in society at large. Such perspectives called attention to ageism as a newly recognized “form of bigotry” analogous to racism or sexism (Butler 1969, 1975) and viewed the “lengthening life cycle” as potentially bringing

forth an “age-irrelevant society” in which age differences would be ignored wherever possible (Neugarten 1996). At the same time, the social and financial costs of high and rising levels of health care spending for older populations (Fuchs 1984), coupled with concerns regarding the “biomedicalization” of the aging process itself (Estes and Binney 1989), fed into critiques of surgical care in the elderly as propagating harmful and debilitating side effects (Illich 1976) and, later, calls for the rationing of medical care based on age (Callahan 1987).

Within the surgical literature, however, discourse surrounding the expansion of surgical care into older populations in the years after Medicare emphasized perspectives on aging that strongly echoed themes evident in earlier surgical writings. The spread of coronary artery bypass grafting (CABG) as a treatment for coronary artery disease in older adults offers an important illustration of these parallels. Developed initially by Rene Favaloro in the late 1960s (Favaloro 1968), and the subject of fierce academic debates over its efficacy as a treatment for coronary artery disease (Jones 2000), CABG procedures were rare before 1974 among adults aged sixty-five and older. Yet between 1974 and 1986, population rates of CABG for adults aged sixty-five and older increased elevenfold, from 3.5 to 42.9 percent per 10,000, a rate of change more than four times that seen among adults aged forty-five to sixty-four (Pokras et al. 1989).

To a certain degree, such changing patterns of utilization likely reflected the impact of real improvements over time in cardiac surgical care. Yet close readings of academic writings in cardiac surgery from this period also reveal the extent to which these changing patterns of practice grew out of specific, long-standing perspectives on the nature of aging and the proper role of surgical intervention at different points during the life course.

Within five years of Favaloro's 1968 description of his technique for CABG using saphenous vein grafts, reports in the surgical literature emerged to argue “that advanced age should not be a deterrent to the selection of surgical patients of heart disease” (Ashor et al. 1973, 30); and while initial analyses considered age greater than sixty-five years as the definition of “advanced age” (Ashor et al. 1973; Barnhorst et al. 1974), subsequent work over the following two decades advocated CABG as a safe and effective procedure for patients at or beyond seventy (Meyer et al. 1975; Stephenson, MacVaugh, and Edmunds 1978), seventy-five (Horvath et al. 1990; Rich et al. 1988), and eighty years of age (Rich et al. 1985; Tsai et al. 1986).

By 1981, however, results from the landmark multicenter Collaborative Study in Coronary Artery Surgery (CASS) (Chaitman et al. 1980; Kennedy et al. 1981) and elsewhere (Kirklin et al. 1979) had demonstrated markedly increased mortality rates after CABG in older versus younger patients. In the CASS study, for example, the overall operative mortality rate was 7.9 percent among patients aged seventy and older, versus 3.7 percent among patients aged sixty to sixty-nine, and 1.6 percent among patients aged fifty to fifty-nine (Kennedy et al. 1981).

The implications of such outcome data for clinical practice were complicated by findings from randomized and observational studies suggesting that any survival benefits of CABG relative to medical therapy were likely to be most pronounced among “sicker” patients with worse coronary disease and more impaired heart function (CASS 1983; Jones 2000; Ryan 1998). Nonetheless, writings from this period on CABG in the elderly strongly recalled earlier surgical perspectives in their wholesale arguments against “age . . . as a ‘contraindication’ or as the criterion for a high-risk subset for any form of surgical therapy,” and their efforts discredit chronological age altogether as a “vital factor in prognosis” (Tsai et al. 1986, 928). Notably, patients aged eighty and older who underwent CABG between 1987 and 1990 experienced an in-hospital mortality of 11.5 percent—more than double that of patients aged sixty-five to seventy (Peterson et al. 1995). Yet authors consistently emphasized CABG in octogenarians as a “worthwhile” enterprise (Mullany et al. 1990), in which “satisfactory” results (Merrill et al. 1990; Utley and Leyland 1991) could be achieved with proper management.

As in earlier writings on general surgery in the elderly, surgical researchers in the 1980s and 1990s sought to attribute high rates of adverse outcomes after CABG in the elderly to the effects of concurrent diseases rather than to the aging process itself. Speaking at the 1979 meeting of the American Geriatrics Society, one surgeon stressed the importance of “physiological,” rather than chronological, age in determining outcomes after CABG:

CABG has been performed in elderly patients with an acceptable level of risk. At present, the risk seems comparable to that for younger patients, as is the benefit. . . . With more precise definition of the criteria for selection of patients, including the estimation of physiologic age, we should be able to offer the benefits of cardiac surgery to greater numbers of elderly patients at risks no different from those in younger patients. (Berman et al. 1980, 31)

Similar comments appeared in the surgical literature over the following decade. In 1987, Keith Naunheim and his colleagues at St. Louis University commented that for “patients older than 80 years . . . their higher incidence of associated diseases and more severe intrinsic cardiac disease place them in a higher risk category” (Naunheim et al. 1987, 807). Walter Merrill and his colleagues from Vanderbilt University noted in 1990 that for older patients, “the advanced extent of their cardiovascular pathology and the high likelihood of associated disease states will inevitably result in a higher incidence of operative death and complications compared to younger patients” (Merrill et al. 1990, 775). Finally, Tsung-Po Tsai and his colleagues at Cedars-Sinai Medical Center in Los Angeles noted that “*all other factors being equal*, indication for and timing of coronary bypass grafting in octogenarians should be as for younger patients” (Tsai et al. 1991, 986, italics added). Such arguments recalled earlier efforts to attribute apparent age-related differences in surgical outcomes to the effects of coexisting diseases. Yet they also reflect an expanding emphasis in the surgical literature, beginning with Lee Goldman’s 1977 Cardiac Risk Index (Goldman et al. 1977), on multivariate risk-stratification models that allowed researchers and clinicians to consider age as one of several potentially relevant predictors of outcome rather than as an overriding or defining characteristic for any one individual (Jones 2013; Neuman and Bosk 2012).

As did earlier arguments related to general surgery in the elderly, writings on CABG in older adults also stressed physicians’ expertise and the benefits of technical skill as potentially mitigating any effect of age on operative risk. Thus, case series commonly stressed the importance of “proper preoperative selection” of older patients as crucial to achieving good outcomes after CABG in the elderly (Mullany et al. 1990; Rich et al. 1985; Weintraub et al. 1991). Others pointed to the importance of attending to the “details of intraoperative and postoperative management” (Utley and Leyland 1991, 896) and “modern surgical techniques” (Naunheim et al. 1987) as ways of achieving favorable outcomes in older patients.

Finally, as in earlier discussions of general surgical operations in elderly patients, discussions of CABG in older adults worked to frame surgical intervention itself as a uniform good whose broader application held potential to redefine the process of aging more generally. To Naunheim and colleagues, the impact of contemporary surgical techniques and approaches to patient management was such that “octogenarian

patients can undergo elective cardiac surgery with operative mortality rates similar to those of the ‘young’ elderly” (Naunheim et al. 1987, 807). Ultimately, such comments bespoke a view of surgery that carried forward the “frontier” perspectives present in early writings on surgery in the elderly. As a widely cited 1995 cost-effectiveness analysis of CABG in patients aged eighty and over concluded, “The quality of life in the elderly who elect to undergo CABG surgery is greater than that of their cohorts and equal to that of an average 55-year old person” (Sollano et al. 1998, 297).

Conclusions

In 2001, the sixteenth edition of the *Sabiston Textbook of Surgery*, a widely used surgical text, contained a new chapter entitled “Surgery in the Elderly.” Observing that the aging of the U.S. population creates “an associated need to provide surgical care to an increasing number of elderly patients,” the authors present a detailed review of mechanistic theories of aging, physiological changes and medical conditions common to older adults, and special considerations related to elderly surgical patients. Toward its end, the chapter touches on ethical issues, such as do-not-resuscitate orders and medical futility, and offers practical advice for clinicians interacting with elderly patients (Rosenthal and Zenilman 2001). In its most recent version, published in 2012, the chapter notes that by reducing operative mortality in the elderly, “advances in surgical and anesthetic techniques” have made “the risk associated with surgery . . . somewhat less of a concern than the need to provide maximal medical management of disease” (Dardik, Berger, and Rosenthal 2012, 328).

Such comments represent a dramatic departure from the stated goal of a textbook on geriatric surgery published four decades earlier, “to crystallize the fact that patients in the geriatric age group can be safely operated upon” (Mitty 1966, vii). Such differences in tone and purpose, together with current health policy concerns regarding the workforce and budgetary considerations created by trends in the volume of surgery performed in the U.S. elderly over time (Etzioni et al. 2003a, 2003b; Valvona and Sloan 1985), portray the operative care of older adults—once an unexplored “frontier” (Wilder and Fishbein 1961b)—as a fully domesticated terrain in American surgery.

Past efforts to explain this process of transformation have centered principally on the influence of financial incentives that have encouraged the use of medical services by older adults (Bodenheimer 2005a) and technological advances that have changed the nature and scope of surgical care (Bodenheimer 2005b). Alternative explanations have emphasized demographic changes that have moved the onset of infirmity and disability to later points in the life course (Rice and Feldman 1983) and the greater focus during the twentieth century on treating “at risk” states in addition to active diseases (Aronowitz 2009).

Our examination of surgical writings from two distinct episodes in surgical history—the expansion of general surgical procedures among older U.S. adults in the first two decades after World War II and the spread of coronary artery bypass grafting (CABG) among older adults beginning in the mid-1970s—highlights the degree to which the diffusion of surgery in the elderly as an innovation in medical practice occurred as a cultural process, characterized by specific perspectives on the meaning of old age and the purpose of medical care. In both cases, surgeons’ calls for the more widespread use of surgical procedures in the elderly co-opted geriatricians’ distinctions between “chronological” and “physiological” age and “normal” and “pathological” aging to frame wholesale arguments against the relevance of age as an input to surgical decisions.

Despite evidence of higher surgical mortality rates among older versus younger patients, such arguments emphasized the fallibility of age as a marker of operative risk and sought out factors other than age, such as the presence of coexisting diseases, to explain away apparent age-related differences in outcomes. As their arguments worked to reframe the aging process as subject to, and reversible by, surgery, surgeons in both cases positioned operative interventions as treatments intended not only to cure or palliate specific organic illnesses but also to counter the aging process itself.

To the extent that surgeons’ rhetoric held age *per se* as largely irrelevant to medical decisions, they carried strong thematic links to concurrent streams of thought that defined ageism as a social problem and sought to substitute positive images of old age for negative ones (Cole 1992). As Thomas Cole has pointed out, because such efforts to “reform cultural sensibilities towards old age” (Cole 1983, 34) typically seek to do so by stressing similarities between older and younger adults, they may have both positive and negative consequences from the standpoint

of health policy. Observing that these efforts run the risk of glossing over real, and potentially important, differences between individuals at distinct points in the life course, Cole argues that they may turn aging itself into “a ‘problem’ that requires a scientific ‘solution’” and embody a broader cultural aspiration towards “abolishing biological aging” (Cole 1983, 39).

Notably, a growing body of more recent surgical research has begun to move away from efforts to “abolish biological aging” from the context of surgical decisions. Concurrent illnesses—previously thought to be the main explanation for differences in operative mortality rates between older and younger patients—have begun to be seen as potentially less important than “the aging process itself” as a determinant of surgical outcomes (Zenilman 2012; Zenilman et al. 2011). Surgical researchers have begun to examine the impact of frailty (Robinson et al. 2009) and functional disability (Finlayson et al. 2012) on surgical outcomes in the elderly, explicitly validating the status of older adults as a distinct and potentially vulnerable subset of surgical patients. Simultaneously, clinical texts in surgery have placed new emphasis on enhancing “the geriatric competence of surgeons and surgical trainees” and acknowledging the potential inadequacy of traditional metrics of “surgical success”—such as thirty-day mortality and morbidity—as measures of health care quality for older adults (Dardik, Berger, and Rosenthal 2012; Rosenthal, Zenilman, and Katlic 2011). Such work has been informed by larger efforts by professional organizations to encourage greater integration of insights from geriatrics into surgical research and practice (Chow et al. 2012; Katz et al. 2009; McGory et al. 2009) and a more general acknowledgment of the distinct ethical challenges created by the potential to perform surgery at any age (Kwok et al. 2011; Pernar et al. 2012; Raiten and Neuman 2012; Redmann et al. 2012; Schwarze, Bradley, and Brasel 2010). In an important way, such work also recalls perspectives on surgery in the elderly that predated, and served as a contrast to, the writings we examine here. While not arguing against the potential for surgical interventions to benefit older adults, these contemporary streams of thought question past efforts to deny the relevance of aging to surgical decisions and, at the same time, implicitly challenge “heroic” models of medical intervention that focus on the extension of life at all costs (Bosk 1979; Fox and Swazey 2002).

Our work must be considered in the context of important limitations. We acknowledge that the relationship between surgical rhetoric and

practice is complex and that the evidence we present here does not provide definitive insights into the importance of changes in medical thought to changes in surgical practice relative to other factors. Because it relies primarily on published academic and clinical surgical writings, our analysis is limited by potential biases in the nature and content of articles submitted and chosen for publication at different moments in time, as well as by the narrative conventions of academic writing itself (Gusfield 1976). We cannot quantify the extent to which the viewpoints we examined, published during two specific periods, may or may not have been representative of views held by practicing surgeons at large in their own time or at other moments in history.

Nonetheless, as these writings illustrate “the assumptions under which leaders in the field attempted to shape their . . . specialty” in regard to its approach to caring for older adults (Hirshbein 2000, 338), they show how certain challenges in clinical care and health policy related to surgery were defined and how they persisted over time. Steven Epstein has emphasized the complex and social nature of medical researchers’ and practitioners’ decisions as to when, and to whom, research findings can and should be generalized. Insofar as the historical writings we examine repeatedly emphasize the sameness of older and younger surgical patients, they act, in Epstein’s terminology, to position older adults as “standardized ‘working objects’” (Epstein 2007, 33) to which practices of surgical decision making and surgical care established in younger individuals could be safely applied. By discouraging fixed age limits for interventions, such arguments undoubtedly yielded health benefits by expanding access to operative care for older adults. Yet to the extent that such arguments almost uniformly characterized surgery as a normal, intrinsically “optimistic” choice, they may also have marginalized the perspectives and values of individual patients. As such, more recent efforts to understand differences in priorities for care at various ages, along with efforts to incorporate palliative care perspectives into surgical decision making, underscore the very limitations of such wholesale arguments for or against surgical care in older adults.

Our findings offer important insights for research, clinical care, and health policy regarding health services utilization in the United States. By showing how the spread of surgical care among older adults was enabled by perspectives that artificially separated surgical decisions from efforts to understand the aging process, our work emphasizes the real implications for both medical care and health policy of societal views of

aging as a biological process and of old age as a stage of life. Moreover, as the novel expansion of surgical procedures to older adults represents only one example of how a new concept of medical treatment emerged, spread, and gained authority in twentieth-century medical thought, it stresses the complex, inherently social, nature of medical progress more broadly. As such, our work reveals future opportunities to examine current views on aging among surgeons and the promoters of, and barriers to, efforts to integrate geriatric and surgical perspectives. Furthermore, it demonstrates the need to more fully understand the role of heroic, "frontier" rhetoric in motivating the spread of new ideas and approaches in medical and surgical care more generally, as well as the types of insights that such rhetoric enables and forecloses. In so doing, these observations stress the extent to which the development of effective policy solutions to the long-term consequences of medical innovation may be aided by viewpoints that see the shape of contemporary medical practice not as a historical inevitability, but rather as a product of the specific perspectives and beliefs of a given time and place.

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Acknowledgments: The authors thank Emily Watson, Olutoyosi Ogunkua, and Jonathan Staloff for invaluable research assistance, and thank Robbie Aronowitz and Joel Howell for their insightful comments. Mark Neuman received support from career development awards from the Foundation for Anesthesia Education and Research and the National Institute on Aging (K08 AG K08AG043548-01).