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| **Author/ Year**  | **Design/ Setting/ Sample**  | **Results /Implications**  | **Quality of Evidence/ Methodological Flaws**  |
| Avery & Shultz 2007  | Theoretical economic model  | Focuses on microeconomic model development for the production of quality. Authors assert that quality will only be valued at a level where the marginal cost of quality is equal to is marginal altruistic utility.  | Theoretical  |
| Bendix 2014  | Presents an overview of RVU.   | Author presents the view that the RVUs can be physicians have few better tools at their disposal than the Relative Value Unit (RVU). RVUs can be used for everything from helping to determine compensation in a multi-physician practice to deciding whether to take a buyout offer from a hospital system.  | Descriptive. A more administrative focus.  |
| Berenson & Rice 2015  | Analysis of public policy  | Payment policy should help temper the current “more is better” attitude of physicians and HCP organizations. Incentive neutrality would better support health professionals’ intrinsic motivation to act in their patients’ best interests to improve overall quality than would pay‐for‐performance plans targeted to specific areas of clinical care. Public policy can support HCPs’ intrinsic motivation through approaches that support systematic feedback to HCPs and provide concrete opportunities to collaborate to improve care. Some programs administered by CMS deserve more attention.  | Authors advocate for public policy changes but note that actually achieving improvement, however, will require a reexamination of the role played by financial incentives embedded in payments and the unrealistic expectations placed on marginal incentives in pay-for-performance schemes.  |
| Conrad 2015  | Conceptual analysis and targeted review of theoretical research and empirical literature   | Implications of agency theory for value-based payment. Healthcare payment is unique in the multiplicity and complexity of principal-agent relationships.  | Conceptual analysis, but not an actual study. Recommendations are theoretical.  Focused on general PFP (more payer compensation for care).  |
| Cunningham, Bazzoli, & Katz 2008  | This study observed how safety net HCPs responded to market pressures that have pushed many organizations to highlight revenue-producing services and limit activities with lesser reimbursement.   |  Safety net HCPs described increased demand and worsened condition of those seeking care. The equilibrium between mission and financial viability has become tenuous; safety nets have become more competitive and profit driven. Some have tried to que and tier appointments based on insurance and many have become stricter in collecting out-of-pocket payments and discount prices for patients who pay up front.   |  Observational . Still more focused on the trickle down of payer-to-organization-to-HCP |
| Flodgren et al. 2011  | Cochrane Review  Incentives divided into five categories, compensation for: 1) a certain timeframe, 2) individual services, 3) provision of care for a specific patient population, 4) proven quality improvement, and 5) a mixed system.  | Investigated the sway of fiscal incentives on healthcare professionals. Payment for time was ineffectual. Payment for other categories were effectual; however, these were generally ineffective in improving guideline compliance and in improving patient outcomes.  |  Authors state that the results should be treated with “considerable caution”. While the methodological quality of the four included reviews was moderate to high, their rating of the quality of the studies they included was low to moderate.    |
| Floyd 2014  |  Discusses an approach to create an equitable P4P program    | The majority of HCPs have productivity- based compensations. The authors advocate for HCP compensation plans that parallel the payer reimbursement change (PFP), and that, in the future, productivity should only represent one component of a more complex plan of base salary and incentives that will improve outcomes.   |  Theoretical  |
| Godager & Wiesen 2013  | Medical students assumed HCP role. randomly assigned to a fee for service payment group or a capitation payment group    | Medical students assumed the HCP role and decided medical service provision; as such, the researchers were able to distinguish the influence of profits and patients’ health benefit on medical treatment selection. The degree of altruism varied greatly: 26% attached a greater value to their individual profit than to patient benefit, 29% attached equal weight, and about 44% put higher weight on the patient.                                                                    |  Due to the substantial variation, there is need for additional empirical research.  |
| Gosden et al. 2003  | Controlled before-and-after design. Implemented involving ten practices of standard contract GPs, paid largely by capitation and FFS, and ten salaried GP practices.  | Focused on the effect of salary vs. capitation on HCP performance and quality of care. Salaried HCPs spent less time on practice administration, but, otherwise, did not have any statistically significant differences with their capitated colleagues in terms of workload, referrals, or quality.   | Other contract characteristics and factors such as differences in management pressure may explain some findings. Quality of care measured using validated instrument but it was not possible to validate the instruments used to measure GP working practices.  |
| Gravelle & Ma 2019  | The UK NHS introduced a pay for performance scheme for primary care HCPs in 2004-5, which rewarded HCPs for the fraction of eligible patients who received correct treatment.  | HCPs reported eligible patients as those having the relevant disorder minus those not suitable for treatment. Using HCP-level data, the authors found that variances in reported disease rates between HCPs, and differences in exclusion rates between and within HCPs, insinuate gaming; faced with fractionated performance indicators, HCPs operated on both denominators and numerators.  | In the absence of pre-QOF evidence, it is uncertain as to whether the introduction of the QOF increased or reduced inequity. There are other variables, which could plausibly affect GP costs.  |
| Green 2014   Real-effort laboratory experiment  | College students were assigned HCP vs. patient roles. HCP-students had to make a judgement on how many services to deliver and for which patients to deliver those services. The HCP group was compensated by one of many the payment structures.  | When payment was retrospective (i.e. FFS), HCPs delivered a worse overall service quality. Inversely, prospective payments (i.e., salary), HCPs delivered a higher quality of service. This demonstrates that financial incentives can “crowd out” intrinsic motivations that would otherwise inspire HCPs to complete the task at higher performance levels. Sometimes, intrinsic motivators were capable of improving service quality when the payment inducements did not crowd them out.  | While the laboratory experiment provides additional insights, some of the simplifications raise concerns: 1) students proof-reading an essay are different than physicians making medical decisions, 2) the healthcare industry has cost layers that are not represented in the DPA game.  |
| Healthcare Financial Management Association 2008  | HFMA’s White Paper on healthcare reform.  Brought together insights from various system stakeholders.  | Using the instability of cost and the complexity of health administration, the authors assert existing payment schemes hinder the activities needed to improve healthcare.   | Conceptually, proposed elements have broad consensus among stakeholders, but signiﬁcant development and testing are needed.  |
| Hennig-Schmidt & Wiesen  2014  | controlled laboratory experiment  To understand how HCPs respond to payment incentives, the authors analyzed the influence of incentives from FFS and capitation payments on HCPs’ supply of medical services. HCPs choose quantities of medical services for patients with different states of health.  | We find that HCPs provide significantly more services under FFS than under capitation. Patients are overserved under fee-for-service and underserved under capitation. However, payment incentives are not the only motivation for HCPs’ quantity choices, as patients’ health benefits are of considerable importance as well. We find that patients in need of a high (low) level of medical services receive larger health benefits under fee-for-service (capitation).  |  It is difficult to generalize findings from the lab to the real world.   |
| Lagarde & Blaauw 2017     | Medically-framed real effort experiment  In this experiment, participants were compensated differently for each data entry period to examine the effect of remuneration schemes in medical decision making.  | Researchers found that : 1) HCPs had higher productivity under FFS; 2) risk-adjusted capitation inhibits cherry-picking; 3) quality is lowest under FFS due to its connection to volume; 4) quality is still better with salary compared to capitation, 5) social incentives (patient benefit) improved quality performance; 6) evidence was mixed on the relative productivity under FFS and capitation, with higher productivity under FFS in only some treatment groups; 7) capitation subjects did not attempt to maximize the workload. The researchers felt that the results showed the strength of financial incentives for individuals who need to be motivated; however, those same monetary motivations are not effective for HCPs who are intrinsically motivated to work well.  | The major limitation is the that it is difficult to generalize findings from the lab to the real world.  |
| Lantos 2003    |  Commentary  | The writer alleges that healthcare reimbursement schemes are still fundamentally comparable to dialogues surrounding rationing and resource allocation. He discusses the complexity of this system as HCPs are usually no longer single practitioners in private practice and services are no longer private transactions between individuals. Exemplifying RVUs, the author warns that systems designed to measure clinical practice often turn into ways to shape practice if they are tied to recompense.   |  Commentary   |
| Lewandowski 2006  | Longitudinal case study  A medical group implemented major changes to PCP compensation arrangements in 2000. Compared productivity, compensation, patient satisfaction, and cost to the medical group/RVU from 1998-2002.   | Increasing productivity is one approach to decrease costs. This article attempted to determine the influence of productivity pay on HCP productivity, patient satisfaction, and medical group costs of care delivery. In this study: WRVUs per FTE rose 38%, HCP compensation increased 20%, cost of PCP compensation per WRVU produced decreased by 13%, overall organizational costs decreased by 20%, and patient satisfaction was unchanged.  | Limitations: 1) the joint effects of the multiple interventions cannot be separated; 2) the granularity of the data was not sufficient to analyze intervals of time shorter than a year; 3) generalization to other medical groups should be done with great caution because of contextual differences.   |
| Lochner et al. 2016  | Observational study was conducted. A pre-post email survey assessed satisfaction with the plan, salary, and salary equity. Physician retention, panel size, and relative value unit (RVU) productivity metrics also were assessed before and after the plan’s implementation.  | These authors propose a new population health based HCP compensation plan. After the intervention, satisfaction rose from 33% to 68% amongst resident faculty and from 26%-87% for community faculty. For both groups, panel size increased and RVUs moved closer to national benchmarks. This article mentioned that HCPs who are paid to provide more services typically do so; these arrangements are aligned with a FFS payment model. The authors assert that the misalignment between financial rewards and organizational goals as the potential to affect HCP morale and engagement.  |  Study does not account for non-clinical work (e.g. teaching). Individual-level pre-post changes in satisfaction or perception of equity were not able to be measured because survey responses were anonymous. he high rate of capitation in our system may preclude generalizability to other settings. Transitioning away from the RVU as the main measure of work would likely be difficult in an environment without significant non-fee-for-service sources of revenue.   |
| Mantel 2018  |  Commentary  | There is some fear that payment modalities that link HCP reimbursements to patient outcomes threaten to weaken HCPs’ tolerance for noncompliant patients, which may create another barrier to care.  | Commentary on practice only from authors perspective  |
| Marcus, Zenty, & Adelman 2009  | Faculty practice group  | One faculty practice group implemented a RVU-centered compensation model, with incentivization-mechanisms for both clinical practice and for scholastic and managerial contributions. By aligning incentivization schemes with the hospital, clinical productivity increased.   |  Descriptive of a narrow set of indices.   |
| Murray 2013  |  Provided an overview of different HCP compensation models.  | The small group private practice model is to treat each HCP’s clinical revenue as his or her own and allocate expenditures according to a process that accounts for fixed and variable overhead. Large group private practices, multispecialty practices, and hospital practices have customarily included a base-pay plan with productivity incentives. Lately, added measures (e.g. quality, cost effectiveness, risk-sharing) have been integrated into these payment plans.   |  Descriptive and more theoretical   |
| Newhouse & Sinaiko 2007  | The authors reviewed the measures of HCP productivity as outlined by Fisher.  | The basic theory undergirding productivity measurement assumes competitive pricing. However, given the pervasiveness of administered prices in the HCP marketplace, that is a bold assumption. The author also is concerned about the ability to quantify quality due to the unclarity surrounding: 1) of what has transacted or what the product is, 2) and what services correspond to which HCPs.  |  Theoretical   |
| Nugent  2009  | Commentary   | Advocates for a “pay me right” approach as no one is benefiting from “pay me more”. Without a synchronized determination between stakeholders (payers, HCPs, patients) to align price and value, the present payment system will increasingly cause higher levels of cost shifting and payer consolidation.  | Conceptual  Focused on general PFP (more payer compensation for care).   |
| Paddock et al.  2017  | Used data on quality of care and total cost of care from 129 California POs participating in a statewide P4P program.  | Examined associations between efficiency, expenditures, and quality. Researchers developed an instrument to compare HCPs’ relative efficiency. Findings demonstrate that the relationship between quality and cost can be misleading when efficiency is not taken into account.   |  The tool used works best when production output is homogeneous (difficult in healthcare). Efficiency could only be estimated relative to the most efficient POs in the data (theoretically possible but unobserved maximum performance level. The quality measure was not all inclusive to all pertinent healthcare measures. The ability to assess the tool’s validity was limited by available measures of overuse, inappropriate use, and meaningful HIT use.    |
| Petersen et al. 2013  |  Cluster randomized trial of 12 VA outpatient clinics with 5 performance periods. Enrolled 83 primary care physicians and 42 nonphysician personnel.  | HCPs randomized into individual level incentives, practice level incentives, both, or none to help encourage BP control. Individual inducements, but not practice nor combined incentives, resulted in BP control/appropriate responses to uncontrolled BP. In the absence of any incentive, HCPs prescribed more guideline recommended medications.   | Generalizability may be limited d/t 1) VA setting, 2) financial incentives were limited to BP related outcomes.   |
| Scoggins et al. 2013  | Academic surgical practice   As the focus upon revenue continued to increase, the group attempted to use transparency concerning productivity to improve clinical productivity.  | The compensation plan remained the same during the pre- transparency and post-transparency time periods, and there was no change to workload; faculty was paid a base salary and a practice-plan income based on individual collections minus organizational overhead. In the pre-transparency timeframe, productivity data were not made public; after that time, the organizational leadership developed a scorecard to encourage transparency in regard to productivity. After the release of the scorecard, clinical productivity improved. The authors do note that added processes needed to be taken to guarantee proper incentivization of research and teaching activities.  |  Authors admit n association between transparency productivity metrics and increase clinical performance but not causation. In addition, the authors note that the surgeons completed their own coding and may have some differences might be accounted for by that and not actually a difference in true productivity.   |
| Singleton & Miller  2016  | Presents a review of broad market trends effecting HCP contracts.  | The four market drivers of HCP salaries are: HCP shortages, consolidation, employment, and volume-value ratios. Presently and conversely, volume-based metrics, such as RVUs, are present in 58% of agreements and remain the chief means by which HCPs achieve bonuses. Quality metrics, by comparison, only accounted for ~ 29% of overall bonus amount, which may not be sufficient to effect HCP-behaviors.  |  Descriptive   |
| Strasburger 1999  | Commentary   Academic group deliberating the enactment of an incentive plan for compensation.   | The staff was already completing forms tracking and being evaluated on RVUs, teaching units, and administrative units. The author was apprehensive and argues that productivity measurement is: 1) a clear deportation from the altruistic motivation that he had in pursuing a medical career; 2) unneeded given professional status; 3) associated with increased administrative bureaucracy.  | Opinion piece.  |
| Van Slyck 1999  | Transcript for a debate about productivity within healthcare between payers and HCPs.  | One salient point was that no one can deny that productivity is about cost-reduction; quality is not the issue. From an administrative point, it was felt that quality was used as a justification to not participate in cost reduction. Because HCPs are under mounting pressures to moderate their expenses, there is a strong inducement to regard cost and productivity data as a means to drive cost reductions; however, one interviewee cautioned that these are but symptoms of a systemic problem. That interviewee stated that the preeminent way to regulate costs is to focus on quality improvement.  |  Only presents the opinions of the interviewees   |
| Wiskerchen 2013  Abstract only  |    | As more HCPs are offered hospital employment, RVU-based compensation contracts are becoming more sophisticated and complex. The author counsels that HCPs must begin acquainting themselves with the nuances of these RVU based formulas as to have a meaningful discussion with administrators and, also, confirm that the compensation agreement addresses pertinent specialty specific issues.  | Abstract only Theoretical.   |
| Wynne 2015   |  Commentary/Blog  | Expenditures continue to increase; this growth is thought to represent a basic principle of HCPs doing more work to counterweigh stagnant wages and to keep income levels stable.  | Commentary from author’s perspective  |