EHR RUBRIC-SP

(Electronic Health Record Revision and Update By Re-Iteration and with Context for Small Practices: A method of measurable analysis for EHRs.)

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Abstract

In this article, I propose EHR-RUBRIC-SP (**Electronic Health Record Revision and Update By Re-Iteration and with Context for Small Practices**), a method to analyze EHR (Electronic Health Record) systems (EHRSs). While EHR-RUBRIC-SP is primarily designed for the context of evaluating EHRS deployment and usage in smaller practices, in theory, the evaluation system could be used on a wider basis. It is of particular note that this evaluation system is patient-centered; rather than covering financial incentives to small providers, we empower small providers to improve patient care. However, the emphasis on meeting US government meaningful use (MU) criteria still exists, and through meeting these criteria, providers will be able to avoid fines. Reviewing the literature, I develop common methods of analyzing the EHR and EHRSs based upon cost, quality, data software structure, and system hardware capabilities. Particular attention is paid to measurable metrics of sociology in Information Technology (IT) adoption. From the literature, I design the details of EHR-RUBRIC-SP, which analyzes the EHRS immediately prior to deployment, six months after EHRS deployment, and one year after EHRS deployment. The EHR-RUBRIC-SP therefore is by nature iterative. It is hoped that adopters of EHRSs in small practices will embrace EHR-RUBRIC-SP and that this evaluation system will allow these practices to improve their services.

Introduction, Background, & Literature Review

The literature on EHRs and EHRSs is, to say the least, copious. Topics covered range from the obvious medical aspect of the EHR to social aspects of systems adoption to system design itself. In between, many authors entertain advanced forms of data analysis (both from social and system-related data) in order to improve functionality of EHRSs, record-keeping systems in general, and even sociological networks of professionals, particularly with respect to their adoption of IT advances.

In medical terms, the EHR is a system designed to capture data relevant to patient diagnosis and/or treatment (Chilmark, 2013). As the *E* indicates, the record must be electronic. Ideally, the EHR must be personally portable between clinicians and hospital systems for patient convenience. At least one company has stated an equation of “EHR = EMR + PHR”, where

EMR stands for Electronic Medical Record and PHR stands for Personal Health Record (Chilmark, 2013).

Because EHR-RUBRIC-SP is designed to be used in smaller, private practices, it is important to note trends of EHRS adoption in this milieu. While no consensus definition of a small practice exists, we note that Decker, Jammoom, & Sisk (2012) place the classification of "small practice" at a maximum of two full-time physicians. We thus choose (somewhat arbitrarily) to extend the definition to practices of five physicians or less. Very recent research by Xierali et al (2013) finds that small practices are the least likely to adopt EHRSs; these authors found a 68% rate of adoption among small practices in 2011, a finding that is reinforced by Decker, Jammoom, & Sisk's preceding research. Thus, we may say that there is indeed a market for EHR implementation analysis in smaller practices.

The practice's users are more likely than not going to be averse to change, particularly the more radical the change is (Warner & Hochberg, 2012). Thus, some sort of social evaluation is called for: We evaluate instead through network structure and social science dogma the potential of technology to spread. Mirriahi, Dawson, & Hoven (2012) stated that information diffusion is best achieved through a graph of individuals through nodes (in this case, individuals) of high betweenness centrality (BC). The calculation of BC of individuals in a social structure is complex and beyond the scope of this article; however, there exist software packages for simple calculation of this metric. Here, we use Sci2 (Linnemaier et al, 2009), as it is freely available.

Analysis of the technology used to keep records, including EHRs, is also extremely important. Many technologies exist for the storage of data; these technologies have various components, such as hardware, software, and data structuring. Should a hardware system fail or become overloaded, it is obvious that the EHRS it supports will fail with it; an egregious example was seen in the temporary failure of the United States' healthcare.gov site (Bryant, 2013). Bryant (2013) also points to the possibility that this particular website's failure was also due to poor data structuring; this facet is addressed later on in our review.

A more famous incident of health IT downtime was the Sutter Health case in Sacramento, California (McCann, 2013). Not only did this hospital's EHR system implemented have a full 24-hour crash, a majority of it was also unavailable for approximately eight hours due to scheduled maintenance. The outages proved culturally unacceptable; nurses called for a delay (or even complete moratorium) on EHR adoption (McCann, 2013). Further literature defines the uptime percentage (essentially the inverse of downtime in a ratio figure with respect to total time) as acceptable when it is ≥95.0%, with a more optimal figure of ≥99.0% (Pyles, 2005, pp. 57-59).

Software technologies and data structuring are also of importance in EHRSs. Data matching and access times are dependent upon the software of choice, as said software will use certain data structures. The relational database (RDB) structure, most frequently implemented by SQL (Server Query Language), stores data in flat tables with identifiers that link the data together; such systems are also known as Relational Database Management Systems, or RDBMSs (Rouse, 2008).

In order to achieve meaningful use, data in an RDB must also be handled in absolute context. RDBs feature data typing (the characteristic that each entity in a table must hold a certain data type). In SQL, common types are character strings, integers, decimal numbers, and Booleans. In order for data to be compared from two different tables, they must be of the same declared type. (Donahoo & Speegle, 2005, pp. 5-8). Furthermore, in order to enhance referential integrity (RI; a method of preventing record duplication), a common fixed ontology relies simply upon unique identifying numbers for each entity; such an ontology has been shown beneficial for an EHRS in the setting of primary care (de Lusignan et al, 2006). As such (ideally speaking) no field is repeated within the RDBMS. At the very least, this type of integrity assists in preventing accidental deletion of records within the RDB/RDBMS. (Sahgal, 2013.)

Meaningful Use principles hold that units are kept consistent between processes; the AHRQ (Agency for Healthcare Research and Quality) agrees (2009). Kulanthaivel (2012) furthermore emphasizes the use of unit consistency in dosimetry systems and states that dosage for digoxin, a cardiac medication with low therapeutic index, is always stated in micrograms (1,000 micrograms equals one milligram). In 1997, this particular medication was actually involved in the death of a Houston, Texas infant with a cardiac disorder (Belkin, 1997) due to non-standard dosing instructions. Therefore, we may conclude that the usage of proper units is of prime importance in any EHRS.

Staff (i.e., anybody who works for the clinic) participation is vital in the implementation of an EHRS. The AHRQ (2009) proposed several measures that would evaluate staff participation in implementation of an EHRS. These measures include (but are not limited to) the percentage figure of prescriptions that are ordered via the EHRS, and the percentage of discrepancies in dosages between prescription orders sent and prescription orders ordered (AHRQ, pp. 28-29).

Finally, it is notable that scholars and corporations alike agree that the display and information architecture (IA) of EHRSs must meet patient needs and be patient-centered in general. Rowley (2013) states that (at least as an option), MU stage 2 criteria mandates that providers should be able to give patients laboratory results via an electronic record (or paper copy thereof, if the patient prefers). Indeed, the system implemented by Patients First (2011) has as one of its own MU goal criteria that such personal patient reporting requirement be met. Furthermore, Dalrymple (2013) claims that there exists legislation within the ACA that requires that all results and treatments be explained thoroughly and in plain language that is understandable to the patient. Furthermore, Dalrymple stated that such an implementation would require analysis from the social side as well as the technical side, as a technical system must deliver socially appropriate results.

Of course, subjective biases (amongst other issues) could pose problems in evaluating the social appropriateness of results. In order to provide a framework for at least mathematical consistency in the evaluation of social appropriateness, we shall default to the classical Z-distribution (also known as a normal distribution or the bell curve). This distribution, which will be referenced as a guideline later in this evaluation system, is commonly used in human-centered fields as a metric of human facets to the point that it is the only probability distribution used in some applications of error determinations (Kutner, Nachtsheim, & Neter, 2004, p. 110).

Methods and Evaluative Framework

This section deals with the proposed metrics themselves and the rationales for using them. Note that there are different metrics to be deployed at different points in time, allowing for iterative analysis of the suitability of the system. Furthermore, if applicable, actual numerical results are discussed in simulations performed on the Patients First (PF) system.

Most evaluands for EHR-RUBRIC-SP were chosen based upon the literature review conducted previously. We divide the evaluands into two categories: Social and Technical; furthermore, each category has sub-categories for the time of data surveying (at introduction of the EHRS, six months post-introduction, and one year post-introduction). Each evaluand is subject to proper statistical analysis and interpretation; guidelines for proper use are explained with evaluand descriptions.

A mock grading sheet for EHR-RUBRIC-SP with sample values is available in the Appendix, should the reader wish to facilitate his or her understanding of EHR-RUBRIC-SP.

Phase I: Timed for Pre-implementation; major focus is social

While document specifications (as supplied by instructor) indicated that phase I would be performed at implementation time (T = 0), the author has instead chosen for Phase I to occur *prior to* implementation. We thus analyze first the social structure in order to determine information diffusion. For this end, a simple human resources chart shall suffice, with links drawn between individuals who communicate. However, for purposes of network simulation, individuals who do not embrace technology, intuitively, would be excluded.

I-A. Social Simulation

NOTE: While this metric system is designed to use primarily so-called hard measures of adoption, a social analysis will require some (albeit minimal) surveying. To run this measurable survey, one will require asking the following single question to all staff, measured with an answer of yes or no:

"Would you embrace an electronic health record system?"

It is important to understand that while performing network modeling, individuals who answered "no" to the above question would *actually not be included in the network graph*, as we are operating on the assumption that those who are neither familiar with nor embracing of technology will not participate in this diffusion of information. Mirriahi, Dawson, and Hoven (2012) suggest that high-BC individuals are good places to introduce the EHRS. Introduction of the EHRS at other points in the network reduces the score. To determine the BC-point of introduction discrepancy (which we term a unique measure known as the BCPID), we use the following equation:

$$BCPID = \frac{\sum(BCs\ of\ N\ clinicians\ to\ whom\ the\ vendor\ introduced\ the\ technology)}{\sum(BCs\ of\ the\ the\ N\ clinicians\ with\ the\ highest\ BCs)}$$

A step-by-step guide to the calculation of BCPID in the Sci2 tool (with an example) is available in Appendix 2.

I-B. System Survey

MU recommendations (as reviewed prior) state that data must be interchangeable and have proper unit notation. Therefore, the following criteria are suggested in Phase I of system surveying:

- #1B1. All numerical entities in the RDB behind the EHR should be stored as decimal (double) value format. The reason for this criteria is obvious and due to the incapability of an RDB to compare non-numeric values (or in some cases, values of separate numeric format).
- #1B2. There must be referential integrity. If a practice is to choose an RDBMS, no *field* may be duplicated in separate tables. In other words, patient name may *not* be present as a field in two different tables, as only one table is responsible for storing patient name. *Further detail about evaluating an RDBMS for referential integrity is beyond the scope of EHR-RUBRIC-SP; interested readers are directed to Sahgal's 2013 article (please see references section).*

Thus, we finally arrive at the following scores for the pre-implementation analysis:
#1A1 (BCPID): Scored from 0-10 by multiplying the BCPID by 10. (Maximum score is 10).
#1B1 (Storage of numbers): 10 points if stored numerically and in identical decimal format and with units; 5 points if done so without units; 0 if stored in non-decimal format or does not exist.
#1B2: (Referential Integrity): 20 points initially; subtract 1 point for each table field found to be redundant. Unique identifiers that are used to join tables do not count, as they serve as explicit keys and are required; however, entities such as having fields for doctors' notes in two separate tables is a reason for subtraction of a point. The minimum score possible for #1B2 is zero.

Due to the iterative nature of EHR-RUBRIC-SP, there is an opportunity for decision-making and thus iteration at this point. One may propose that for #1A1 and #1A2, **both scores**

must be greater than 5 respectively in order to consider any EHR system socially acceptable; in other words, more than half the practice's staff must be in the largest component of the communication network and there must be less than 50% BCPID. **The organization therefore should consider not adopting any EHR if the result from #1A1 is less than or equal to 5.0; we can only speculate that staff IT training may be required in this case.** Furthermore, as non-numerical storage of numerical values at this stage is unacceptable in achieving meaningful use, a score of 5 is needed in #1B1 and that this criterion must be met **prior to implementation**. #1B2 is a later goal of MU, and the total of all items under #1B can be considered acceptable if they add up to 10 points.

II-A. Social Survey (6 months out)

By this point, we should assume that all criteria from the pre-flight implementation checklist outlined in section I of this rubric have been met in a satisfactory manner. Non-fulfillment of any of the criteria in I-B, in particular, must be rectified as per MU criteria; note again that the "I" in EHR-RUBRIC-SP emphasizes iteration (i.e., re-design if necessary).

In conducting the second social survey itself, basic 'yes/no' questions should be asked of users at many levels at this point, and are based on MU criteria. Prior graph theory studies by Mirriahi, Dawson, & Hoven (2012) as well as more domain-specific use cases such as Patients First (2011) indicate that IT adoption will proceed through to patients. In order to determine disruptiveness of this technology, we actually need not ask staff anything and may instead measure from system logs. We suggest a measure that composites (as stated in the literature review) the AHRQ requirements (2009); in particular, we target those common in the outpatient setting: Percentage of medication agreement (comparison of what is dispensed with what the EHR states ought to be dispensed), percentages of prescriptions ordered directly via the online functionality system, and percentage of laboratory test results that are available online to at least the physician. The AHRQ specifies the first two of these criteria explicitly (pp. 28-29) as potentially meeting meaningful use.

Thus, criteria include:

- #2A1. Average the three figures given in the previous paragraph (medication agreement, e-prescribing, and lab test result delivery).

- #2A2. (For patients) “Have you used this portal and gained useful knowledge about your health from it?” (Percentage yes is calculated)

One does have the option of re-constructing a network as seen in section I-A of the proposed metrics, or one may set an arbitrary threshold of opinion, which would be less measurable (dependent upon #2A1’s answers). However, productivity is a hallmark of a good EHR system, and users must have a favorable opinion of a system in order for it to be adopted in a meaningful fashion. Therefore, if a score of more than 50% as the composite for #2A1 is not met, the practice may wish to check their BCPID figure from #1A1. In order to determine the score out of 10 for evaluand #2A2, we turn to Rowley (2013), who expects a rate of 5% patient-side adoption by 2014. If 5% of patients access the portal and (as per survey text) gain knowledge, we assign 10 points.

While the AHRQ (2009) specifies that a majority fulfillment of its criteria (in general, around 50% for measures related to clinician activity), criteria for patient adoption are more difficult to find. AHRQ claims that “the denominator [total patient or clinician base] is difficult to determine” (p.28) at times. Thus, we will trust our instincts with respect to the Z-distribution and set a boundary at the negative one standard deviation boundary of percentage patients who have adopted, a figure that is ≥ 15%. **Finally, in section #2A, 10 points are assigned for meeting each criteria, and 10/20 points for the aggregate of #2A1and #2A2 is desired.**

II-B. System Survey, 6 months out: Structure & Reliability

- #2B1-1 & 2: The protocol on this step is to repeat steps #1B1 and #1B2 above, and score by the same 10 and 20-point scales, respectively.

Based on the outage of the critical healthcare.gov website (Barnes, 2013), it is again brought to us that outages are simply not an option in an EHRS. We thus ask for a system metric, directly from the system itself: A value of zero is desired for a downtime ratio, and any greater values may warrant investigation into the reason(s) for the downtime and mitigation of these downtime factors. The Downtime ratio could be a valid relative measure of these factors, but given the precedent case as explained by McCann (2013) also adds the idea that any outage in excess of eight hours is purely unacceptable and unacceptable downtime should also be factored in.

Therefore, we have the final system metric for this stage of evaluation:

- #2B2-1: The server log is to be observed for outages. As an EHRS would ideally be available 24 hours a day, seven days a week, it is possible that an outage may have occurred during business hours. Thus, we calculate the uptime ratio to see how well the system actually *did* perform its duties in being available:

$$Uptime\ Ratio = \frac{(Hours\ server\ was\ up\ the\ past\ six\ months)}{(Days\ in\ the\ past\ six\ months)\ * 24}$$

Note that the number 24 stands for 24 hours in a day, and that any six month interval could have a different number of days, depending particularly on the inclusion of the month of February in the cycle study period.

- #2B2-2: Assign 10 points if no outages due to **any** cause occurred with a frequency greater than 7 days apart (this figure is based on a week's length, obviously). A score of 0 is incurred for #2B3-2 if *any unscheduled* outage was observed *during business hours,* since as per McCann (2013), clinician-side productivity in such an outage would be severely reduced.
- #2B2-3: Assess reliability with respect to unacceptable downtime by looking for any downtime that was greater than 8.0 hours. This facet receives a score of 10 if none were found, and 0 if any were found.

The scores of the system in stage II are then analyzed. Because of the improvement expected from Stage I, the practice's EHRS should ideally score 10 on #2B-1 and at ≥25 on #2B-2. Furthermore, an outage score (sum of all sub-scores of #2B2) may be calculated; more than two out of three of these disruptions (i.e., a #2B2 sub-score of under 20) can be considered undesirable. It is at this point the responsible engineers should evaluate factors behind any unacceptable disruptions, suggestions such as sheer traffic volume and poor data architecture were proposed by Barnes (2013), at least in the case of healthcare.gov.

Stage III: 12 months post-implementation

It is important to note that by reaching this particular stage, the practice should have cleared *all* criteria from Stage II, including #2A2-1/2, which is a repeat of #1A2 (and thus ensures clearance of Stage I). Otherwise, it is intuitive that the practice may end up unable to escape from an infinite loop of testing! Otherwise, Stage III is essentially an extension of previous stages, but with higher criteria. If satisfaction of Stage II criteria is delayed, Stage III of evaluation also should be delayed by the same amount.

III-A: Social Analysis

- #3A1: Please see #2A1 and take the same composite score. At this point, we would like a target higher than 50%; as we are moving in terms of Z-distribution (the normal distribution), we have chosen to evaluate the system at the next standard deviation (SD) past 50%. **The score from #2A1 when re-calculated, therefore, must fall at ≥85%. (10/10 points). If the criterion is met halfway in terms of improvement (i.e., to 67.5%), we may assign 5/10 points for #3A1.**
- #3A2: We again assess patient engagement. The next step from the previously published (Rowley, 2013) estimate of 5% should increase to at least to the next standard deviation. **Therefore, at Stage III, ≥15% of patients should have been noted to use the patient-facing electronic portal and have gained information from it (10 points); much as is #3A1, we can use a halfway point (i.e., 7.5% of patients having used the system and gained information) to achieve a score of 5/10 on metric #3A2**.

By this point, we want at least halfway compliance on the aggregate of the criteria; therefore, #3A1 and #3A2 should total to 10.

III-B: System Survey

- #3B1. As passing the requirements for Stage II are mandated, we shall not entertain extensive outages. However, we may refine our metric and instead look at monthly maintenance by itself. A precedent study (Sutter Hospital, as shown by McCann [2013]) showed a maintenance time of 8 hours for the system. As some at Sutter considered the figure unacceptable, we halve Sutter's maintenance outage time and ask that 4 hours or less have been spent each month on system maintenance. **#3B must be met fully for the systems test to pass.**

Aftermath (post-Stage III)

While the discussion of evaluations post-Stage III is beyond the scope of this article, practices that cannot meet Stage III within 12 months would be continuing their testing. Much like the recommendation in case of failure in Stage II, we recommend that three months be given to re-evaluate Stage III should any of its components fail testing. Further evaluation beyond Stage III, in addition, would not occur for any practice until 2015 due to the date of this writing and may be subject to changing governmental rules (at least in the US), and practices are encouraged to turn to future MU criteria scales at that time

Discussion & Conclusions

We have created a thorough, three-stage plan (EHR-RUBRIC-SP) for the evaluation of an EHRS implementation in smaller private medical practices. EHR-RUBRIC-SP is split into three stages, to be implemented just prior to, six months after, and twelve months after implementation. Two major dimensions are seen in each of the stages: Social-based dimensions and technical systems-based dimensions. The plan is designed to be patient-focused, and does not fixate upon financial revenue gain. However, the MU focus of the plan facilitates the avoidance of financial penalties (which are beyond the scope of this discussion).

It is obvious that EHR-RUBRIC-SP is not thorough (nor is it designed to be), nor are the evaluation's evaluands *always* measurable by *all* practices. The AHRQ particularly cites the "denominator" problem of determining total patient (or order) count (2009, p. 28); we consider this issue to be inherent in any analysis. However, practices may circumvent the denominator issue simply by counting their own patients and orders manually.

Lastly, there exists literature such as Xierali et al (2013)'s research on the paucity of adoption of EHRSs by smaller practices. Such literature provides an onus through which smaller practices may be encouraged to adopt and evaluate their adoption of an EHRS. **Similarly, we hope that EHR-RUBRIC-SP is actually deployed across a real EHRS in context of a smaller practice in order to see if the evaluation is satisfactory with regards to the practice's desires.**

Appendix 1. Sample EHR-RUBRIC-SP evaluation result sheet.

Criteria No.	Details	Your Value	(Unit)	Ideal	Your Score	(
STAGE ONE JANUARY 2014						
#1A1	BCPID	0.85	Coefficient	1	8.5	1
#1B1	Quantitative Result Storage	Stored numerically; no units	N/A	All stored numerically w/units	5	1
#1B2	Referential Integrity: Non-Duplication	15	N/A	20	12	2
	Interpretation:					
#1A1/#1A2	Both are above 5. PASS; literature indicates that the social structure is favorable for widening adoption.					
#1B1/#1B2	#1B1 shows that you meet meaningful use by numerical storage, but no units exist. You have 5 duplications in #1B2. PASS					
	(But it is recommended that you watch #1B2 as it must be higher in the next stage!)					
END STAGE ONE (FULL PASS)						
BEGIN STAGE TWO JULY 2014						
#2A1	Aggregate percentage (3 measures)	0.79	Ratio	1	79%	1
#2A2	Meaningful Patient EHR engagement	0.06	Ratio	≥0.05	6%	1
#2B1-1	See #1B1	All stored numerically w/units	N/A	All stored numerically w/units	10	1
#2B2-2	See #1B2	16	N/A		16	2
#2B3-1	Uptime Ratio	0.985	Ratio		0	1
#2B3-2	Shortest time between unscheduled outages	9	days		10	1
#2B3-3	Longest single outage not due to maintenance	9	hours	≤8	10	1
	Interpretation:					
#2A--	Aggregate measures of meaningful use are good. Patients have adopted at above published MU2 levels. PASS					
#2B1/2B2	PASS with both improved over stage 1. Check your records to remove the remaining duplicate fields.					
#2B3 (sum)	FAIL (10/30): Your system is not as reliable as it should be. Check your error logs and re-evaluate ALL of #2B3 criteria in 3 months BEFORE going to Stage 3.					
	Do not proceed to Stage 3 until adequate reliability is ensured.					
END STAGE TWO (PARTIAL BUT UNACCEPTABLE FAILURE)						
STAGE TWO REMEDIATION OCTOBER 2014						
#2B3-1	Uptime Ratio	0.995	Ratio		9.9	1
#2B3-2	Shortest time between unscheduled outages	10	days		10	1
#2B3-3	Longest single outage not due to maintenance	0.5	hours	≤8	10	1
	Interpretation:					
	Remediation: PASS. Continue to Stage Three					
END STAGE TWO REMEDIATION (PASSED)						
BEGIN STAGE THREE* JANUARY (OR APRIL) 2015						
#3A1	Meaningful Patient EHR engagement	0.17	RATIO	1	17%	1
#3B1	Outages: No outages ≥4h, ALL CAUSE	0	Outages	0	10	1
CONGRATULATIONS! YOU HAVE PASSED EHR-RUBRIC-SP! NOW ON TO MU...4?						
END STAGE THREE						

Appendix 2: Social Network Analysis Workflow (BCPID calculation)

Scenario: The vendor introduces the EHRS to Doctors 2 and 4.

Furthermore, in the HR chart, the following linkages are noted, creating an edgelist:

Doctor1	Staff1
Doctor1	Staff2
Doctor2	Staff2
Doctor2	Staff3
Doctor2	Staff4
Doctor4	Resident3
Doctor4	Staff7
Doctor4	Staff1
Resident3	Staff7

Note that bolded individuals were the ones the IT vendor introduced the EHRS to.

We then load the edgelist data into Sci2 (File > Load)

Then, we analyze betweenness centrality (BC) of all individuals:
(Analysis > Networks > Unweighted & Undirected > Node Betweenness Centrality)

We then open the resulting file ('with --- added as betweenness centrality'):
(Right click object > View (choose NWB format in the next dialogue))

The following list of BC values is obtained:

(Node/Person)	BC
Staff1	36
Staff2	40
Staff3	0
Staff4	0
Staff5	0
Staff7	0
Doctor1	40
Doctor2	42
Doctor 4	28
Resident3	0

Using the BCPID formula from EHR-RUBRIC-SP

Sum of BC for points of introduction (Doctor 2 + Doctor 4)	70
Sum of the two highest BC values (Doctor 1 and Doctor 2, in this case)	82
Ratio (BCPID)	**0.85**

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