

Initiative to improve quality of paediatric ward-round documentation by application of 'SOAP' format

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ABSTRACT

Background Audits on record keeping practices at our multidisciplinary hospital revealed unstructured ward-round notes which were dissimilar from each other on aspects of patient information. Written as per the discretion of the rounding physician, the practice compromised team communication and medicolegal safety and risked patient harm. Paediatricians decided to address this concern for their department and proposed to improve the quality of documentation by structuring their notes using subjective, objective, assessment and planning (SOAP) format. On observing only 13% compliance with SOAP use despite education and training to use it, a series of interventions were explored to increase its application.

Methods Brainstorming sessions with the paediatricians provided practical solutions. These were tested one by one using plan–do–study–act cycles to understand their impact. Team feedback was pursued towards the end of each cycle to understand the opinion of each team member.

Interventions Interventions included verbal reminders, individual feedback and SOAP acronym display. Each of these were tested singularly and serially. Acronym display proved successful until the arrival of COVID-19, which disrupted its implementation and redirected paediatricians' work priorities. This led to exploration of a new solution, and paediatricians recommended use of visual reminders at the handover site. Quantitative information was analysed to reject or retain the ideas.

Results Verbal reminders and individual feedback made no difference to SOAP usage. Acronym display improved compliance from 13% to 90% but it fell to 45% during COVID-19. Its replacement with visual reminders during pandemic times reinstated the compliance to a median of 84%.

Conclusions Selection of a change idea that respected front liner's constraints and suited local work environment proved valuable. Both acronym display and visual reminders served as visual reinforcements towards embracing a note format and proved effective. Perceived benefits from methodically written notes encouraged paediatricians to re-establish simpler measures to retain SOAP application, otherwise disrupted during the COVID-19 pandemic.

INTRODUCTION

Problem

Audits on record-keeping practices at our multidisciplinary hospital revealed that ward-round notes (handwritten clinical notes by

the doctor during ward round) were unstructured and carried limited as well as dissimilar information chosen differently by different doctors. While there was satisfactory compliance with regularity, legibility, timing, drug prescriptions, investigation records and vital monitoring, there was marked inconsistency in the reporting of clinical information between doctors. This risked omission of vital facts such as developments during hospital stay, impression of progress, revision in clinical diagnosis, justification for change in medicines or advice for a new test. The paediatric team realized that this inconsistent and incomplete documentation lead to lack of clarity in communication between paediatricians which in turn could compromise patient safety and medico-legal integrity. To address these concerns the department decided to focus on improving their documentation (online supplemental figure 1, fishbone diagram).

Available knowledge

Well-written case notes provide accountability, corroborate the delivery of appropriate services, support clinical decisions,^{1,2} promote effective communication and prevent patient harm.³ Inadequate communication between different health professionals is associated with discontinuity of care, which can lead to errors and compromise patient safety.⁴ In present times, clinical notes also serve as a valuable document to audit the quality of healthcare services offered,⁵ determine issuance of insurance claims and, importantly, serve as a documentary evidence for medico-legal purpose.⁶

Despite its importance, clinical record keeping is often given a low priority, and it is common to find missing information and inconsistency between the entries.⁵ Often, there is great variability in the format of clinical notes among different healthcare professionals and hospitals in different countries.⁵ These may be influenced by the doctor's/healthcare professional's years of experience,



previous incidents (i.e. lessons that have been learnt) and relevant circumstances of the case (acute deterioration of the patient, etc).⁵ In densely populated nations such as ours, an additional role is played by limited consult times from enormous caseloads, resulting in priority towards clinical interaction over documentation.⁷

The onus for improving records lies with individual health professionals. Structuring the clinical records especially at the time of admission is known to improve the quality of information recorded.^{8–10} This reduces clinical errors and improves patient outcomes.⁸ In the same context, ward-round proforma or templates have been employed to standardise recording of patient progress. This has demonstrated an improvement in documentation practices,^{11–13} patient safety,^{4 12 14 15} efficiency in ward rounds¹⁶ as well as completeness of records.¹⁷ These proformas have been typically designed to capture comprehensive information pertaining to a particular specialty (eg, surgery or orthopaedics^{4 12 13 15–17}) or a disease (eg, deep venous thromboembolism).¹⁴

Another method commonly applied to improve documentation practices has been audit exercises to sensitise doctors regarding their performance. This includes educating them via trainings or reminder communications to perform against a benchmark. These audits engage either a concerned specialty centric template (eg, Shark, Crabel, Star, to name a few)^{18–20} or adhere to norms defined by quality accreditation programmes.^{21 22}

Both proforma as well as audit templates have focused on comprehensive aspects of record keeping such as investigations, drug prescription, information to patients, date and time of records, and regularity besides characteristics of the clinical information. There appears to be a paucity of literature demonstrating methods focused only on the nature of the clinical information relayed in the note.

BACKGROUND

Electronic medical records use standardised templates, which guide specific entries. As compilation of records on blank sheets permits individual preferences for compilation, it risks selective and deficient entries.

Ward-round notes in our hospital, like most healthcare facilities in India,⁶ are maintained on paper. Hospital case files are composed of several paper sheets which are assembled in a uniform order throughout the hospital. Some of these sheets carry preprinted templates and some are blank, but each sheet is assigned and labelled for a specific purpose. Our hospital is accredited under the National Accreditation Board for Hospital certification, and case records are regularly subject to detailed audits which assess adherence towards exhaustive record-keeping practices including date and time of the notes, regularity, legibility, patient medication details, investigation details, nursing records, pain score, etc. These audits, however, do not reflect evaluation of the content

within the notes, whose inconsistency and selective filling were our prime concern.

Rationale

Recognising our need to structure our notes, we explored the methodology used by Dolan *et al.*,⁴ i.e. structuring of the records incorporating the subjective, objective, assessment and planning (SOAP) template. The SOAP acronym is a derivative of problem-oriented medical record practice, which warrants that clinical records be structured around the patient's problems and updated in detail on a daily basis.²² SOAP prototype provides the cognitive framework for clinical reasoning while serving as a reminder for specific aspects of clinical information.³ A progress note under this format reflected essential parameters of ongoing patient progress and treatment information. We inferred from the available literature that structuring our notes will improve information recorded and thereby quality of documentation.

It was felt that SOAP format was suited to our system for two reasons. First, it served our requirement to balance out the neglected clinical parameters and save us from the implementation of exhaustive notes which could prove labour and time intensive for a busy system like ours. Second, its simple design circumvented the need for detailed department specific proforma, which would have required multiple approvals as well as institution-wide reforms around creation of distinct case files for different departments.

Aim

Our Specific, measurable, applicable, realistic and timely (SMART) aim was to improve the quality of documentation in ward-round notes, for paediatric inpatients aged between 1 month and 15 years, by application of the SOAP template to at least 80% of the eligible notes by 6 months. Eligible notes constituted two out of all the ward-round notes written during 24 hours of an inpatient stay.

METHODS

Context

Sitaram Bhartia Institute of Science and Research is a non-profit, 70-bed hospital providing care across multiple disciplines via its outpatient department (OPD), inpatient department services (IPD) and emergency services. The department of paediatrics caters to an average of 1800 outpatient and around 100 inpatient neonatal and paediatric admissions monthly. Of these inpatients, 70%–80% are healthy newborns admitted in the ward, while the remaining 20%–30% comprise sick children treated either in the ward, the paediatric intensive care unit or the neonatal intensive care unit (NICU). The team has full-time consultants who provide round-the-clock care, following a dedicated roster. Paediatricians undertake two ward rounds in the morning (along with a demanding OPD roster) and two in the night shift for admitted patients. In addition, they also attend emergency cases round the clock. All paediatricians meet together

once a day, during morning departmental huddle for the purpose of clinical handover and assigning of departmental responsibilities.

Record keeping for all hospital inpatients is maintained on paper in case files composed of case sheets, labelled for its specific purpose and organised serially in a folder. While sheets filled by doctors at the time of admission have preprinted formats specific to that specialty (online supplemental annexure 1), progress records are entered during ward rounds in blank sheets used throughout the hospital for all specialties (online supplemental annexure 2). We formed a team comprising two paediatricians, a quality executive, a quality consultant and one staff from the medical record department. The quality executive was responsible for the creation of the SOAP template in the patient file. The paediatrician, along with the quality executive, audited ward-round notes under all four headings and noted the compliance towards whether the content filled under these headings was appropriate or not. The medical record team ensured appropriate storage as well as access of patient records to the paediatricians. The quality consultant led brainstorming and feedback sessions with the entire team. Data analysis and implementation of change ideas were undertaken collectively by the quality team and clinicians.

We focused on documentation in paediatric cases that ranged from 1 month to 15 years of age, as they represented the sicker subset of admissions. We assumed that these patients were at most risk from substandard record keeping and hence deserved priority intervention.

Interventions

In May 2019, we met all paediatricians and highlighted the concerns arising from unstructured ward-round notes, particularly the aspect of selective and variable patient information by different doctors compromising team communication and medicolegal integrity. We introduced the concept of structuring these notes using the SOAP format and shared information material on its methodology. The concept was appreciated by all, and many expressed familiarity with it from their training years. Following their agreement to use the format, training sessions were conducted to educate all consultants to implement it during rounds. All consultants were covered using serial training sessions by the end of the month. In the months of May 2019–July 2019, we evaluated our paediatric case files to learn our compliances with SOAP format (this constituted as our baseline). For this, we identified a senior consultant who audited all paediatric case records daily and ascertained whether information relayed in the ward-round notes matched the SOAP format and was relevant to each component of the acronym. However, we observed only a marginal compliance of 13% with SOAP use for these months.

Following this, we organised a brainstorming session where we sought their ideas on how to imbibe the practice in routine functioning. Our front liners put forth

several reminder-based solutions which were tested using month-long plan–do–study–act (PDSA) cycles.

Intervention 1: verbal reminders to use SOAP format (August 2019) PDSA 1

This change idea was tested with a PDSA cycle conducted throughout the month of August 2019. We selected 2 days of the week and on those days participated in departmental huddles to remind paediatricians to use SOAP format during their ward rounds. We maintained a calendar of these reminder meets, and our senior consultant audited all case files daily to identify the presence of SOAP format and also corroborate content under each of its components. We continued to observe only 13% use of SOAP format, reflecting no change from our baseline status. It was seen that while paediatricians increasingly wrote as per SOAP template, out of the four headings, they often missed one or the other. Paediatricians insisted that they require specific heading-based reminders.

Intervention 2: specific ‘SOAP component’-based individual verbal feedback (September 2019) PDSA2

The modified intervention to be tested through the PDSA cycle was to meet paediatricians ‘individually’ once a fortnight and share their compliance to SOAP and specifically offer feedback towards any individual component being missed. This was done verbally, and we maintained a log of these reminder meetings for each doctor. This PDSA cycle was run in September 2019. We observed a marginal rise of 19% in adherence with SOAP format. Some doctors also expressed that they felt criticised regarding their documentation therefore we discontinued this intervention.

Intervention 3: visual reminder by SOAP acronym depiction on case sheets (October 2019) PDSA 3

This idea was tested via a PDSA cycle conducted in October 2019. We ‘wrote’ the SOAP acronym in a vertical format in the eligible case files, on the left side (online supplemental annexure 3) in all progress sheets. We ensured this entry was included in all paediatric files within 24 hours of the admission itself. We maintained a record of eligible case files as well as those that underwent this intervention. We observed an increase in note compilations under SOAP format to 52%. Paediatricians expressed that the presence of the acronym adjacent to the area of note writing served as a strong reminder even during a busy shift.

We discovered that during phases of increased case-loads, creating visual reminders was proving tedious. We deliberated upon shifting to “preprinted” sheets displaying SOAP templates for ease of implementation in February 2020 and to subsequently expand this scope to NICU admissions. By this time, we also considered reducing audit frequency in paediatric admissions to half.

However, we faced unforeseen disruptions with the arrival of the COVID-19 pandemic.

Transient COVID-19 impact

Declaration of a national lockdown in March 2020 disrupted printing services and suspended our plan to consider transition to preprinted sheets from existing written SOAP reminders. Gradually, the hospital realigned its priorities towards COVID-19 preparedness. The team experienced anticipatory drills, training schedules and modified care delivery processes which resulted in additional responsibilities on team members and this reset their focus. They also experienced anxieties from economic slowdown, collapsed support systems and infection among colleagues, all of which affected their morale as well as working capacity.

As we faced the brunt of these factors from May to July, despite lesser admissions (also an impact of COVID-19 environments), our ability to sustain reminders as well as maintain compliance with SOAP format plummeted from 92% in April 2020 to 46% in May 2020. In July 2020, the team met again to address the concerns, and early adopters in the team recommended a new idea of displaying the SOAP compliance to reset the practice. This led us to adopt a different approach in modified environments.

Intervention 4: visual prompter on team compliance with SOAP usage *PDSA 4*

We discontinued writing the SOAP acronym in files and ran a fresh PDSA in August 2020 to test a new intervention. We displayed our initiative's performance (as a measure of percentage notes written under SOAP format) on the department information board placed at the huddle station using a chart display (online supplemental annexure 4). A coloured printout of our chart displaying the latest data was pinned on the information board every Wednesday. We also maintained a log of these updates. Paediatricians reported that well-articulated notes relayed information efficiently among doctors and nurses. In COVID-19 times when patient interaction time was stressed and group exchanges were suspended, comprehensive notes relayed enhanced communication and improved work efficiency. On noting an improvement of 72% towards use of the SOAP template, we retained this change idea.

Study of the interventions

Every intervention was tested individually, and outcomes were analysed over the corresponding time frame using quantitative data to help ascertain their impact. We noted dismal compliance with SOAP notes with the first two interventions, while the last two demonstrated a significant rise in SOAP application.

We observed no improvement on testing our first intervention (verbal team reminders) even though it was easy and simple to execute. While the team agreed to use the

SOAP format after this intervention, they were often using it partially. Paediatricians then recommended that we provide specific component-based reminders, which led to our second intervention. This intervention led to a marginal improvement with some paediatricians finding this a criticism of their documentation efforts. We therefore discarded the first two interventions. Our third intervention (visual reminder in case sheets) led to a steeper rise in compliance from 19% to 52% in the month of October 2019. This improved further to 60% in November 2019. This change was appreciated by the team as it was a strong cue to use the format especially during busy shifts. Our maximum compliance reached 92% against a low case load and stayed close to 90% even during heavy caseloads.

Both our outcome and process measures plunged with the arrival of COVID-19. Further, ability to enter the acronym also suffered and implementation processes declined from 67% to 33%, resulting from reduced manpower and COVID-19 driven anxieties. This warranted a switch to our fourth intervention in August 2020, which demonstrated a rise in SOAP use from 72% to 91% in December 2020.

Measures

We calculated the notes expected to be filled under SOAP format during the 24 hours of a patient's stay and identified them as eligible notes. One note, each from the day and the night shift, that is, two out of four notes constituted eligible notes.

We studied ward-round notes wherein 'all' four headings of the SOAP template were used. Our consultant also studied whether information conveyed against each heading was appropriate and relevant to it. Our outcome measure was the percentage of notes written in SOAP format. Our primary process measure was compliance with the acronym on ward-round case sheets. We also monitored our compliance to our subsequent change idea in which we used visual prompters on the department information board. Our balancing measures were paediatrician and patient feedback during the implementation of the SOAP acronym.

Analysis

The outcome of the project was analysed using standard run charts which identified statistical significance in the outcome measure assessed on a regular basis. Based on run-chart rules proposed by Anhøj and Olesen, we saw a shift in the run on one side of the median, so we revised and calculated a new median.²³ Also, towards the end of every cycle we collected team feedback using group discussions, focusing on the 'specific' intervention to learn team experiences and sentiments.

RESULTS

During the course of our project, we tested various interventions through PDSA cycles and aimed at standardising the paediatric ward-round notes by using application

of SOAP format in at least 80% of patients' case files. Following the implementation of our last change idea in August 2020, we have achieved our goal with a median compliance of 84% (online supplemental figure 2). Compliance to the first process measure (depiction of SOAP acronym) in the case sheet fell from 67% to 33% (online supplemental file 3), resulting from reduced manpower and COVID-19 driven anxieties. Compliance to the second process measure (visual prompter) increased the compliance with SOAP formatted notes from 72% to 91% in December 2020.

Our balancing measures also showed no negative impact of the improvement initiative on other aspects of paediatric care. Both paediatricians and patients did not report any reduction in bedside care or patient interaction.

DISCUSSION

Summary

A pertinent and a succinct ward-round note is a critical link to safe care delivery. Our ward-round notes were mostly unstructured and unmethodical, compromising interprofessional communication, patient and medico-legal safety.

We selected the SOAP format noting its attribute to capture specific information while offering flexibility to the doctor relying on a simple format. Team exchanges were instrumental in learning methods to apply the concept. Use of visual reminders in the form of acronyms emerged successful in embedding the change. Special cause variation from unexpected pandemic environments had a dense impact, warranting shift in the change idea, right in the middle of the journey. Regular physician engagements and reciprocity towards their sentiments aided continued team participation especially during unforeseen disruptions.

Interpretations

Out of the four interventions tested, visual reinforcements, i.e. SOAP acronym on the case sheet and visual reminder during huddles, had stronger and sustained impact. Visual reminders proved effective even during higher caseloads. This corroborates with previously tested interventions such as pre-filled templates, which demonstrate sustained impact.^{4 12–17}

Themes from team feedback revealed that structured notes translated into meaningful clinical practice. Improved reflection of plan in the notes facilitated efficient discharge preparations besides enhanced communication opportunities with the family. Systematic representation of patient assessment also facilitated early detection in clinical deterioration and timely escalation of treatment. Meaningful practice perceived with structured notes proved to be a valuable factor in maintaining gains for 5 months in the pre-COVID phase. Subsequently, a minor modification of using reminders in department information board resulted in a prompt revival after the

initial COVID-19 phase. This confirmed our belief that the clinicians valued the change.

However, despite the internal motivation, 100% application was difficult to achieve, likely due to prevailing time constraints of care aspects in a country with high caseloads.

Lessons and limitations

We learnt that front-line participation depended not just on the strength of the idea but also on team engagement during the execution phase. Selection of an idea suited to local environments is important. Selection of a methodology that circumvented the need for proforma approvals for a singular department and supported easy replication across other departments was pertinent for our set-up. Further, mindful of our manual record-keeping practices on paper, we found that selection of a template which was succinct and not labour intensive and which respected time constraints proved useful. We also observed that working with a team of full-time employed consultants with aligned departmental goals contributed to their increased participation on a regular basis even during the pandemic.

Our limitation remained that while we achieved uniformity in record keeping by filling under four headings, we could not confirm whether this information was complete, corroborating to the exact clinical situation and of most relevance. We assumed that the content which doctors were mentioning under these headings was thorough and accurate. Furthermore, sustainability of our modified intervention during higher paediatric inpatients is still to be observed.

Way forward

Going forward, we will be continuing with acronym display in case sheets and with the weekly visual reminders during huddles when the COVID-19 phase comes to an end. We also intend to expand the scope of the format application to neonatal admissions. Seeing our success, two other departments, that is, medicine and obstetrics and gynaecology units, have taken up this improvement project.

CONCLUSIONS

Despite its importance and relevance, worldwide conformance with methodically written ward-round note is dismal. Medical teams need to identify their solutions, suited to local work environment. We observed that selection of a simple idea, which acknowledged the concerns of our paediatricians working with constrained consult times, led to its acceptance. Further, proactive engagements and reciprocity with paediatricians during all stages of implementation encouraged sustained partnership. We learnt that while encouraging a specific note format, visual reinforcements whether in the form of acronym display or visual reminder at team handover site, brought the maximum impact. Benefits like improved communication and planning helped drive its use and retention



even during the pandemic. This opened up the possibility of using simple, cost-effective solutions for complex and resource-strained workplaces. In the end, regional factors such as doctor:patient ratio and work dynamics influenced the scope of improvement and limited 100% effectiveness.

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REFERENCES

- Mann R, Williams J. Standards in medical record keeping. *Clin Med* 2003;3:329–32.
- Mitchell WR. *Documentation in counseling records*. AACD legal series. . ERIC, 1991: 2. 1–78.
- Cameron S, Turtle-Song I. Learning to write case notes using the soap format. *J Couns Dev* 2002;80:286–92.
- Dolan R, Broadbent P. A quality improvement project using a problem based post take ward round proforma based on the soap acronym to improve documentation in acute surgical receiving. *Ann Med Surg* 2016;5:45–8.
- Mathioudakis A, Rousalova I, Gagnat AA, et al. How to keep good clinical records. *Breathe* 2016;12:369–73.
- Thomas J. Medical records and issues in negligence. *Indian J Urol* 2009;25:384–8.
- Irving G, Neves AL, Dambha-Miller H, et al. International variations in primary care physician consultation time: a systematic review of 67 countries. *BMJ Open* 2017;7:e017902.
- Mann R, Williams J. Standards in medical record keeping. *Clin Med* 2003;3:329–32.
- Goodyear HM, Lloyd BW. Can admission notes be improved by using preprinted assessment sheets? *Qual Health Care* 1995;4:190–3.
- Belmin J, de la Fournière F, Bellot P, et al. [Quality of the information collected during admission to a hospital geriatric service: importance of a structured medical record]. *Presse Med* 1998;27:1519–22.
- Duxbury O, Hili S, Afolayan J. Using a proforma to improve standards of documentation of an orthopaedic post-take ward round. *BMJ Qual Improv Rep* 2013;2:u200902.w699.
- Thompson AG, Jacob K, Fulton J, et al. Do post-take ward round proformas improve communication and influence quality of patient care? *Postgrad Med J* 2004;80:675–6.
- Al-Mahrouqi H, Oumer R, Tapper R, et al. Post-acute surgical ward round proforma improves documentation. *BMJ Qual Improv Rep* 2013;2:u201042.w688.
- Gilliland N, Catherwood N, Chen S, et al. Ward round template: enhancing patient safety on ward rounds. *BMJ Open Qual* 2018;7:e000170.
- Alazzawi S, Silk Z, Saha UU, et al. A ward round proforma improves documentation and communication. *Br J Hosp Med* 2016;77:712–6.
- Fernandes D, Eneje P. Electronic Printed Ward Round Proformas: Freeing Up Doctors' Time. *BMJ Qual Improv Rep* 2017;6:u212969.w5171.
- Wright DN. Does a post-take ward round proforma have a positive effect on completeness of documentation and efficiency of information management? *Health Informatics J* 2009;15:86–94.
- Ho MY, Anderson AR, Nijjar A, et al. Use of the CRABEL score for improving surgical case-note quality. *Ann R Coll Surg Engl* 2005;87:454–7.
- Tuffaha H, Amer T, Jayia P, et al. The STAR score: a method for auditing clinical records. *Ann R Coll Surg Engl* 2012;94:235–9.
- Grewal P. Surgical hospital audit of record keeping (SHARK)--a new audit tool for the improvement in surgical record keeping. *J Surg Educ* 2013;70:373–6.
- Azzolini E, Furia G, Cambieri A, et al. Quality improvement of medical records through internal auditing: a comparative analysis. *J Prev Med Hyg* 2019;60:E250–5.
- Esposito S, Pelullo CP, Agazzino E. Attena f. a paired-comparison intervention to improve quality of medical records. *J Hosp Adm* 2013;2:91.
- Anhøj J, Olesen AV. Run charts revisited: a simulation study of run chart rules for detection of non-random variation in health care processes. *PLoS One* 2014;9:e113825.